

Effects of Cruise Ships on Visitor Experiences in Glacier Bay National Park and Preserve

Volume 1

Jane E. Swanson
Mark E. Vande Kamp

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Protected Area Social Research Unit
College of Forest Resources
Box 352100
University of Washington
Seattle, WA 98195-2100

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The two volumes included in this document report the final results of the various studies that make up the visitor use research regarding the effects of cruise ships in Glacier Bay National Park and Preserve. It is anticipated that few people will want or need to read these volumes cover-to-cover; instead, the report will be used primarily as a reference document. To best serve that type of use, some redundancy in the reporting of study results is unavoidable.

- **All users of this document should begin by reading the *Executive Summary*.** The first section, *Project Justification*, briefly describes the background and methods of the project. The second section, *Project Conclusions and Implications*, includes a very general description of the conclusions and implications supported by the results of the various studies included in the project.

Readers who wish to move beyond this most general overview level can target their reading by making use of the Volume Guide (presented below). The Volume Guide summarizes the project components included in each volume and provides a basis for the “You are here” Guide that helps readers stay oriented in the context of the whole report.

- **Readers who are not already familiar with the research looking at effects of cruise ships on visitors should read the *Introduction* section of the *General Project Overview*.** The *Introduction* section describes the history of the project, study objectives, an overview of the research process and study methods, and timelines describing the course of the project.
- **Readers interested in an overview of the project results slightly more detailed than that included in the *Executive Summary* should read the *Summary and Implications* section of each study.**
- **Readers seeking still more detail or who are interested in only specific populations should refer to the detailed reports of each study component.**
- **All readers are also encouraged to review** the table of contents.

VOLUME GUIDE

Volume 1

Executive Summary

General Introduction

A Survey of Cruise Ship Passengers

A Survey of Day-Boat Visitors

A Survey of Tour-Boat Visitors

A Survey of Backcountry Visitors

Volume 2

A Survey of Private Vessel Visitors

A Survey of Charter-Boat Visitors

Qualitative Interviews with Park Visitors: Summer 2008

Qualitative Interviews with Experience Gatekeepers

Appendices (includes questionnaires and general comments)

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Table of Contents

EXECUTIVE SUMMARY	III
PROJECT JUSTIFICATION	III
<i>Method</i>	iii
PROJECT CONCLUSIONS AND IMPLICATIONS	IV
<i>Objective 1 – Cruise ships affect visitors’ experiences in all user groups</i>	iv
<i>Objective 2 – Few changes in visitor experiences are predicted if managers allow 2 cruise ships to enter Glacier Bay every day</i>	ix
<i>Objective 3 – Effects of cruise ships on visitor experiences were equal to or greater than effects of other forms of transport</i>	xii
<i>Implications</i>	xiii
INTRODUCTION	1
BACKGROUND	1
ADMINISTRATIVE HISTORY	1
RESEARCH HISTORY	2
SUMMARY OF PROBLEM ANALYSIS	2
<i>Step 1: Fundamental issues to be addressed</i>	3
<i>Step 2: Site visit to GLBA</i>	6
<i>Step 3: Proposed research options</i>	7
OFFICE OF MANAGEMENT AND BUDGETING REQUIREMENTS	7
RESEARCH OBJECTIVES AND SELECTED RESEARCH PROGRAM.....	8
YEAR 1 RESEARCH – SUMMER 2007.....	9
YEAR 2 RESEARCH – SUMMER 2008.....	9
MEASURING CRUISE SHIP EFFECTS	9
<i>General-level effects</i>	10
<i>Specific-level effects</i>	10
MEASURING EXPOSURE TO CRUISE SHIPS	12
MEASURING EFFECTS OF OTHER MECHANIZED CRAFT	12
QUALITATIVE INTERVIEWS	13
<i>Interviews with Experience Gatekeepers</i>	13
<i>Interviews with park visitors</i>	13
SUMMARY.....	14
METHOD.....	14
DELAY IN OMB APPROVAL	14
METHOD: QUANTITATIVE MAIL SURVEY	15
GENERAL SAMPLING STRATEGY	15
SURVEY INSTRUMENTS	17
METHOD: QUALITATIVE INTERVIEWS OF PARK VISITORS.....	19
RESPONDENT UNIVERSE	19
INTERVIEW PROCEDURES	19
INTERVIEW CONTENT	19
EXPECTED RESPONSE RATE	19
METHOD: QUALITATIVE INTERVIEWS OF EXPERIENCE GATEKEEPERS	19
METHOD: VESSEL COUNT DATA COLLECTION.....	20

General Introduction

PROJECT LIMITATIONS AND TARGETED INFORMATION.....	20
LIMITATIONS.....	20
TYPES OF INFORMATION THE SURVEY PROVIDES	20
BASELINE INFORMATION ABOUT CURRENT VISITORS AND CURRENT CONDITIONS	20
INFORMATION ABOUT WHETHER THE NUMBER OF CRUISE SHIPS ENTERING GLACIER BAY AFFECTED VISITORS’ EXPERIENCES	21
<i>Single-day visitors</i>	21
<i>Overnight visitors</i>	22
ESTIMATES OF EFFECTS OF CRUISE SHIPS UNDER POTENTIAL FUTURE CONDITIONS	23
<i>Single-day visitors</i>	23
<i>Overnight visitors</i>	24
INFORMATION ON THE ROLE OF OTHER MECHANIZED TRANSPORT ON VISITORS EXPERIENCES	24
REFERENCES	25

REPORT 1: A SURVEY OF CRUISE SHIP PASSENGERS

REPORT 2: A SURVEY OF DAY-BOAT VISITORS

REPORT 3: A SURVEY OF TOUR-BOAT VISITORS

REPORT 4: A SURVEY OF BACKCOUNTRY VISITORS

REPORT 5: A SURVEY OF PRIVATE VESSEL VISITORS

REPORT 6: A SURVEY OF CHARTER VISITORS

REPORT 7: A QUALITATIVE STUDY OF PARK VISITORS

REPORT 8: A QUALITATIVE STUDY OF EXPERIENCE GATEKEEPERS

APPENDIX A: 2007 Logistical scoping report by Mark Vande Kamp

APPENDIX B: 2007 Qualitative interviews exploring visitor experiences in Glacier Bay National Park and Preserve by Douglas Deur, Scott Smiley, and Mark Vande Kamp

APPENDIX C: On-site questionnaire—Cruise ship passengers

APPENDIX D: On-site questionnaire—Motorized VIS contact location

APPENDIX E: On-site questionnaire—Charter and tour boat passengers

APPENDIX F: On-site questionnaire—Backcountry (non-motorized) visitors

APPENDIX G: Mail questionnaire—Cruise ship passengers

APPENDIX H: Mail questionnaire—Motorized visitors

APPENDIX I: Mail questionnaire—Backcountry (non-motorized) visitors

APPENDIX J: Interview Guide for 2008 Visitor Interviews

APPENDIX K: Interview Guide for 2008 Experience Gatekeeper Interviews

APPENDIX L: General comments of park visitors from mail surveys

Executive Summary

Project Justification

In 1985, a vessel permit system was established in Glacier Bay National Park and Preserve (GLBA) based on the increased awareness that marine vessels could affect the park's natural resources. Currently, *The Final Environmental Impact Statement for Vessel Quotas and Operating Requirements in Glacier Bay National Park and Preserve* and the resulting Record of Decision signed November 21, 2003 guide vessel management in GLBA. The Record of Decision adopted an alternative that maintains a daily maximum of two cruise ships in the park and sets seasonal use days for the June - August season at 139 ships. The Record of Decision also allowed park managers to specify use levels between 139 and 184 seasonal use days. However, increases in seasonal use days were to be "based on the results of and guidance provided through studies that examine the effects of vessels on all park resources and visitor experience" (p.18).

The Record of Decision specified that studies examining the effects of cruise ships would be identified with the assistance of a Science Advisory Board (SAB). A final report of the SAB findings and recommendations was published in September 2005 (Glacier Bay National Park Science Advisory Board: Final Report, 2005). The SAB report included findings and recommendations regarding the effects of cruise ships on visitor experiences. Researchers and park managers conducted a problem analysis to translate the SAB report into a research program that addressed the following objectives:

1. How do cruise ships affect, if at all, visitors' experiences in Glacier Bay proper?
 - a. Which dimensions of visitor experiences in Glacier Bay proper, if any, do cruise ships affect?
 - b. If cruise ships affect visitor experiences in Glacier Bay proper, which features of cruise ships have effects?
2. What are estimated effects for park visitors under the Record of Decision maximum use level of 2 cruise ships in the bay, every day?
3. How do effects on visitor experiences in Glacier Bay proper compare for cruise ships and other forms of mechanized transport?

Method

Between June 27, 2008 and August 31, 2008, visitors in the six user groups were contacted in either Juneau or Bartlett Cove and asked to participate in a mail survey. Those agreeing were sent a questionnaire within one week of the initial contact. Follow-up mailings resulted in response rates ranging from 69.3% to 85.1% across the six user groups. Samples (n ranged from 87 to 450) were examined for non-response bias and representativeness, and if needed, were statistically weighted to represent the target populations.

Information collected during the initial contact described the participant and his/her travelling party, and was used in non-response analyses. The mail questionnaires asked about 1) trip characteristics including length of stay, activities, weather, and importance of different trip experiences; 2) general demographic information including age, gender, education, and ethnicity;

General Introduction

3) exposure to different types of mechanized transport; and 4) effects of exposure to different types of mechanized transport.

In addition, two qualitative studies were conducted in summer of 2008 to complement the findings of the mail survey: 1) Qualitative interviews with park visitors were conducted to provide more context and elaboration of the mail survey findings, and 2) Qualitative interviews with individuals who played a role in directing visitors' experiences such as VIS staff or guides (i.e., experience gatekeepers) assessed the prevalence and nature of efforts to reduce visitors' exposure to other motorized vessels.

Project Conclusions and Implications

For each project objective, conclusions based on the study findings are presented in bold headings below, followed by a brief description of the associated findings. Implications of these conclusions relevant to GLBA managers are presented at the end of each objective.

Objective 1 and 2 both concern the effects of cruise ships on visitor experiences; addressing, respectively, the absolute level of such effects, and the possible change in those effects arising from an increase to the maximum use level of 2 cruise ships in the bay, every day. This research program was motivated largely by the second objective. However, it is the first systematic attempt to assess the impacts of cruise ships on all GLBA visitor experiences. Before this research, managers have not had an empirical basis for deciding whether current effects of cruise ships are acceptable. Thus, the findings related to both Objective 1 and 2 have implications for management decisions.

Objective 1 – Cruise ships affect visitors' experiences in all user groups

Cruise ship passengers were the user group least affected by encountering another cruise ship.

Among all user groups, some members reported that cruise ships affected their experiences (see Table E-1). Cruise ship passengers were least affected, with 38% encountering cruise ships and 5% reporting that the ships detracted from their experiences. These low rates arose partly because cruise ship passengers were the only group that could encounter a cruise ship only on 2-ship days. However, cruise ship passengers also had the lowest detraction rate – of those who saw other cruise ships, 14% reported that they detracted from enjoyment of GLBA.

Table E-1. Summary of encounters with cruise ships in Glacier Bay and their detraction effects by park user group

Variable	Backcountry visitors	Charter boat visitors	Cruise ship passengers	Day boat visitors	Private vessel visitors	Tour boat visitors
Number of respondents	158	87	406	450	197	314
Response rate	69.3%	79.9%	85.1%	83.3%	69.9%	84.9%
% of respondents for each user group						
Saw or heard cruise ships	84.1%	91.0%	37.8%	88.8%	96.5%	76.4%
Cruise ships detracted from enjoyment of Glacier Bay	66.5%	45.0%	5.4%	47.6%	39.2%	37.3%
Detraction rate						
% of those who saw or heard cruise ships who reported detraction	79.1%	49.5%	14.3%	53.6%	40.6%	48.8%

Backcountry visitors were the user group most affected by encountering cruise ships.

Backcountry users were most affected with 67% reporting that cruise ships detracted from their experiences. Most backcountry users encountered cruise ships (84%), and they were the user group with the highest detraction rate – of those who saw cruise ships, 79% reported that they detracted from enjoyment of GLBA.

The effects of cruise ships on the other four user groups were roughly similar: 1) between 76% and 97% of each group encountered ships, 2) between 37% and 48% reported that the ships detracted from their experiences, and 3) detraction rates for those who saw ships fell between 41% and 50%.

There was no consistent evidence across user groups that encounters with cruise ships at Margerie/Grand Pacific Glaciers were particularly likely to detract from visitors' enjoyment.

To assess whether cruise ship encounters at the glaciers were more likely to detract than encounters throughout the park, the rates of detraction from enjoyment of the glaciers (see Table E-1) were compared to the rates of detraction from enjoyment of Glacier Bay (see Table E-2). This comparison revealed that cruise ship passengers and backcountry users were less likely to report detraction when encountering cruise ships at the glaciers. (Perhaps most visitors in those user groups were reconciled with sharing Tarr Inlet with cruise ships.) In contrast, other user groups were more likely to report detraction when encountering ships at the glaciers. The largest difference was observed for charter boat visitors – 49% of those who encountered cruise ships reported that they detracted from their enjoyment of Glacier Bay, and 78% of those who encountered ships at Margerie/Grand Pacific Glaciers reported that they detracted from their enjoyment of the glaciers.

Table E-2. Summary of encounters with cruise ships Margerie and Grand Pacific glaciers and their detraction effects by park user group

Variable	Backcountry visitors	Charter boat visitors	Cruise ship passengers	Day boat visitors	Private vessel visitors	Tour boat visitors
Number of respondents	158	87	406	450	197	314
Response rate	69.3%	79.9%	85.1%	83.3%	69.9%	84.9%
% of respondents for each user group						
Visited Margerie/Grand Pacific Glaciers	13.8%	56.0%	66.7%	77.3%	65.2%	56.9%
Saw or heard cruise ships at Glaciers	10.1%	36.8%	23.5%	40.7%	46.2%	25.0%
Cruise ships detracted from enjoyment of Glaciers	6.3%	28.7%	1.2%	25.1%	19.3%	14.3%
Detraction rate						
% of those who saw or heard cruise ships at Glaciers who reported detraction	62.5%	78.0%	5.1%	61.7%	41.8%	57.3%

For all user groups, cruise ships were most likely to detract from four of the eight specific experience dimensions: solitude, pristine environment, tranquility, and experience scenic beauty.

The mail questionnaires asked visitors to rate whether cruise ships detracted from eight specific aspects of visitor experiences. Across all the user groups, the pattern of detraction results was very

General Introduction

consistent. Cruise ships were most likely to detract from solitude, pristine environment, tranquility, and scenic beauty. Of these trip experience dimensions, solitude was the dimension most frequently affected.

For most of the specific aspects of visitor experiences, the percentage of visitors reporting detraction due to cruise ships was higher than the percentage reporting detraction from enjoyment of Glacier Bay (compare Table E-3 and Table E-1). For example, among cruise ship passengers, 23% reported that other cruise ships detracted from solitude while 5% reported detraction from enjoyment of Glacier Bay. In the other user groups, more than half of visitors reported detraction from solitude, with the highest percentage (84%) among backcountry visitors.

Table E-3. Summary of detraction effects of cruise ships on trip experience dimensions by park user group

Variable	Backcountry visitors	Charter boat visitors	Cruise ship passengers	Day boat visitors	Private vessel visitors	Tour boat visitors
Number of respondents	158	87	406	450	197	314
Response rate	69.3%	79.9%	85.1%	83.3%	69.9%	84.9%
% of respondents who reported detraction from experience dimension ¹						
Solitude	83.6%	60.7%	23.2%	56.4%	51.1%	57.0%
Pristine environment	78.3%	60.5%	20.6%	57.2%	47.6%	52.0%
Tranquility	79.9%	54.0%	13.4%	49.8%	46.8%	44.7%
Experience the scenic beauty	68.4%	45.1%	12.2%	43.6%	36.3%	45.5%
Hear the sounds of nature	66.7%	36.9%	10.0%	33.7%	35.0%	30.4%
Experiencing the wonder of nature	48.1%	42.6%	10.1%	39.5%	30.2%	39.1%
Intimate experience with nature	51.5%	45.1%	9.4%	38.8%	31.0%	34.9%
View wildlife	32.4%	27.0%	7.3%	25.0%	18.3%	21.9%

¹ Respondents rated the effect of cruise ships on specific experiences using the scale: 1 = Detracted greatly, 2 = Detracted somewhat, 3 = No effect, 4 = Added somewhat, 5 = Added greatly. Experience dimensions with average ratings less than 3 (No effect) were counted as reported detraction.

Qualitative interviews suggested additional effects of cruise ships: a feeling of surreal incongruity when seeing a cruise ships in Glacier Bay, direct navigational hazards, and wake hazards.

The results in Table E-3 were consistent with the findings of the 2008 qualitative study of Glacier Bay visitors. Interviewed visitors commonly reported disruption of the “wilderness experience” due to cruise ships. Although the mail survey items were developed in conjunction with qualitative interviews conducted in 2007, an additional effect of cruise ships was commonly reported by visitors in the 2008 qualitative interviews: a feeling of surreal incongruity when they encounter a cruise ship in Glacier Bay. Some participants in the qualitative interviews also reported that cruise ships posed direct navigational hazards and that their wakes were hazardous, issues that were not specifically addressed by the mail survey.

Although general measures of trip satisfaction indicated high levels of trip satisfaction for most visitors in all user groups, these findings do not negate the more specific findings regarding effects of cruise ships.

In all user groups, 90% or more of visitors were “Somewhat likely” or “Very likely” to recommend that a friend or family member visit Glacier Bay, and 89% or more of visitors reported that their time spent in Glacier Bay was “Very good” or “Extremely good” (see Table E-4). Although these numbers clearly indicate high levels of trip satisfaction, prior research with recreational visitors has found that such general satisfaction measures are relatively insensitive to visitors’ trip experiences and should not be taken as strong evidence that particular experiences such as encounters with cruise ships had little or no effect on visitors. Therefore, although they appear to be contradictory, the results from neither the general nor the more specific measures should be ignored. The specific measures indicated that there were effects of cruise ships on specific visitor experiences. The general measure findings suggest that these effects were not sufficient to affect overall perceptions of trip experience.

Table E-4. Summary of general measures of trip satisfaction by park user group

Variable	Backcountry visitors	Charter boat visitors	Cruise ship passengers	Day boat visitors	Private vessel visitors	Tour boat visitors
Number of respondents	158	87	406	450	197	314
Response rate	69.3%	79.9%	85.1%	83.3%	69.9%	84.9%
% of respondents for each user group						
Time spent in Glacier Bay was “Very good” or “Extremely good” ¹	90.2%	97.2%	90.6%	91.0%	89.2%	94.1%
“Somewhat likely” or “Very likely” to recommend that a friend or family member visit ²	90.7%	97.1%	97.7%	92.1%	92.3%	97.5%
Experience with cruise ships made me “A lot less” or “Somewhat less” likely to recommend ³	31.1%	19.7%	7.0%	28.1%	13.9%	32.8%
Experience with cruise ships made me “A lot more” or “Somewhat more” likely to recommend	6.3%	2.4%	16.2%	11.0%	8.0%	10.6%

¹ Respondents rated their time in Glacier Bay using the scale: 1 = Extremely poor, 2 = Very poor, 3 = Poor, 4 = Good, 5 = Very good, 6 = Extremely good.

² Response options for likelihood of recommending visit: 1 = Very unlikely, 2 = Somewhat unlikely, 3 = No opinion, 4 = Somewhat likely, 5 = Very likely.

³ Response options for effect of experience with cruise ships on likelihood of recommending were 1 = A lot less, 2 = Somewhat less, 3 = No effect, 4 = Somewhat more, and 5 = A lot more

Haze from large cruise ship exhaust, sound from public address systems, and engine sounds were most likely to detract from the trips of backcountry users and least likely to affect cruise ship passengers.

The mail survey included items asking visitors about the encounters with and possible effects of: 1) haze from cruise ship exhaust, 2) sound from cruise ship public address systems, and 3) sound from cruise ship engines. Across the user groups, the pattern of results from these specific measures (see Table E-5) was similar to the pattern for general encounters and detraction – cruise ship passengers

General Introduction

were least affected, backcountry visitors were most affected, and the results for the other four user groups were roughly similar.

Table E-5. Summary of effects of specific aspects of cruise ships by park user group

Variable	Backcountry visitors	Charter boat visitors	Cruise ship passengers	Day boat visitors	Private vessel visitors	Tour boat visitors
Number of respondents	158	87	406	450	197	314
Response rate	69.3%	79.9%	85.1%	83.3%	69.9%	84.9%
<i>Haze from large cruise ship exhaust</i> % of all respondents in user group						
% Saw	22.8%	7.9%	0.8%	6.9%	13.5%	5.3%
% Detracted greatly or somewhat	20.9%	4.8%	0.2%	5.1%	10.4%	4.6%
<i>Sound from large cruise ship public address systems</i>						
% Heard	42.4%	14.5%	1.6%	6.7%	15.5%	4.8%
% Detracted greatly or somewhat	38.6%	11.6%	0.0%	5.1%	8.5%	4.6%
<i>Sound from large cruise ship engines</i>						
% Heard	54.7%	31.1%	1.7%	20.6%	31.0%	10.1%
% Detracted greatly or somewhat	45.9%	22.4%	0.6%	15.7%	15.0%	7.0%

Rather than haze, public address systems, or engine noise, findings suggested that the vast size and incongruity of cruise ships were the aspects most responsible for detracting.

For the items measuring encounters with and possible effects of three specific aspects of encounters with cruise ships, the results suggest that they were not the aspects most responsible for detracting. For each user group, fewer visitors reported detracting due to each specific aspect (see Table E-5) than reported detracting due to encounters in general (see Table E-1). In addition, logistic regression analyses designed to predict the likelihood of detracting based on these specific aspects of cruise ship encounters showed little to no predictive power. The qualitative interviews with Glacier Bay visitors suggest that the most detracting feature of cruise ships was their vast size – across all participants it was the feature that elicited the most comments. Many participants also commented on the incongruity of the ships (see 2008 Qualitative Interviews of Park Visitors). For example, one participant said, “They were just so enormous.” Another commented that, “... cruise ships were out of place and odd-looking.”

Objective 2 – Few changes in visitor experiences are predicted if managers allow 2 cruise ships to enter Glacier Bay every day

Changing to 2 cruise ships in Glacier Bay every day will result in more cruise ship passengers encountering other cruise ships, and in four other user groups, visitors will report more and/or longer encounters with cruise ships. Backcountry visitors were the only user group with no predicted changes in encounters.

The most obvious way in which visitor experiences might be affected by increased cruise ship use of Glacier Bay would be increases in visitor encounters with cruise ships. Table E-6 shows all such increases predicted based on the survey results. The largest effects predict that the percentage of cruise passengers encountering other cruise ships will increase from 37.8% to 44.0%, and that the total time private vessel visitors will see or hear cruise ships will increase from 4.3 to 5.7 hours.

General Introduction

Table E-6. Summary of predicted increases in encounters with cruise ships by park user group

Variable	Backcountry visitors	Charter boat visitors	Cruise ship passengers	Day boat visitors	Private vessel visitors	Tour boat visitors
% See or hear cruise ships			37.8% to 44.0%			
Number of cruise ships encountered at Margerie/Grand Pacific glaciers						.49 to .61
Number of days cruise ships seen or heard		2.2 to 2.5			3.0 to 3.4	
Total hours see or hear cruise ships		2.3 to 2.9		1.5 to 1.7	4.3 to 5.7	
Hours saw/heard cruise ships (on longest day)				1.1 to 1.2	1.8 to 2.0	

Changing to 2 cruise ships in Glacier Bay every day was predicted to result in few changes in detracting from visitor experiences due to cruise ships, and those predicted changes were small.

Table E-7 shows that half of the user groups would experience changes in detracting due to cruise ships when two cruise ships are in the bay every day. Specifically, more cruise ship passengers will report that other cruise ships detracted from their enjoyment, and charter boat and private vessel visitors will report slightly more severe detracting due to cruise ships

Table E-7. Predicted effects on percentage of visitors reporting cruise ships detracted and the severity of detracting for each park user group.

Variables ¹	Backcountry visitors	Charter boat visitors	Cruise ship passengers	Day boat visitors	Private vessel visitors	Tour boat visitors
% reporting cruise ship detracting from trip enjoyment			5.4% to 6.4%			
% reporting cruise ship detracting from each of 8 experience dimensions						
Solitude (largest change)			8.7% to 10.2%			
View wildlife (smallest change)			2.8% to 3.2%			
Effect of cruise ships on trip enjoyment		2.5 to 2.3				
Effect of cruise ships on trip experience of Solitude		2.3 to 2.1				
Effect of cruise ship public address systems		2.0 to 1.6				
Effect of haze from cruise ship exhaust					1.9 to 1.5	

¹ Respondents rated the effect of cruise ships on specific experiences using the scale: 1 = Detracted greatly, 2 = Detracted somewhat, 3 = No effect, 4 = Added somewhat, 5 = Added greatly. Experience dimensions with average ratings less than 3 (No effect) were counted as reported detracting.

Changing to 2 cruise ships in Glacier Bay every day will result in few changes in encounters with other types of transport and few changes in the effects of those encounters on trip experiences.

It was possible that increasing cruise ship use would indirectly affect encounters with other types of transport, the percentage of visitors reporting detracting effects of other types of transport, and the

rated level of detraction. Relatively few changes were predicted, and those changes were small and sometimes inconsistent (see Table E-8). For example, more charter boat visitors were predicted to hear helicopters (16% to 21%), but the level of detraction for charter boat visitors who said helicopters detracted from trip enjoyment was predicted to become less negative (2.8 to 3.3).

Table E-8. Predicted effects on encounters with other craft and their related detraction effects by park user group

Variable	Backcountry visitors	Charter boat visitors	Cruise ship passengers	Day boat visitors	Private vessel visitors	Tour boat visitors
Motorized water craft other than cruise ships						
Number of motorized vessels other than cruise ships encountered					12.3 to 16.6	
Number of motorized vessels other than cruise ships encountered at Margerie/Grand Pacific glaciers						.63 to .89
Total hours saw or heard motorized vessels other than cruise ships					13.6 to 17.9	
Heard public address systems of motorized vessels other than cruise ships					11.5% to 5.2%	
Helicopter						
Number of helicopters seen or heard				1.6 to 1.8		
Number of helicopters seen or heard at Margerie/Grand Pacific glaciers		0.1 to 0.0				
Heard helicopter sounds		15.8% to 20.7%				
Propeller-driven aircraft						
Total hours saw or heard propeller-driven aircraft					1.0 to 1.6	
Number of propeller-driven aircraft seen/heard at Margerie/Grand Pacific		0.2 to 0.1				
Visit other tide water glaciers						
Visited Johns Hopkins Glacier					48.0% to 58.4%	
Effect of encounters on trip enjoyment						
Effect of helicopters on trip enjoyment		2.8 to 3.3				
Effect of kayaks on enjoyment of Margerie/Grand Pacific glaciers				3.6 to 3.5		

Objective 3 – Effects of cruise ships on visitor experiences were equal to or greater than effects of other forms of transport

Table E-9. Encounter and detraction rates for different forms of transport by park user group

Variable	Backcountry visitors	Charter boat visitors	Cruise ship passengers	Day boat visitors	Private vessel visitors	Tour boat visitors
Number of respondents	158	87	406	450	197	314
Response rate	69.3%	79.9%	85.1%	83.3%	69.9%	84.9%
Cruise ships						
Saw or heard cruise ships	84.1%	91.0%	37.8%	88.8%	96.5%	76.4%
Saw or heard cruise ships who reported detraction from enjoyment of Glacier Bay	79.1%	49.5%	14.3%	53.6%	40.6%	48.8%
% Reporting detraction from enjoyment of Glacier Bay	66.5%	45.0%	5.4%	47.6%	39.2%	37.3%
Motorized vessels other than cruise ships						
% reporting 1 or more encounters	90.6%	94.9%	56.6%	79.0%	96.3%	71.3%
% reporting encounters who reported detraction from enjoyment of Glacier Bay	70.8%	27.1%	8.4%	25.7%	18.4%	17.8%
% Reporting detraction from enjoyment of Glacier Bay	64.2%	25.7%	4.8%	20.2%	17.7%	12.6%
Propeller-driven aircraft						
% reporting 1 or more encounters	84.8%	63.0%	13.6%	28.9%	38.0%	33.3%
% reporting encounters who reported detraction from enjoyment of Glacier Bay	63.4%	22.4%	15.7%	31.8%	28.2%	24.7%
% Reporting detraction from enjoyment of Glacier Bay	53.8%	14.0%	2.2%	9.2%	10.7%	8.4%
Helicopters						
% reporting 1 or more encounters	26.1%	19.9%	9.7%	14.0%	15.1%	10.9%
% reporting encounters who reported detraction from enjoyment of Glacier Bay	70.8%	21.0%	10.3%	43.3%	20.7%	44.5%
% Reporting detraction from enjoyment of Glacier Bay	18.7%	3.2%	1.0%	6.0%	3.2%	5.2%

For all user groups, cruise ships detracted from a higher percentage of visitors' enjoyment of Glacier Bay than any other type of transport

For all but cruise ship passengers, cruise ships were the form of transport most likely to detract from the enjoyment of GLBA for those visitors who saw them (i.e., highest detraction rate; see Table E-9). Even among cruise ship passengers, other cruise ships had the 2nd highest detraction rate of any form of transport.

The negative effects of cruise ships relative to other forms of transport were consistent with the results of the qualitative study. Most interviewed participants reported that they saw cruise ships, and that those experiences were both more memorable and more significant than experiences with smaller vessels.

Because ratings of detraction due to encounters with various forms of transport were intertwined, mitigation efforts should focus on all forms of transport.

Although increases in cruise ship use were not predicted to increase the detracting effects of other craft (see Table E-8), the survey results for all user groups showed that ratings of detraction due to one type of craft were often related to encounters with another type. For example, one of the 21 such statistically significant relationships observed for backcountry visitors showed that whether or not visitors encountered prop-driven aircraft was significantly correlated with their rating of cruise ship detraction.

A variety of hypotheses may account for such intertwined relationships. Some visitors may be both more observant of other craft and more likely to say such craft detracted from their experiences, or a disturbing encounter with one type of craft may sensitize them to the presence of other forms of transport. Alternately, visitors might respond to all the detraction measures based on a generalized feeling of how much they were "bothered" by the presence of other visitors, and be either unwilling or unable to clearly separate the effects of different vessels or craft. Future research could be designed to test these different explanations. Because a complete investigation of these relationships was not a focus of the current research, we can say little about the specific ways in which encounters with the various forms of transport affect visitor ratings of detraction. However, there was strong evidence that those encounters do not have independent effects on the rated detraction due to each type of craft.

Although the exploratory analyses discussed in this section do not clearly define the relationships between encounters with and effects of the different type of craft, they can help managers decide whether information designed to mitigate the detracting effects of cruise ships should focus entirely on cruise ships or should also address the effects of other forms of transport. Specifically, if the detracting effects of each form of transport were unrelated to each other, then each effect could be treated independently. However, because the effects are related, mitigation efforts focused on all forms of transport are likely to be more effective.

Implications

The findings from the mail surveys do not lead to a set of simple implications for management. While general measures of trip satisfaction for all user groups suggested little to no evidence that cruise ships affected visitors' satisfaction with their trips, measures asking about the effect of cruise ships on specific aspects of trip experiences indicated that cruise ships affected many visitors' trips in a variety of ways. Inconsistent findings between general and specific measures have been found in other visitor research. Such findings suggest that events can have meaningful and significant effects on specific aspects of visitors' trips and yet, visitors often report minimal effects when considering their trip satisfaction more generally.

General Introduction

When both general and specific measures find comparable effects, implications for management policy are relatively simple compared to the inconsistent results found in this survey. Questions of policy cannot be settled by simply asking whether most visitors were generally satisfied with their trips. Managers must also consider whether all the measured effects of cruise ship encounters are acceptable in light of the visitor experiences they seek to provide. The fact that the desired conditions differ for the various user groups further complicates management decision-making.

Although the measured effects of cruise ships on visitor experiences have complex implications, the predicted effects of increasing cruise ship use to two ships per day every day are relatively simple. The survey results suggest that such an increase would produce relatively few changes in the experiences of visitors. In the largest expected increase in detraction due to cruise ships for the most highly-affected user group, survey results predicted that the percentage of all cruise ship passengers who report negative effects of other cruise ships would increase by approximately 1.5 percentage points.

Ultimately, while researchers can provide data and visitors can provide opinions, it is up to managers to decide, a) whether or not the current effects of cruise ships described in this report are appropriate and acceptable, and b) whether the predicted effects of increasing cruise ship use to two ships per day every day are acceptable.

General Introduction

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INTRODUCTION

Glacier Bay National Park and Preserve consists of 3.3 million acres of land and 940 square miles of marine waters. Most visitors to Glacier Bay National Park and Preserve (GLBA) experience the park in watercraft including cruise ships, tour boats, charter boats, private vessels, and kayaks. Cruise ships began serving GLBA in 1969 and since the early 1970's have brought the majority of visitors to the park (70% or more). In the last few years, cruise ship passengers comprised 95-97% of the approximately 400,000 visitors to GLBA.

Whereas cruise ships clearly offer benefits to people who use them as their mode of transportation to visit the park, there is less information about how cruise ships in Glacier Bay affect the environment or visitor experiences. The managers of Glacier Bay National Park and Preserve (GLBA) are pursuing a research initiative arising from the vessel management planning process that is designed to assess the effects of cruise ships in Glacier Bay.

Part of the research initiative includes a research program designed to examine whether and how cruise ships affect visitor experiences (excluding their benefits as a mode of transport). It is based on a problem analysis (Vande Kamp and Nelson 2007) and on the Glacier Bay Vessel Management Science Advisory Board report (2005). This document describes the visitor experience research program.

BACKGROUND

Administrative history

A vessel permit system was established in 1985 based on increased awareness that marine vessels may affect the park's natural resources. The vessel permit system regulated entries into Glacier Bay¹ by cruise ships, tour boats, charter boats, and private vessels.² The Final Environmental Impact Statement for Vessel Quotas and Operating Requirements, and the resulting Record of Decision signed November 21, 2003 currently guide vessel management in Glacier Bay National Park and Preserve (GLBA). The Record of Decision (Record of Decision for Vessel Quotas and Operating Requirements in Glacier Bay National Park and Preserve, 2003) adopted an alternative that maintains the current daily maximum of two cruise ships in the park and sets seasonal use days for the June - August season at 139 ships. The Record of Decision also provides for possible increases in cruise ship use. Specifically, use in the June - August season could be increased to two ships per day, every day for a seasonal use total of 184 ships. The Record of Decision allows park managers to specify use levels between 139 and 184 seasonal use days; thus, specific increases are park managers' decisions.

The Record of Decision for Vessel Quotas and Operating Requirements in Glacier Bay National Park and Preserve (2003) provided the following direction for the role of research in the process of changing quotas for cruise ships.

The determination of whether to increase seasonal-use day quotas for cruise ships will rely on criteria that define the environmental and social conditions to be met before any additional seasonal-use days are approved. These criteria will be based on the results of and guidance provided through studies that examine the effects of vessels on all park resources and visitor experience. (p.18)

¹ Glacier Bay proper is the portion of the park that is north of a line drawn from Pt. Carolus to Pt. Gustavus.

² Kayaks are regulated under the backcountry permit system.

General Introduction

The Record of Decision also specified that the studies examining the effects of cruise ships would be identified with the assistance of a Glacier Bay Vessel Management Science Advisory Board (SAB). The SAB was established and a final report of their findings and recommendations was published in September 2005 (Glacier Bay National Park Science Advisory Board: Final Report, 2005).

Research history

The SAB report included findings and recommendations related to effects of cruise ships on visitor experiences. Their review of the relevant literature found few studies measuring the effects of cruise ships on visitor experiences. The report did cite two studies of particular interest, both of which asked GLBA visitors about cruise ships. The first showed that 24% of tour, charter, and private vessel visitors reported that cruise ships detracted from their experience (Littlejohn, 2000). The second study found that 20% of park tour boat visitors who saw cruise ships reported that the ships detracted from their experience of the tidewater Grand Pacific Glacier³ (Johnson, 1990). Although these two studies surveyed only some types of GLBA visitors and visitor reactions may have changed since they were conducted, they established that cruise ships can have negative effects on the experiences of GLBA visitors.

Johnson (1990) also asked visitors how they would react if they encountered a specified number of cruise ships (0, 1, 2, 3) at the tidewater Grand Pacific Glacier, almost two-thirds of them reported that seeing two ships would be “unpleasant” or “very unpleasant”. This finding is interesting because it showed that most visitors believed that negative effects on their experiences would increase if they encountered more cruise ships.⁴ However, it may not be directly applicable to the currently proposed increase. Although the proposed increase would potentially expose visitors to two cruise ships every day at the tidewater glaciers, it is unclear how frequently both ships would be encountered there. Currently, when two cruise ships are in the bay, the captains usually communicate with each other so only one of them is at the face of the tidewater glacier at a time.

The SAB report also 1) described research questions that might be explored to better understand the effects of cruise ships on visitors’ experiences and 2) discussed the information needed to resolve those questions. The SAB recommended a comprehensive research program that was presented in general terms with no prioritization or cost estimates. Because the research program outlined in the SAB could not be performed within the time and budget limitations facing park managers, the SAB recommended (and park managers agreed to fund) a social research problem analysis. Mark Vande Kamp and Peter Nelson (2007) conducted the problem analysis of the comprehensive visitor research program included in the SAB report. Their analysis considered logistical and cost issues associated with the visitor research proposed in the SAB.

Summary of Problem Analysis

The Problem Analysis consisted of three steps. Step 1 identified fundamental issues requiring park managers’ input to set boundaries on both the scope of the final problem analysis and the research program options. A brief description of these issues is below. Step 2 of the Problem Analysis was a site visit to GLBA where the authors of the problem analysis engaged in scoping activities. A brief description of these activities is included below. Step 3 of the Problem Analysis integrated the information from Steps 1 and 2 and proposed three research program options for management review. These research programs are also described below.

³ At the time of this study, Grand Pacific Glacier had not receded and thus, was contiguous with Margerie Glacier.

⁴ Visitors responded to hypothetical encounters of different numbers of cruise ships. Because no research has examined whether these verbal descriptions of encounters with different numbers of cruise ships evoke the same response from visitors as actual encounters with two cruise ships, it would be inappropriate to conclude more than that visitors perceive an impact to their experience will occur.

Step 1: Fundamental issues to be addressed

The Problem Analysis conceptualized the fundamental issues as questions for managers to answer. Below is a brief description of each issue and park management's position.

Should the research program focus exclusively on the currently proposed range of increased cruise ship traffic?

This first question arose because information of potential use to managers could have been collected if the research program recommended by the science advisory board was augmented to include survey questions designed to estimate the effect on visitor experience if more than two cruise ships per day were allowed to enter Glacier Bay proper⁵ (see Figure 1). These conditions would exceed both the current maximum number of entries per day and the maximum increase allowed in the Record of Decision. The Problem Analysis presented the potential benefits of expanding the scope of the proposed research project to collect such information and the arguments against such expansion including 1) the added complexity and cost of the research and 2) questions about the validity of the research results when visitors are asked to evaluate hypothetical or simulated conditions. Park management elected to retain a tight focus for this project and look only at conditions that would be allowed by the Record of Decision. Contributing to their decision was information that cruise ship growth in South East Alaska is leveling off due to infrastructure limits. In particular, the number of cruise ships assigned to Alaska by cruise lines is reaching its limit and although size of the ships has increased, the width of the Panama Canal limits the size of many ships (as the canal is the primary means of transporting vessels from the Caribbean to the Pacific). Additionally, in order for three cruise ships per day to be allowed in Glacier Bay proper, a new Environmental Impact Statement would need to be completed.

Should the research program examine the potential effects of visitation by forms of transport other than cruise ships (e.g., other vessels and aircraft)?

This second question arose for two primary reasons: 1) Johnson (1990) found that the relationship between the number of encounters with cruise ships and reported effects on experiences were different for visitors who did or did not have disturbing encounters with other forms of mechanized transport; and 2) the research program presents an opportunity for managers to gather information that will inform decisions and planning efforts beyond the current research focus (i.e., whether to increase cruise ship traffic). The Problem Analysis indicated that whereas broadening this research to include other forms of transport would increase our understanding of the effects of different forms of transport (individually and in aggregate), it would be difficult to expand the project into a full exploration of all the different types of mechanized transport given the cost and complexity involved. Park management left it to the discretion of the researchers developing the questionnaire to include questions asking about other forms of mechanized transport, provided that the inclusion of these questions would not jeopardize the success of efforts to measure the effects due to cruise ships or exceed the limits of the research budget and the timeframe in which information was desired.

⁵ Glacier Bay proper is the portion of the park that is north of a line drawn from Pt. Carolus to Pt. Gustavus.

Should the research program go beyond measuring the effect of visitation by cruise ships, and to what extent should it seek to explain how visitation by cruise ships affects visitor experiences?

The third question arises because the research program recommended by the science advisory board was designed to be an extensive approach to understanding the effects of cruise ships on visitors' experiences rather than a more limited assessment of effects (if any) of cruise ships on visitors' experiences. The Problem Analysis included both an option to maintain this extensive research approach and a more limited, but defensible research approach. These two options represented two points on a research continuum. Adopting an extensive approach makes it unlikely that any significant effect of cruise ships would be overlooked in the research process. Also, the information obtained would likely suggest a variety of management actions, other than reducing the number of cruise ships, which could reduce cruise ship effects on visitor experiences. The more limited, but defensible approach would focus on the more narrow questions, "To what degree do cruise ships affect the experiences of visitors to Glacier Bay?" and "How would the proposed increase in cruise ship traffic affect currently observed effects on the experiences of Glacier Bay visitors?" This more limited approach would provide information about the frequency and extent of effects of cruise ships on visitor experience.

The Problem Analysis recommended a research program that would include an essential core of questions arising from the narrower approach, and to the extent practical, would integrate components that would increase understanding of *how* cruise ships effect visitor experience. Park managers agreed that it would be appropriate to pay incremental costs associated with analyzing and reporting of additional questions, but that budget constraints made it unwise to expand visitor samples or produce multiple versions of the questionnaire in order to address research questions related to *how* potential effects might arise.

Can GLBA visitors be studied as a single population?

GLBA is a large park and has several distinct visitor subpopulations. The Vessel Management Plan focuses on cruise ship access to Glacier Bay proper; therefore the visitors of interest for this research are those who have the opportunity to directly or indirectly encounter cruise ships within Glacier Bay proper. The SAB identified five categories of visitors that may be affected by cruise ships: 1) cruise ship passengers, 2) tour boat passengers, 3) charter boat passengers, 4) boaters on private vessels, and 4) backcountry visitors. The question is whether to treat these multiple visitor populations as a single one.

Visitors in these different categories are likely to differ in their motivations and expected experiences for this trip to Glacier Bay proper. Furthermore, prior research suggests that conflicts with other users in general, and crowding related issues in particular, are asymmetrical; non-motorized visitors tend to be more sensitive to encounters with motorized visitors than vice versa (Adelman Heberlein and Bonnickson 1982). Thus, it is possible that cruise ships will affect these visitors' experiences differently, and understanding such differences is likely to be important to park managers. As discussed in the Problem Analysis, treating multiple populations as a single population can result in an ecological fallacy. An ecological fallacy can arise when one makes an inference about an individual or sub-population based on data that are aggregated at a higher level. For example, the proposed research program might find that 25 percent of the sampled Glacier Bay visitors report that cruise ships detracted from their experience, and one might be tempted to conclude that Glacier Bay visitors have about a 25 percent chance of experiencing an effect of cruise ships. In fact, there might be no visitor groups who fit that conclusion. It is possible that the 25 percent average could arise because 15 percent of cruise ship passengers reported effects and more than 50 percent of all other visitor groups reported effects. Such false conclusions based on misleading averages of dissimilar groups are ecological fallacies. Researchers dramatically reduce the likelihood of ecological fallacy

General Introduction

by treating user groups as separate populations to be studied independently, and the Problem Analysis recommended such a research design.

The Problem Analysis agreed with the SAB regarding the relevant visitor user groups. However, the authors recommended categorizing visitors in terms of visit length (single day vs. overnight) and type of vessel (motorized vs. non-motorized) to facilitate survey design. Five categories were proposed: 1) cruise ship passengers; 2) single-day, motorized; 3) single-day, non-motorized, 4) overnight motorized; and 5) overnight non-motorized. Because cruise ship passengers are the largest group of visitors to GLBA and potentially have a different experience than other single-day motorized passengers due to the nature of their vessel (e.g., size), they were segregated rather than being included with single-day, motorized visitors. Table 1 shows how the Problem Analysis categories correspond to the five visitor categories identified in the SAB.

Table 1. Correspondence between Problem Analysis categories and SAB visitor categories

Categories per Science Advisory Board Report	Categories per Problem Analysis				
	Cruise Ship Passengers	Single-day, motorized	Single-day, non-motorized	Overnight motorized	Overnight non-motorized
Cruise Ship Passengers	X				
Tour boat passengers		X		X	
Charter boat passengers		X		X	
Private vessel boaters		X		X	
Backcountry users (mostly kayaks)			X		X

The authors of the Problem Analysis recommended excluding single-day, non-motorized visitors from the study, as their likelihood of encountering cruise ships was relatively small given the geographical and temporal nature of their trips. Further discussion with park staff during the 2007 logistical scoping activities suggested there might be more temporal overlap with cruise ships than originally thought. However, the large geographical separation between such users and cruise ships and the relatively small number of such visitors made the likelihood of effects low enough to warrant exclusion of single-day kayakers. All of the other visitor categories were included in the study.

Park managers agreed that the research should sample visitors from all of the following groups who entered Glacier Bay proper: 1) cruise ship passengers, 2) tour boat passengers, 3) charter boat passengers, 4) private vessel boaters, and 5) multi-day backcountry users.

Step 2: Site visit to GLBA

During Step 2, the Problem Analysis authors spent time in Glacier Bay National Park and in Juneau conducting scoping activities. These scoping activities included observing visitor activities, talking with some visitors, speaking with some operators who transport or facilitate visits to GLBA, and gaining a sense of the conceptual and logistical challenges to a research program. The Problem Analysis described their findings in detail and this information was used in the development of research options.

Step 3: Proposed research options

Step 3 of the Problem Analysis integrated the information and decisions from Steps 1 and 2 and proposed three research program options.

- Option 1 was a one-year research program that would be minimal, but defensible. This research option focused on using quantitative methods to measure direct effects of cruise ships, with some additional questions exploring indirect effects and the ways cruise ships affect visitor experience.
- Option 2 was a two-year design that incorporated qualitative research and a comprehensive pilot test for the quantitative component. This option was designed primarily to address the major limitations of Option 1. The inclusion of the qualitative component would increase the probability that the questionnaire would ask about appropriate aspects of visitor experience and the pilot test would reduce the risk of unforeseen problems associated with sampling and the unknown response rates to a mail questionnaire. A second qualitative component that studied the strategies that experience gatekeepers (e.g., park staff, charter boat captains) use to limit visitors' exposure to cruise ship was also included.
- Option 3 was a two-year design with expanded sampling and research topics. This option was primarily concerned with expanding the types of information collected to include: diary surveys of backcountry visitors, detailed investigation of visitor conflicts and disturbing encounters, detailed collection of vessel itineraries, and possible effects of climate change on the GLBA visitor experience.

These research program options were described in detail, including estimated budgets. A draft of the Problem Analysis was presented to park management in November 2006 for review.

Office of Management and Budgeting requirements

Social research such as that proposed in the Problem Analysis requires review and approval by the Office of Management and Budgeting (OMB). OMB has two levels of review: 1) expedited review that takes approximately 60 days to complete (most NPS social science research falls into this category) and 2) full review that takes approximately 8 months to complete. Full review is required when research is likely to be influential in controversial policy formation. Given the context of this project, it was unclear what level of review OMB would require for the proposed research options so the authors of the Problem Analysis contacted OMB during late October and early November 2006.

OMB ruled that the primary data collection (the quantitative survey) would require the full review process. This decision meant that a one-year research program (Option 1 in the Problem Analysis) was not feasible for 2007. Upon receiving this information, further communication was sent to OMB inquiring about whether the first year components of Option 2 would be eligible for expedited review. Option 2's first-year components included:

1. A qualitative component designed to gather information about how interactions with cruise ships potentially affect the different GLBA visitor groups and the dimensions of experience that are enhanced or diminished by such interactions; and
2. A quantitative pilot study component designed to test the survey procedures including contact and response rates, various psychometric qualities of the questionnaire items, propensity of the questionnaire design to encourage response set, and respondents' comprehension of the items themselves. A total of 800 people (200 from each of four targeted visitor subpopulations) were to be contacted.

General Introduction

The information collected by these components was felt to be important to the research design for the second-year to enable collection of data that were high quality and representative of the populations of interest.

Although OMB agreed that the qualitative component was eligible for expedited review, it declared the quantitative pilot study component ineligible. Specifically, 1) they asserted that the mail-back methods proposed were not so novel as to warrant pilot testing, and 2) despite assurances that the data collected during year one would not be used in any manner for setting policy, they viewed a pilot study with a sample of 800 as an additional year of the full study. Thus, the quantitative pilot study as proposed was held to require full OMB review (which, given the limited time frame, was not feasible for 2007). OMB would allow up to 20 individuals contacted in each group for the qualitative study to complete a draft survey instrument mailed to their home address. This sample size however was insufficient to provide reasonable estimates of any of the desired outcome measures, such as response rates, measures of psychometric qualities of the items, response set resulting from the design of the questionnaire, etc. In fact, the original sample size of 200 for each group was set so that a reasonable 95% confidence interval of $\pm 6.4\%$ around the estimated response rates would be achieved.

OMB refused a request for a telephone conference call to discuss the pilot study, in preference for a written explanation from the researchers of why the 20 per group sample size was not adequate. A written explanation was submitted, however, OMB did not alter its stance.

Park management was eager to have the primary data collection occur in 2008 to coincide with research examining effects of cruise ships on animals. The results of these various research programs are to be reviewed by park managers in the winter of 2009-2010. Because of insufficient time for full OMB review prior to the 2007 season, the quantitative pilot study component was not possible if the primary data collection was to occur in 2008. Thus, the first-year research originally proposed for Option 2 was significantly limited by OMB requirements.

RESEARCH OBJECTIVES AND SELECTED RESEARCH PROGRAM

In early January 2007 the authors of the Problem Analysis and GLBA Chief of Resources and project representative, Susan Boudreau met to discuss the Problem Analysis and OMB review requirements. Park staff decided to move ahead with a research program that would focus on the following primary and secondary research questions. Effects of cruise ships in these research questions exclude any effects of cruise ships as a respondent's mode of transportation. Such effects were assumed to be positive and should be considered in the final decisions regarding cruise ship quotas.

4. How do cruise ships affect, if at all, visitors' experiences in Glacier Bay proper?
 - a. Which dimensions of visitor experiences in Glacier Bay proper, if any, do cruise ships affect?
 - b. If cruise ships affect visitor experiences in Glacier Bay proper, which features of cruise ships have effects?
5. What are estimated effects for park visitors under the Record of Decision maximum use level of 2 cruise ships in the bay, every day?
6. How do effects on visitor experiences in Glacier Bay proper compare for cruise ships and other forms of mechanized transport?

Consistent with guidance from park staff, the research program developed to address these research objectives was a modified version of Option 2 in the Problem Analysis. Like Option 2, the current

research program was a two-year design. Year 1 research gathered information needed to develop and administer an effective quantitative mail survey in Year 2. A mail survey was planned because it was a cost-effective and flexible way of collecting visitor experience data that can provide population estimates. Also in Year 2, qualitative interviews with park visitors were conducted to complement and inform the results of the quantitative survey.

YEAR 1 RESEARCH – SUMMER 2007

Year 1 research, conducted during June and July 2007, included 1) logistical scoping to help inform the development of contact procedures for the mail survey and 2) qualitative interviews with visitors to inform the content of the survey.

Between May 31 and June 15, 2007⁶, Mark Vande Kamp visited Juneau and Gustavus to 1) assess a variety of potential issues that could affect researchers' ability to contact GLBA visitors for the 2008 mail survey; 2) investigate/observe other issues that might be relevant to the design and conduct of the mail surveys; and 3) orient, update and discuss findings with Project Manager and park staff. The logistical scoping activities involved observing visitor behavior at anticipated contact locations (i.e., Bartlett Cove, Juneau, and Auke Bay) as well as speaking with park staff and concessionaires about the ways visitors access the park and feasible points in which to contact visitors. As no visitors would be contacted during logistical scoping, OMB approval was not required. Although this research approach provided valuable information, it was much less informative than the Pilot Test originally proposed. A trip report detailed the findings of the logistical scoping (see Appendix A). The questionnaires and contact procedures included in this report reflect the findings of both the qualitative interviews and logistical scoping activities.

Between June 1, 2007 and August 15, 2007 Douglas Deur Ph. D, conducted qualitative interviews. The collected information was analyzed in conjunction with Scott Smiley, Ph. D (see Appendix B for report). This research is discussed in more detail below, in the section titled *Effects on dimensions of visitors' experiences*.

YEAR 2 RESEARCH – SUMMER 2008

Data collection for Year 2 was planned for June 1, 2008 through August 31, 2008, and took place between June 27 and August 31 (see Methods Section below). The primary data collection was a mail survey of visitors to Glacier Bay proper. Qualitative interviews were also conducted to facilitate interpretation of the quantitative findings. Consistent with the SAB report and the Problem Analysis, targeted visitors included: 1) all cruise ship passengers, 2) all tour boat passengers, 2) all charter boat passengers, 3) all private vessel boaters, and 4) multi-day backcountry users.

The development of a questionnaire required the translation of abstract research objectives into concrete measures. The next sections discuss this process for key measures in this study.

Measuring cruise ship effects

The focus of the mail survey was to examine how cruise ships affect, if at all, visitors experiences in Glacier Bay proper. The limited research on cruise ships and their effects has not established conventional measures of effects of cruise ships. Effects on trip experience could be asked at a relatively general level (e.g., How did seeing or hearing cruise ships affect your enjoyment of Glacier Bay proper?) or at a more specific level (e.g., How did seeing or hearing cruise ships affect your enjoyment of the sounds of nature in Glacier Bay proper?). Including items at both levels 1) increased the likelihood that the research would include measures that are both sensitive to effects and relevant

⁶ Mark Vande Kamp took four days of personal vacation (June 9 -12) during this trip.

General Introduction

to managers and/or visitors, and 2) provided the opportunity to obtain information about specific effects as well as some indication of the strength and extent of the effects. For example, if cruise ships affect one or two dimensions of visitor experiences but none of the overall measures, it would suggest that effects are occurring but they are limited in their scope. As recommended in the Problem Analysis, a number of measures were used to capture a wide-range of possible effects.⁷ The SAB report and Problem Analysis listed a number of potential general and specific effects of cruise ships on visitor experience and this list guided the selection and development of measures of effects.

General-level effects

General measures of trip satisfaction are often insensitive to different setting conditions (e.g., crowding, encounters; Manning 1999), presumably because the effects under study were limited in scope. Slightly narrowed measures that ask about the effects of specific conditions of the setting on general outcomes are more sensitive to differences in setting conditions (Swanson et al. 2006). One format of these measures asks whether the setting conditions affected the visitor's trip enjoyment, and the response scale generally ranges from "Added greatly" to "Detracted greatly" with a "No effect" option. A second format measures the effects of setting conditions on visitors' behavioral intentions such as return visitation or future recommendations to visit.⁸ Respondents are asked whether the setting conditions they experienced would affect their future recommendations (or likelihood of returning), and the response scale ranges from "A lot more likely" to "A lot less likely" with a "No effect" option. Given the sensitivity of these narrower measures, questions using these formats were used to measure the effects of cruise ships in the mail survey.

Specific-level effects

More specific effects of interest in this research included: 1) effects of cruise ships on particular dimensions of visitor experiences, 2) effects due to particular features of cruise ships, and 3) effects of cruise ships on visitors' experiences at Margerie/Grand Pacific Glaciers.

Effects on dimensions of visitors' experiences

The Recreation Experience Preference (REP) scales are commonly used to measure visitors' satisfaction with different dimensions of their recreation experiences (Driver 1983; Manfredo, Driver, & Tarrant 1996). These scales attempt to measure a large number of possible experience dimensions (Driver 1983) and have been shown to have reasonable psychometric properties (Manfredo et al. 1996). Because of the large number of items, researchers generally identify experience dimensions for a specific location that are relevant to both the visitors' desired recreation experience and to managers' objectives, and include those REP scales in their research instruments. REP scales are well-suited for measuring effects of cruise ships on dimensions of visitors' experiences.

To construct effective measures of cruise ship effects on dimensions of visitor experience, it was necessary to know what dimensions of the visitor experience were relevant to people visiting Glacier Bay proper. Furthermore, it was important to know which of these experience dimensions, if any, cruise ships affected. Prior survey research in GLBA (Johnson 1990, Littlejohn 2000) suggested some possible dimensions for persons who visit Glacier Bay proper, although these studies did not measure whether cruise ships had any effect on those particular dimensions of trip experience. Furthermore, the research was not designed to identify the range of important experience dimensions or to include

⁷ This approach was used successfully in a study examining the effects of military aircraft training exercises on humans who live and recreate in Alaska (Swanson et al. 2006).

⁸ The future recommendation format is useful for places that are primarily "once in a lifetime" destinations and most people would be unlikely to visit in the future for reasons other than the specific conditions under study (e.g. effects of cruise ships and other craft).

all visitors to Glacier Bay proper. Thus, designing the 2008 survey based solely on prior research in GLBA had the potential to overlook significant effects of cruise ships.

The qualitative interview component planned for Year 1 addressed this information need. Semi-structured qualitative interviews provided visitors an opportunity to talk freely about their trip experiences and allowed the researcher to identify the full range of visitor experiences in Glacier Bay proper. The focus points of the qualitative interviews were 1) to identify a comprehensive list of visitor experiences for visitors to Glacier Bay proper and 2) to identify which of these dimensions, if any, were affected by cruise ships (see Appendix B for report).

The qualitative interviews revealed seven dimensions of trip experiences that fell under three broader categories (see Table 2). These dimensions were found to be either relevant or understandable to all visitor user groups (e.g., cruise ship passenger, kayaker), and some visitors indicated that these dimensions of their visitor experience were affected by cruise ships. This information was used in the selection and construction of REP scales.

Comparing the identified dimensions of Glacier Bay proper visitors' experiences with those dimensions measured by the list of REP scales (Driver 1983) revealed considerable overlap in content. As prior research suggested that two REP scales are sufficient for measuring a dimension (Manfredo et al. 1996), two REP scales were selected and/or generated for each dimension. Parameters for selecting items from the list of REP scales in Driver (1983) were: 1) the scale was strongly correlated with the dimension, 2) scales measuring the same dimension were strongly correlated with each other, and 3) the scales were face valid. Nine scale items were selected and 5 scale items were constructed using the REP format. Together these 14 REP scale items were used in measuring of the importance of different dimensions of trip experience and the effects of cruise ships on each dimension of trip experience. (see *Survey Instruments* below).

Table 2. Dimensions of trip experience identified in 2007 qualitative interviews.

A. Experiencing nature
1. Seeing nature
2. Experiencing the wonder of nature
3. Intimate experience with nature
B. Soundscape
1. Hear the sounds of nature
2. Tranquility
C. Absence of humans
1. Solitude
2. Pristine environment

Features of cruise ships that effect visitor experience

A secondary research objective was to measure which features of cruise ships have effects on visitor experience. The SAB report and the Problem Analysis identified the following features of cruise ships as potentially affecting visitors' experience: 1) haze from exhaust, 2) sound from the public address systems, and 3) engine sound. The qualitative interviews conducted in 2007 also suggested that these were features of cruise ships that were likely to affect visitors' experiences. Questions asking about each of these potential effects were included in the survey.

Effects of cruise ships on visitors' experience of Margerie/Grand Pacific Glaciers

The qualitative interviews with visitors revealed that many view their trip in Glacier Bay proper as a series of points of interest connected by pathways. The points of interest were commonly tidewater glaciers and wildlife sightings (with the wildlife sightings occurring in variable locations). Visitors generally commented that other craft had the most effect when they were at points of interest. Given

General Introduction

the constraints of the mail questionnaire, it was not possible to ask separately about effects of cruise ships along the pathways, at points of interest, and overall. The focus of the majority of questions were to ask visitors about cruise ships they saw or heard during their time in Glacier Bay proper (i.e., overall experience).

The primary attraction for the majority of visitors to Glacier Bay proper are the Margerie and Grand Pacific Glaciers at the head of Tarr Inlet. Vessels and aircraft commonly congregate at the face of these glaciers. Because this is a destination of most visitors and spatially stable (unlike many wildlife sightings), it provided an opportunity to examine the effects of cruise ships and other craft at a primary point of interest. Questions asking visitors whether experiences with different craft affected their enjoyment of the Margerie/Grand Pacific Glaciers were included in the mail survey.

Measuring exposure to cruise ships

Another primary research objective was to estimate the effects of cruise ships on park visitors under the Record of Decision maximum use level of 2 cruise ships per day, every day. During the 2008 season, there are 31 one cruise ship days and 61 two cruise days between June 1 and August 31 (peak season) for a total of 153 seasonal use days. In order to estimate the effects of cruise ships under the maximum use level, it was necessary to know what kind of days (1 or 2 cruise ship) visitors experienced during their trips. Because the cruise ship schedule was set in advance and available to researchers, knowing the day visitors enter Glacier Bay proper and the number of days spent in the park was sufficient for determining the type of days visitors experienced.

The number of cruise ships entering Glacier Bay proper on each day can be considered a crude measure of visitors' exposure to cruise ships. However, it was quite possible that a given visitor on a two cruise ship day may see or hear cruise ships for less time than a person visiting on a one cruise ship day, depending on where they spend time in the bay. For example, because cruise ships move through the lower bay up into the West arm, visitors to the East arm of the bay should be less likely to see or hear cruise ships. To obtain more specific, albeit imperfect, measures of exposure, visitors were asked how long they saw or heard cruise ships during their time in Glacier Bay proper and how much time they spent in each area of the bay: East arm, West arm, and Lower bay.

The park currently manages cruise ship use by limiting the number of entries per day (e.g., 1 or 2 cruise ships). How the ships and other vessels share the bay is currently left to the discretion of the captains of the different vessels. Often, the crews of the cruise ships communicate so that both ships are not at the face of Margerie/Grand Pacific Glaciers at the same time, as much for safety as for experience quality. Thus, it was possible that the number of vessels at the face of Margerie/Grand Pacific Glaciers would not differ on one and two cruise ship days.

Measuring effects of other mechanized craft

The final primary research objective was to compare the effects of cruise ships on visitor experience with the effects due to other forms of mechanized craft. As noted earlier, Johnson (1990) found that visitors who had disturbing encounters with other forms of mechanized transport were more sensitive to cruise ships. There was no way to know whether disturbing encounters with other mechanized transport were somehow related to the number of cruise ships entering the bay, as these data were not collected. If incidents with other mechanized transport are related to the number of cruise ships entering the bay, then managers should take that relationship into account when considering the maximum use levels by cruise ships. Furthermore, comparing effects of the different kinds of mechanized transport provides managers with information about the relative effects each type of transport has on visitor experience. This information may be useful in both assessing the strength of current effects of cruise ships and in suggesting possible strategies for future mitigation.

The specific kinds of transport identified for study (in conjunction with park management) were 1) motorized water craft other than large cruise ships, 2) propeller-driven airplanes, and 3) helicopters. To provide a reasonable basis for comparison, for each type of mechanized transport, visitors were asked analogous questions to those asked for cruise ships. Constraints on the length of the questionnaire precluded the inclusion of a set of REP related questions asking about effects on specific dimensions of visitor experience for each type of transport.

Qualitative interviews

Qualitative interviews were conducted in 2008 primarily to address potential limitations of the mail survey. There were several limitations that fell into three classes: 1) limitations due to length of the survey, 2) limitations of close-ended questions to capture complex viewpoints, and 3) limitations of visitor knowledge (the experience was affected by guides or vessel captains without visitors' knowledge). Two sets of qualitative interviews were conducted: one with experience gatekeepers and a second with park visitors.

Interviews with Experience Gatekeepers

The authors of the Problem Analysis reported that during the site visit a number of GLBA VIS staff, charter boat operators, and the owners of Glacier Bay Sea Kayaks described ways in which they directly or indirectly limit visitors' exposure to cruise ships and other motorized vessels. It is possible that under the maximum proposed increase of two cruise ships per day entering Glacier Bay proper, these strategies will no longer be effective. If so, the estimates derived from the survey data would need to be adjusted. Qualitative interviews with experience gatekeepers assessed the prevalence and nature of efforts to reduce visitors' exposure to other motorized vessels. These interviews also had the potential to suggest ways park managers could minimize effects of motorized vessels on visitors experience without limiting the number of vessels in the bay.

Interviews with park visitors

Complementing the mail questionnaire with qualitative interviews of visitors helped in interpreting and/or understanding some findings from the mail questionnaire. Review of the drafted mail questionnaires revealed the following areas where qualitative interviews could elaborate.

1. Due to survey length limits, questions about reactions to features of cruise ships (and other craft) only had broad categories (negative effect, no effect, positive effect). Further information about the relative effects of different features of cruise ships and of other vessels were obtained from the qualitative interviews (e.g., whether sounds from PA systems were worse than engine noise from other boats).
2. Again, survey length limits precluded asking about the effects of other vessels on specific dimensions of visitor experience. Thus, if effects of other craft were observed, there was no way to know what dimensions of visitor experience they affected and thus, whether they were the same dimensions affected by cruise ships. Qualitative interviews provided additional insight into the comparative effects of different motorized vessels.
3. The survey asked whether visitors experienced effects of different motorized vessels on their trip experiences. Given length constraints, it was not possible to include questions asking about the persistence, changes in intensity, and duration of those effects. Obtaining such information about effects aided in interpreting the quantitative survey findings
4. Cruise ships in Glacier Bay are a complex issue. They are an efficient, minimal footprint, means for people to visit the park, and yet, they have the potential to affect other visitors' experiences. It was possible that some visitors believe cruise ships have a place or right to be

General Introduction

in Glacier Bay proper while also reporting that their own experiences were affected by cruise ships. Obtaining additional information about how visitors view and weigh the pluses and minuses of cruise ships in Glacier Bay provided a context for interpreting findings from the mail questionnaire.

5. The qualitative study done in 2007 indicated that many visitors experience Glacier Bay as points of interest (nodes) linked by pathways. The mail survey asked about cruise ship effects overall (nodes and pathways combined) and at Margerie/Grand Pacific Glacier (a primary node). Understanding more about the relative importance of the nodes versus the pathways provided a context for interpreting effects reported in the mail survey.

As noted above, qualitative interviews were conducted with the same user populations that were included in the mail questionnaire.

SUMMARY

To summarize, Year 1 consisted of a qualitative interview study of GLBA visitors and logistical scoping activities, both conducted during June 2007. Year 2 consisted of: a) a mail survey of visitors to Glacier Bay proper during the 2008 summer season; b) qualitative interviews with experience gatekeepers; and c) qualitative interviews with park visitors.

METHOD

The methods for each of the project components are briefly described in the following sections: 1) quantitative mail survey, 2) qualitative interviews with park visitors, 3) qualitative interviews with experience gatekeepers, and 4) the ship observer data collection. A full description of the method for each project component is included in the report describing that project component.

DELAY IN OMB APPROVAL

The research planned for this project required a full review by the Office of Management and Budgeting (OMB). Although the DOI reviewer had planned to have his review complete by April 1, he did not release the 30-day notice to be printed until April 9. It was printed April 17, 2008. The 60-day OMB review period begins on the day the 30-day notice is printed. The first 30-days allow time for public comment. The OMB desk officer has the second 30 days to review the package and provide comments or approval (in this case, by June 17, 2008).

Jim Gramann from the NPS Social Science Office contacted OMB on June 18, 2008 when no comments or approval were received from OMB by the close of business on June 17, 2008. A conference call with park staff, NPS Social Science staff, Darryll Johnson, and Jane Swanson on June 19th discussed the situation and various options available. Jim Gramann indicated that it was likely to be most expeditious to proceed by having him advocate to OMB for quick review and approval so the project could go into the field within a week. This course of action was followed. OMB responded with comments on June 25, 2008. A conference call between the Principal Investigator, OMB staff, and NPS Social Science staff was held on June 26, 2008 to address questions and approval was issued on June 27, 2008. Data collection began June 28, 2008.

All the project components were negatively affected by this delay. Early season visitors are not represented in any of the samples, and some sample sizes are smaller than called for by the work plan because of the shorter time period in which to make contacts.

Method: Quantitative Mail Survey

GENERAL SAMPLING STRATEGY

The Problem Analysis (Vande Kamp and Nelson 2007) defined four target populations to examine for potential effects, if any, of cruise ships on the quality of visitor experience: 1) cruise ship passengers; 2) single-day, motorized visitors; 3) overnight motorized; and 4) overnight non-motorized visitors. These target populations took into consideration transportation method and length of stay (i.e., single-day motorized, cruise ship, multi-day motorized, multi-day nonmotorized) with user groups (e.g., cruise ship passengers, kayakers) being secondary. The Problem Analysis recommended conceptualizing visitors in this manner to facilitate survey design—a valid point. However, this approach would support inferences about the target populations rather than inferences about the user group populations (hereafter referred to as user populations) that the park manages. Although the information collected under the target population sampling approach could be re-grouped to provide information about user populations that the park manages, creating a sampling plan based on user populations was more defensible in that the estimates for the different user groups would be more statistically reliable.

In sampling, the margin of error (usually expressed in percentage points) is commonly used to quantify the uncertainty about a survey result due to sampling error. Sampling error arises because only a sub-set of a population is being surveyed (i.e., sampled) and even if the people are randomly sampled the data provided by the sub-set will differ from the population depending on who is selected. For example, if a survey finds that 75% of visitors say cruise ships detracted from their trip enjoyment and the margin of error is stated to be 5%, an interval can be created (75% $\pm$ 5%) ranging from 70% to 80%. Assuming a 95% confidence interval, then if 100 samples are selected and the intervals for the results calculated using a 5% margin of error, then 95 of those intervals will contain the true value of the population.

The width of the interval around the population estimate is determined by the margin of error selected. Selecting the margin of error for this project depended in part on how large a difference would be significant or meaningful to policy decisions. If park policy decisions are to be based on small differences then a small margin of error is required (e.g., small intervals around the estimate). Another factor affecting margin of error decisions is available funding. Reducing the margin of error (e.g., smaller intervals) requires substantial increases in sample size which increases the cost of the project. In conjunction with park managers, a 95% confidence interval and a 5% margin of error were determined to be appropriate for this research.

Table 3 provides the target sample sizes for each user population. Target sample sizes were selected to achieve reasonable levels of statistical power (i.e., reasonable likelihood of detecting genuine differences within each user population). Power calculations were made based on the following assumptions:

1. Random samples for each user group (thus, single and multi-day users will be representatively sampled in each user group);
2. A 95% confidence interval;
3. A 5% margin of error;
4. Questions of the yes/no type have a true occurrence in the population of 50%/50%;⁹
5. Desired statistical power of 80%.

⁹ This assumption results in the most conservative sample sizes (i.e., the largest samples) and thus, questions that have different occurrence rates or more response options will have greater statistical power for the same margin of error and confidence interval.

General Introduction

The relationship between the target number of contacts and target sample sizes was based on the following assumptions:

1. Refusal rates of 20% for cruise ship and backcountry visitors, and 10% for tour boat, private vessel, and charter visitors;¹⁰
2. A 70% response rate to the mail questionnaire;

Table 3. Contact and Response Rates by User Population for Quantitative Survey

User population	Estimated population for 2008	On-site contacts	Participation rate %	Addresses for Mail Survey	Response Rate %	Final Responses to Mail Survey
Cruise	400,000	686	80%	549	70%	384
Day boat	3,600	551	90%	496	70%	347
Other tour boat	8,600	584	90%	526	70%	368
Charter	1,305	471	90%	424	70%	297
Private vessel	1,275	468	90%	421	70%	295
Backcountry	900	480	80%	386	70%	269
Total	415,680	3,240		2,802		1,960

Table 4 shows estimates of statistical power for differences in percent of respondents affected and for differences in mean ratings for each user population.

Procedures were developed based on discussions with park managers and staff. The desired information for all four user populations was collected using on-site questionnaires followed by mail questionnaires. The on-site questionnaires collected general demographic and party data as well as contact information for follow-up mailings. The mail questionnaires included questions about trip experiences and effects of mechanized transport. To the extent possible, parallel questions were included in each survey to allow comparison across the four populations.

Between June 28, 2008 and August 31, 2008 there were 22 one-cruise-ship days and 43 two-cruise-ship days (approximately the 1:2 ratio of 1- to 2-cruise ship days). One factor affecting all user populations was the greater number of two cruise-ship days. In order to ensure sufficient sampling of one cruise-ship day visitors, the sampling plans developed for each user population took into account daily entries of cruise ships into Glacier Bay proper.

Descriptions of specific contact procedures are included in the methods of each user population survey. In all cases, survey workers had an official appearance, including a University of Washington jacket and an official name-tag.

¹⁰ Refusals occur when people refuse to participate in the study at the time of the initial contact. Response rates reflect the number of people who return a mail survey after they have agreed to participate in the study.

Table 4. Sample Sizes and Power Estimates by User Population

User population	Estimated population for 2008	Column A	Column B	Column C	Column D	Column E
		Final Responses to Mail Survey ¹	Estimated % of visitors affected negatively by cruise ship			Mean differences detectable at 80% power assuming SD = 0.8 on a 5-pt scale ³
			Difference detectable at 80% power ³	Difference one- vs. two cruise ship days ⁴	Difference current vs. future conditions ⁵	
Cruise	400,000	384	5% vs. 14.9%	9.9%	3.3%	0.24
Day boat	3,600 ²	347	10% ⁶ vs. 22.6%	12.6%	4.2%	0.26
Other tour boat	8,600 ²	368	25% ⁷ vs. 40.2%	15.2%	5.1%	0.25
Charter	1,305 ²	297	25% ⁷ vs. 42.1%	17.1%	5.7%	0.28
Private vessel	1,275 ²	295	25% ⁷ vs. 42.1%	17.1%	5.7%	0.28
Backcountry	900 ²	269	44% ⁸ vs. 62.9%	18.9%	6.3%	0.30
Total	415,680	1,960				

¹Sample size calculated using a 5% margin of error, 95% confidence interval, and with a 50% response distribution. Representative samples will have 1/3 of the sample contacted on one-cruise-ship days and 2/3 of the sample contacted on two-cruise-ship days.

²When populations are less than 20,000 in size, it is appropriate to consider them finite. Compared to infinite populations, finite populations require smaller sample sizes to achieve the same degree of reliability in an estimate.

³Power calculations were all done for infinite populations, which require larger sample sizes than finite populations. Thus, the estimates for finite populations are conservative. Furthermore, sample sizes for one-cruise ship days were equal to 1/3 of the final response to the mail survey and sample sizes for two-cruise-ship days were equal to 2/3 of the final response to the mail survey.

⁴The percentage point difference between one- and two-cruise-ship days is equal to the difference detectable at 80% power. It should be noted that the differences for finite populations are conservative.

⁵ The percentage point difference between current and future conditions is equal to one-third of the difference between one- and two-cruise ship days as only one-third of the days will have increased cruise ship entries. It should be noted that the differences for finite populations are conservative.

⁶This estimate is based on the finding that 20% of day boat passengers reported cruise ships detracted from their enjoyment (Johnson 1990). The finding reflects the percentage of visitors reporting cruise ships detracted from their trip experience on both one- and two-cruise-ship days, so may be conservative.

⁷This estimate is based on findings for private, charter, or tour boat visitors that reported cruise ships detracted from their trip (Littlejohn 1999). It is likely conservative as it reflects the percentage of visitors reporting cruise ships detracted from their trip experience on both one- and two-cruise-ship days.

⁸This estimate is based on findings for backcountry visitors that reported cruise ships detracted from their trip while in the backcountry (Littlejohn 1999). It is likely conservative as it reflects the percentage of visitors reporting cruise ships detracted from their trip experience on both one- and two-cruise-ship days.

SURVEY INSTRUMENTS

The mail survey component consisted of a brief questionnaire completed upon contact (i.e., contact sheet) and a longer mail questionnaire was sent within 1 week of contact. Consistent with the Problem Analysis recommendation, transportation mode and length of stay were considered when designing the survey instruments.

General Introduction

The contact sheets took about 3 minutes to complete and primarily collected information about the participant and his/her travelling party to use in non-response analyses. Four versions of the contact sheet were required: 1) cruise ship passenger contact sheet (see Appendix C), 2) contact sheet for day boat and private vessel visitors contacted at the Visitor Information Station in Bartlett Cove (see Appendix D), 3) contact sheet for other tour boat and charter boat passengers (see Appendix E), and 4) nonmotorized (backcountry user) contact sheet (see Appendix F).

The mail questionnaires took 20-25 minutes to complete. Three versions of the mail questionnaire were necessary: 1) cruise ship passenger questionnaire (see Appendix G), 2) motorized visitor questionnaire (see Appendix H), and 3) nonmotorized (backcountry user) visitor questionnaire (see Appendix I). The mail questionnaires asked about 1) trip characteristics including length of stay, activities, weather, and importance of different trip experiences; 2) general demographic information including age, gender, education, and ethnicity; 3) exposure to different types of mechanized transport; and 4) effects of exposure to different types of mechanized transport. Table 5 below summarizes the list of effects to be measured for cruise ships and other craft. Questions in the Motorized visitor version of the mail survey (see Appendix H) are cross-referenced for each effect.

Table 5. List of effects to be measured for cruise ships and other craft in the motorized visitor version of the survey

Types of effects being measured		Questions corresponding to ...	
		Cruise ships	Other craft
General effects			
	Affect enjoyment of Glacier Bay proper	Q10	Q10
	Affect recommendations that others visit Glacier Bay proper in the same manner	Q19A	Q19B,C,D
	Overall satisfaction with time spent in Glacier Bay proper	Q20	Q20
Specific effects			
	Dimensions of visitors' experiences	Q8	*
	Enjoyment of Margerie/Grand Pacific glaciers	Q11c	Q11c
	Affect viewing of wildlife	Q8I,Q13,Q14	*
	Haze from exhaust affected views	Q16A	Q16B,C
	Heard sound from Public Address system	Q16D	Q16E,F
	Heard engine sound	Q16G	Q16H,I,J
Exposure			
	Percentage of days in Glacier Bay proper that 2 cruise ships were in bay	Q2**	*
	Time spent in different parts of Glacier Bay proper	Q5	Q5
	Length of time heard or saw cruise ships	Q7	Q9
	Number of vessels present at Margerie/Grand Pacific glaciers	Q11b	Q11b
	Planned trip to minimize exposure	Q17	Q17

*None of the mail survey questions address this point. The qualitative interviews with visitors provided some information regarding this point.

**The information in Question 2 will be used in conjunction with the cruise ship schedule to calculate percentage of days that 2 cruise ships entered Glacier Bay proper.

Method: Qualitative Interviews of Park Visitors

To address limitations of the mail questionnaire, qualitative interviews with visitors were included in the 2008 research. The qualitative interviews with visitors increased understanding and facilitated interpretation of the survey data.

Respondent universe

Visitors to Glacier Bay proper have been divided into four user populations: 1) cruise ship visitors, 2) tour boat visitors, 3) charter boat visitors, and 4) backcountry visitors. For each user population, the respondent universe consisted of adult visitors (age 18 or older) contacted between June 28, 2008 and August 31, 2008.

Interview procedures

A survey worker contacted visitors in the different user populations using the same procedures planned for the mail questionnaire. However, the information and request made of these visitors was to participate in the qualitative interview. Visitors were only asked to participate in one component of the project (e.g., the mail survey or the qualitative interview). The number of visitors to be contacted for the qualitative interview was specified for each day mail survey contacts happened (between 0 and 2 contacts) and these contacts were made randomly among the contacts for the day. Upon agreement to participate, visitors were asked to provide their names, phone number(s), and good times to call. The contact information was sent to the qualitative interviewer so she/he may call the visitor at the first “good time to call.” Interviews were conducted at a mutually agreed upon good time and were expected to average 30 minutes.

Interview content

The interview guide (see Appendix J) was developed to gather information that facilitated interpretation and understanding of findings from the quantitative survey (see p. XX).

Expected response rate

Response rates are less of an issue with qualitative interviews than quantitative surveys as the focus of the interviews is to obtain information across the breadth of visitors’ experience (ideally, exhausting the conceptual space) rather than making statistical inferences of population estimates. Efforts were made to contact visitors who represented a wide range of people and experiences in order to capture the full spectrum of experience.

Method: Qualitative Interviews of Experience Gatekeepers

Some visitors’ experiences in Glacier Bay proper are mediated by other people such as park staff at the VIS (who advise backcountry visitors and help them plan their trips), as well as charter operators and guides (who set their client’s itineraries). In an effort to provide visitors with the type of experience they desire, these experience gatekeepers may use a variety of strategies to minimize encounters with cruise ships and other vessels. The goal of these interviews was to understand the prevalence and nature of those strategies.

Potential experience gatekeepers identified in the Problem Analysis and 2007 scoping work include VIS staff, charter boat operators, and guides. Experience gatekeepers (age 18 or older) were asked to participate in a brief interview (no longer than 15 minutes). Those consenting to participate were interviewed as described in the interview guide (see Appendix K), and asked whether they modify their itineraries to minimize visitors’ contact with other vessels and if so, how.

Method: Vessel Count Data Collection

The park manages the number of entries into Glacier Bay proper. When two cruise ships are in Glacier Bay proper, the captains generally communicate with each other so both are not at the glaciers at the same time. These actions may effectively result in small differences in the exposure to cruise ships for other vessels either at the glaciers or as the vessels move through park waters. In order to measure the potential exposure of cruise ships to each other and to other vessels, information about the numbers of different kinds of vessels within view while cruise ships are in Glacier Bay proper were collected by objective observers.

As described earlier, during the summer of 2008, observers traveled through Glacier Bay proper on each cruise ship as part of research examining cruise ship effects on whales. The primary investigator for that research agreed to have the observers record encounters with other vessels as the cruise ship moves through Glacier Bay proper. The information collected for these encounters included: 1) date; 2) time; 3) type of vessel; and 4) length of time vessel was in sight. The whale observers were located on the bow of the cruise ship. This positioning made it impossible for the observer to track vessels that were behind the cruise ship and this limitation is duly noted. Additionally, these observers took a break while at the Margerie/Grand Pacific glaciers. They recorded the following information at the start and end of their breaks: 1) date; 2) time; 3) number of cruise ships; 4) number of tour boats, small cruise ships, and large private vessels; 5) number of small motorboats and sailboats; and 6) number of kayaks.

PROJECT LIMITATIONS AND TARGETED INFORMATION

This section provides a general description of the expected information and analyses that were collected and conducted. A much more complete technical description of the results of each study is included in each report.

LIMITATIONS

The Glacier Bay Visitor Survey has several general limitations that should be kept in mind when interpreting the data: 1) In all surveys, it is assumed that respondents provide accurate and honest answers to the questions asked. 2) The data represent visitor attitudes, opinions, and evaluations of their experience at a particular point in time (i.e., the time of the survey) and people's attitudes, opinions, and experience evaluations are dynamic so changes can occur at any time. 3) The data represent visitors' recall of their experience in Glacier Bay, as the survey was mailed to visitors approximately one week after their trip. 4) There are limitations that revolve around the issue of non-response (i.e., possible bias in the sample due to differences between the visitors who completed the questionnaires and those who did not).

TYPES OF INFORMATION THE SURVEY PROVIDES

Baseline information about current visitors and current conditions

At the most basic level, the surveys provided descriptive information (e.g., frequencies, averages, etc.) for the following:

1. Trip characteristics (e.g., length of stay, activities engaged in, tidewater glaciers visited),
2. Importance of different dimensions of trip experience (e.g., experience tranquility, view wildlife)
3. Visitors exposure to different kinds of mechanized transport (e.g., length of time, number),

4. Effects of that exposure, if any, on trip experience (e.g., effect on enjoyment at Margerie/Grand Pacific Glaciers, effect on future recommendations, effects on different dimensions of trip experience),
5. Occurrence of different events that may affect quality of trip experience (e.g., haze, engine sounds).
6. General demographic information about visitors (e.g., age, gender, residence, race & ethnicity, education, prior visits to GLBA)

These data provide baseline information describing a broad range of visitors and visits to Glacier Bay proper under current vessel conditions.

The qualitative interviews were analyzed for common themes and a report describing those findings was produced. Furthermore, information obtained in the qualitative interviews with visitors was integrated with the findings from the quantitative survey to increase our understanding of current circumstances.

Information about whether the number of cruise ships entering Glacier Bay affected visitors' experiences

Single-day visitors

Data collected from single day visitors provide the opportunity to answer the question: Do cruise ships effect visitors' experiences differently on 1 and 2 cruise ship days? The following analyses were done to address this question:

- For each measure of effect listed in Table 5 (same list of effects as those in Table 4), 1 and 2 cruise ship day visitor responses were compared for statistically significant differences. These analyses were done to identify significant differences related to the number of cruise ships entering the bay.
- Self-reports of length of time visitors heard or saw cruise ships were analyzed for differences between 1 and 2 cruise ship days. These analyses revealed whether visitors reported different levels of exposure based on the number of cruise ships entering the bay.
- Analyses were conducted on the observational data collected by the whale observers to determine if there were different numbers and/or types of vessels in the bay and at Margerie/Grand Pacific Glaciers on 1 and 2 cruise ship days. As noted earlier, having an additional cruise ship enter the bay may not result in different exposure depending on how the vessels disperse in the area.

Taken together, the above analyses tested whether an additional cruise ship entering Glacier Bay affected visitor experiences.

Table 5. List of effects to be measured for cruise ships and other craft

Types of effects being measured		Questions corresponding to ...	
		Cruise ships	Other craft
General effects			
	Affect enjoyment of Glacier Bay proper	Q10	Q10
	Affect recommendations that others visit Glacier Bay proper in the same manner	Q19A	Q19B,C,D
	Overall satisfaction with time spent in Glacier Bay proper	Q20	Q20
Specific effects			
	Dimensions of visitors' experiences	Q8	*
	Enjoyment of Margerie/Grand Pacific glaciers	Q11c	Q11c
	Affect viewing of wildlife	Q8I,Q13,Q14	*
	Haze from exhaust affected views	Q16A	Q16B,C
	Heard sound from Public Address system	Q16D	Q16E,F
	Heard engine sound	Q16G	Q16H,I,J
Exposure			
	Percentage of days in Glacier Bay proper that 2 cruise ships were in bay	Q2**	*
	Time spent in different parts of Glacier Bay proper	Q5	Q5
	Length of time heard or saw cruise ships	Q7	Q9
	Number of vessels present at Margerie/Grand Pacific glaciers	Q11b	Q11b
	Planned trip to minimize exposure	Q17	Q17

*None of the mail survey questions address this point. The qualitative interviews with visitors will provide some information regarding this point.

**The information in Question 2 will be used in conjunction with the cruise ship schedule to calculate percentage of days that 2 cruise ships entered Glacier Bay proper.

Overnight visitors

By definition overnight visitors spend two or more days in Glacier Bay proper. Unlike single-day visitors, whose exposure to cruise ships could be classified as either a one- or two-cruise ship day, overnight visitors' exposure depended on their length of stay and the mix of one- and two- cruise ships in the bay days during their stay. Thus, for each overnight visitor, exposure was captured by 1) the percent of 2-cruise ship in the bay days and 2) the number of 2-cruise ship in the bay days.

An analogous series of analyses to those conducted for the single day visitors were conducted for overnight visitors.

1. Analyses were conducted that examined the relationship between each measure of effect listed in Table 5 above and the two measures of exposure: percent of 2-cruise ship in the bay days and 2) number of 2-cruise ship in the bay days. These analyses were done to identify significant differences in experiences related to the number of cruise ships entering the bay.
2. Analyses looked at relationships between self-reports of length of time visitors heard or saw cruise ships and the two measures of exposure (percent of 2 cruise ship in the bay days and number of 2-cruise ship in the bay days). These analyses were done to reveal whether visitors' self- reports of different levels of exposure were related to the number of cruise ships entering the bay.

These analyses tested whether spending more days in Glacier Bay when 2 cruise ships enter the bay affected visitors' trip experience and whether those effects (or lack thereof) were due to differences in exposure, if any, to different vessels overall or at Margerie/Grand Pacific glaciers.

Estimates of effects of cruise ships under potential future conditions

Further analyses of these data provided estimates of effects if two cruise ships were to be allowed in Glacier Bay every day—the maximum allowed under the Record of Decision. Descriptions of these analyses are presented below for single-day visitors and for overnight visitors.

In predicting the future, assumptions are always necessary. The assumptions underlying the predictions of effects include:

- Because most current visitors do not make their visit decisions based on number of cruise ships in Glacier Bay, then the effects observed for two cruise-ships in the bay days under current conditions should be representative of effects when all days are two cruise-ship days
- A visitor's encounter with a cruise ship is a function of the number of cruise ships, the paths of those cruise ships, and the path of the visitor's vessel. Some visitors (or their vessel captains) may adjust their itineraries to reduce encounters with cruise ships and these adjustments could differ when there are more cruise ships in the bay (2 versus 1 cruise ship). It was assumed that the current distribution of visitors' paths on two cruise-ship days will be representative of visitors' paths when every day is a two cruise-ship in the bay day.¹¹

Single-day visitors

Cruise ship use level during the 2008 peak season was 153 seasonal use days (a.k.a. current conditions). This level of use corresponds to a 1:2 ratio of 1-cruise-ship in the bay days and 2-cruise-ships in the bay days. This ratio held true during the 2008 sampling period. Each user group sample was evaluated to determine whether it was representative of this ratio and if not, the data were weighted to reflect current use. Thus, the best estimates for current conditions (153 seasonal use days) were observed effects for all respondents.

The maximum allowed under the Record of Decision is two cruise ships entering the bay every day. Single day visitors under those conditions should experience conditions comparable to current visitors who enter the bay on 2-cruise ships in the bay days. If analyses found significant differences between single day visitors who entered on 1-cruise-ship days and those who entered on 2-cruise-ship in the bay days, then the best estimates of future effects of all single-day visitors are observed effects for single-day visitors who enter Glacier Bay on 2-cruise ships in the bay days. However, if analyses showed no significant difference in visitors' responses due to 1- and 2-cruise ships in the bay days, then it was assumed that there would be no significant change when increasing cruise ship use levels to the maximum-allowed conditions of all 2-cruise ships in the bay days. The estimate in these cases was the observed effect for all respondents (i.e., same as current conditions).

Comparisons between current conditions and the maximum allowed were made on key variables. It should be noted that differences, if any, between current conditions (66% are 2-cruise ship days) and the maximum allowed (100% 2-cruise ship days) will be smaller than observed significant differences between 1- and 2-cruise ships in the bay days (0% and 100% 2-cruise ship days, respectively). Be that

¹¹ The qualitative interviews with experience gatekeepers suggested that the strategies they employed to reduce contact between visitors and cruise ships will remain viable when every day is a two cruise-ship in the bay day.

General Introduction

as it may, park managers will need to assess whether the observed differences in rates are 1) practically meaningful and 2) acceptable.

Overnight visitors

Cruise ship use level during the 2008 peak season was 153 seasonal use days (a.k.a. current conditions). This level of use corresponds to a 1:2 ratio of 1-cruise-ship in the bay days and 2-cruise-ships in the bay days and generally the 1-cruise ship in the bay days were fairly evenly distributed through the season. This ratio and distribution held true during the 2008 sampling period.

Similar to single day visitors, the best estimate of effects for current conditions (a.k.a. 153 seasonal use days) were the observed effects for all respondents. Also, if analyses found no effects for percentage of 2-cruise ships in the bay days on effects of cruise ships, then no increases in effects due to the increase in cruise ship use levels would be expected. Thus, the best estimate for the maximum allowed was the observed effects for all respondents (same as current conditions).

Because approximately every third day was a 1-cruise ship day, it was possible that some overnight visitors would experience the maximum allowed conditions (2 cruise ships entering the bay every day). They were likely to be few of them in the sample, and on relatively short trips. Thus, unlike single day visitors, there was not an adequate group of overnight visitors that only experienced 2-cruise ships in the bay days to use for estimating effects under the maximum allowed condition. Thus, when the analyses relating effects to the percentage of 2-cruise ships in the bay days (see #1 above) were significant, then those models were used to predict future effects. It should be noted that because the prediction of effects under 100% 2-cruise ship use days lies at the extreme range of current conditions, the estimate has a larger confidence interval (i.e., a wider range that the true population estimate may fall in) than an estimate that falls in the mid-range.

As noted for single-day users, park managers will need to compare 2008 current condition effects of cruise ships with predicted effects for a possible increase to 2-cruise ships in the bay on all days to determine whether the difference, if any, is practically meaningful and whether the predicted effects are acceptable.

Information on the role of other mechanized transport on visitors experiences

A series of analyses similar to those described above for cruise ships were conducted for the different forms of other mechanized transport. Furthermore, analyses examined whether exposure to these different forms of transport affected visitors responses to cruise ships. Information obtained from the qualitative interviews with visitors was integrated with the corresponding quantitative findings.

REFERENCES

- Adelman, B. J. E., T.A.Heberlein, and T.M. Bonnicksen (1982). Social psychological explanations for the persistence of a conflict between paddling canoeists and motorcraft users in the Boundary Waters Canoe Area. *Leisure Sciences* 5 (1), 45-61.
- Driver, B.L. (1983). *Master list of items for Recreation Experience Preference scales and domains*. Unpublished document. USDA Forest Service, Fort Collins, CO: Rocky Mountain Forest and Range Experiment Station.
- George, D. & Maller, P. (2003). *SPSS for Windows step by step: A simple guide and reference. 11.0 update* (4th ed.). Boston: Allyn & Bacon.
- Jacob, G. R. and Schreyer, R. (1980). Conflict in outdoor recreation: A theoretical perspective. *Journal of Leisure Research*, 24, 348-360.
- Johnson, D. R. (1990). *Glacier Bay National Park tour boat passenger visitor survey 1989*. Technical report. The National Park Service Cooperative Park Studies Unit, College of Forest Resources, University of Washington.
- Littlejohn, M. (2000). Glacier Bay National Park Bartlett Cove Visitor Study Summer 1999, Visitor Services Project. Cooperative Park Studies Unit, University of Idaho: 115.
- Manfredo, M. J., B. L. Driver, and M. A. Tarrant (1996). Measuring leisure motivation: a meta-analysis of the recreation experience preference scales. *Journal of Leisure Research*, 28, 188-213.
- Manning, R. E. (1999). *Studies in outdoor recreation: Search and research for satisfaction*. Corvallis, Oregon: Oregon State University Press.
- Manning, R. E. (2007). *Parks and carrying capacity: Commons without tragedy*. Washington: Island Press.
- National Park Service (2003). *Record of decision for vessel quotas and operating requirements in Glacier Bay National Park and Preserve*. Glacier Bay National Park and Preserve: National Park Service.
- Glacier Bay Vessel Management Science Advisory Board (2005). *Glacier Bay National Park Science Advisory Board: Final report Research and monitoring needs relevant to decisions regarding increasing seasonal use days for cruise ships in Glacier Bay*. Glacier Bay National Park and Preserve: National Park Service.
- Ruddell, E. J. & Gramann, J. H. (1994). Goal orientation, norms, and noise-induced conflict among recreation users. *Leisure Sciences*, 16, 93-104.
- Swanson, J. E., M. E. Vande Kamp, D. R. Johnson, M. J. Grinley, K. H. Anderson, and T. Haynes (2006). *Effects Of Military Overflights On Human Users Beneath Selected Alaska Military Operations Areas*. United States Department of the Interior, National Park Service, Pacific West Region, University of Washington, Technical Report NPS/PWR/PNWCESU-2007-02 (NPS D-34), Seattle, WA.
- Tachakkaori, A. and C. Teddlie. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. Thousand Oaks, CA: Sage Publications.

General Introduction

Vande Kamp, M. E. and P. Nelson. (2007). *Research assessing current and potential impacts of cruise ships on visitor experiences in Glacier Bay National Park and Preserve: A problem analysis*. Technical report. Protected Area Social Research Unit, College of Forest Resources, University of Washington.

Vaske, J. J., Neeham, M. D., and Cline, Jr. R. C. (1995). Clarifying interpersonal and social-value conflict among recreationists. *Journal of Leisure Research*, 39, 182-195.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environment and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interest of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under US administration.

Report 1
A Survey of Cruise Ship Passengers

Jane E. Swanson
Mark E. Vande Kamp

VOLUME GUIDE

Volume 1

Executive Summary

General Introduction

You are here → A Survey of Cruise Ship Passengers

A Survey of Day-Boat Visitors

A Survey of Tour-Boat Visitors

A Survey of Backcountry Visitors

Volume 2

A Survey of Private Vessel Visitors

A Survey of Charter-Boat Visitors

Qualitative Interviews with Park Visitors: Summer 2008

Qualitative Interviews with Experience Gatekeepers

Appendices (includes questionnaires and general comments)

TABLE OF CONTENTS

LIST OF FIGURES	IV
LIST OF TABLES	VII
I. INTRODUCTION AND METHOD	1
GOALS OF THE MAIL SURVEY OF PASSENGERS ABOARD LARGE CRUISE SHIPS.....	1
SURVEY DESIGN AND QUESTIONNAIRE DEVELOPMENT	1
SAMPLING AND VISITOR CONTACT PROCEDURES	2
ADMINISTRATION OF MAILINGS	3
STATISTICAL CONSIDERATIONS	4
LIMITATIONS	4
<i>Non-response</i>	4
ACCURACY OF THE SAMPLE.....	8
ESTIMATES FOR CURRENT AND MAXIMUM ALLOWED SEASONAL USE DAYS.....	9
CONVENTIONS FOLLOWED IN THIS REPORT	9
II. VISITOR PROFILE	11
HIGHLIGHTS	11
GENDER AND AGE.....	12
EDUCATION	13
RESIDENCE	14
ETHNICITY AND RACE.....	15
NUMBER OF TRIPS TO GLACIER BAY NATIONAL PARK IN LAST 10 YEARS	16
III. TRIP CHARACTERISTICS.....	17
HIGHLIGHTS	17
PARTY SIZE.....	18
PARTY TYPE.....	19
VISITED GLACIER BAY BEFORE JUNEAU.....	20
SIGHTSEEING TOURS DURING STAY IN JUNEAU	21
IMPORTANCE OF VISITING GLBA IN SELECTING CRUISE	23
ACTIVITIES ENGAGED IN DURING TRIP TO GLACIER BAY NATIONAL PARK	24
NUMBER OF HOURS RESPONDENT SPENT WHERE THEY COULD VIEW GLACIER BAY PROPER.....	25
IMPORTANCE OF DIFFERENT TRIP EXPERIENCES	25
VISITED MARGERIE AND GRAND PACIFIC GLACIERS	28
OTHER TIDEWATER GLACIER VISITED	29
WEATHER.....	31
IV. ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS.....	33
HIGHLIGHTS	33
VISITED MARGERIE AND GRAND PACIFIC GLACIERS	34
SAW OTHER CRAFT AT MARGERIE AND GRAND PACIFIC GLACIERS	35
NUMBER OF DIFFERENT TYPES OF CRAFT SEEN AT MARGERIE AND GRAND PACIFIC GLACIERS	35
V. ENCOUNTERS: ENTIRE TRIP.....	39
HIGHLIGHTS	39
SAW OR HEARD LARGE CRUISE SHIPS.....	41
NUMBER OF HOURS SAW OR HEARD LARGE CRUISE SHIPS	42
COMPARISON OF LARGE CRUISE SHIP AND OTHER MOTORIZED CRAFT ENCOUNTERS	43
HEARD OR SAW DIFFERENT KINDS OF MOTORIZED CRAFT	44
MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS: LENGTH OF TIME AND NUMBER HEARD OR SEEN.....	45
PROPELLER-DRIVEN AIRPLANES: LENGTH OF TIME AND NUMBER HEARD OR SEEN	46
HELICOPTERS: LENGTH OF TIME AND NUMBER HEARD OR SEEN	47

VI. EXPERIENCES WITH HAZE, PUBLIC ADDRESS SYSTEMS, AND ENGINE SOUNDS	48
HIGHLIGHTS	48
EXPERIENCES WITH HAZE	50
EXPERIENCES WITH PUBLIC ADDRESS SYSTEMS	50
EXPERIENCES WITH ENGINE SOUNDS	51
VII. EFFECTS OF ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS...	54
HIGHLIGHTS	54
PRESENCE OF DIFFERENT TYPES OF CRAFT AFFECTED ENJOYMENT OF MARGERIE AND GRAND PACIFIC GLACIERS	55
VIII. EFFECTS OF ENCOUNTERS: ENTIRE TRIP.....	60
HIGHLIGHTS	60
EFFECT OF ENCOUNTERS OF DIFFERENT TYPES OF CRAFT ON ENJOYMENT OF GLACIER BAY PROPER	61
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON DIFFERENT TRIP EXPERIENCES.....	62
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON VIEWING LAND ANIMALS.....	67
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON VIEWING MARINE ANIMALS.....	68
FUTURE RECOMMENDATIONS TO VISIT GLACIER BAY	68
OVERALL RATING OF TIME SPENT BOATING/CRUISING IN GLACIER BAY PROPER.....	70
IX. OPINIONS REGARDING CRUISE SHIPS IN GLACIER BAY PROPER.....	72
HIGHLIGHTS	72
AGREEMENT WITH “LARGE CRUISE SHIPS IN GLACIER BAY PROPER ARE MAJESTIC.”	73
AGREEMENT WITH “LARGE CRUISE SHIPS PROVIDED A SENSE OF SCALE WHEN VIEWING SCENERY IN GLACIER BAY.”	74
AGREEMENT WITH “LARGE CRUISE SHIPS ARE A GOOD WAY FOR A LARGE NUMBER OF PEOPLE TO VISIT GLACIER BAY PROPER.	74
AGREEMENT WITH “IT IS INAPPROPRIATE FOR LARGE CRUISE SHIPS TO BE IN GLACIER BAY PROPER.”	75
OPINION SCALE	76
X. LENGTH OF EXPOSURE EFFECTS ON VISITOR EXPERIENCE	78
XI. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS	79
CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS MEASURED	79
MEASURES OF EFFECT OF CRUISE SHIPS ON VISITOR EXPERIENCE	79
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF CRUISE SHIP ENCOUNTERS AND THE EFFECT OF CRUISE SHIPS	80
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF CRUISE SHIP ENCOUNTERS AND THE LIKELIHOOD THAT CRUISE SHIPS DETRACT FROM TRIP ENJOYMENT.....	81
<i>Predicting for whom cruise ships detracted from trip enjoyment</i>	82
SUMMARY	82
XII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM VISITOR CHARATERISTICS.....	83
CHARACTERISTICS OF CRUISE SHIP PASSENGERS MEASURED	83
MEASURES OF EFFECT OF CRUISE SHIPS ON VISITOR EXPERIENCE	83
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF CRUISE SHIP PASSENGERS AND THE EFFECT OF CRUISE SHIPS	84
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF CRUISE SHIP PASSENGERS AND THE LIKELIHOOD THAT CRUISE SHIPS DETRACT FROM TRIP ENJOYMENT.....	85
<i>Predicting for whom cruise ships detracted from trip enjoyment</i>	86
SUMMARY	88
XIII. EXPERIENCES WITH DIFFERENT FORMS OF TRANSPORT.....	89

EFFECTS OF CRUISE SHIPS RELATIVE TO OTHER FORMS OF TRANSPORT.....	89
DOES THE NUMBER OF CRUISE SHIPS AFFECT ENCOUNTERS WITH OTHER FORMS OF TRANSPORT AND RATINGS OF THEIR DETRACTION?	90
DO ENCOUNTERS WITH ONE TYPE OF CRAFT AFFECT EXPERIENCES WITH OTHER TYPES OF CRAFT?	90
XIV. SOCIAL VALUE CONFLICT	94
RECREATIONAL CONFLICT OVERVIEW	94
APPLYING THE CONFLICT FRAMEWORK TO CURRENT RESEARCH	95
<i>Measure of problem/conflict</i>	95
<i>Measure of social value conflict</i>	96
ANALYSES	96
<i>Source of conflict for those who saw/heard cruise ships</i>	96
<i>Estimating additional detraction effects due to social value conflict</i>	97
DISCUSSION	97
XV. SUMMARY AND IMPLICATIONS.....	99
OBJECTIVE 1: HOW DO CRUISE SHIPS AFFECT, IF AT ALL, CRUISE SHIP PASSENGERS' EXPERIENCES IN GLACIER BAY PROPER?	99
<i>Recalled encounters with cruise ships</i>	99
<i>General and specific effects of cruise ships</i>	100
<i>Measures of overall trip satisfaction</i>	103
<i>Rated detraction due to cruise ships and encounters with other craft</i>	104
<i>Implications</i>	104
OBJECTIVE 2: WHAT ARE ESTIMATED EFFECTS FOR CRUISE SHIP PASSENGERS UNDER THE RECORD OF DECISION MAXIMUM USE LEVEL OF 2 CRUISE SHIPS PER DAY, EVERY DAY?	104
<i>Implications</i>	105

List of Figures

Figure C- 1. Cruise ship passenger survey respondent's age	12
Figure C- 2. Cruise ship passenger survey respondent's gender	12
Figure C- 3. Highest level of formal education completed by cruise ship passenger survey respondents....	13
Figure C- 4. Residence location of cruise ship passenger survey respondents	14
Figure C- 5. Ethnicity and race of cruise ship passenger survey respondents.....	15
Figure C- 6. First trip to GLBA for cruise ship passenger survey respondents	16
Figure C- 7. Number of trips to GLBA in last 10 years for cruise ship passenger survey respondents.....	16
Figure C- 8. Party size of cruise ship passenger survey respondents.....	18
Figure C- 9. Type of party for cruise ship passenger survey respondents	19
Figure C- 10. Cruise ship passenger survey respondents' self-reported order of visits	20
Figure C- 11. Actual order of visits for cruise ship passenger survey respondents, based on known cruise ship itineraries.	21
Figure C- 12. Purchased a tour prior to arriving in Juneau	22
Figure C- 13. Tours taken in Juneau	22
Figure C- 14. Importance of visiting GLBA in selecting cruise	23
Figure C- 15. Activities engaged in by cruise ship passenger survey respondents during trip to Glacier Bay National Park.....	24
Figure C- 16. Number of hours cruise ship passenger survey respondent spent where he/she could view Glacier Bay proper	25
Figure C- 17. Percent of cruise ship passenger survey respondents who reported visiting Margerie and Grand Pacific glaciers	29
Figure C- 18. Other tidewater glaciers visited	30
Figure C- 19. Percent of cruise ship passenger survey respondents who visited Reid glacier by number of cruise ships in the bay per day	30
Figure C- 20. Percent of cruise ship passenger survey respondents who experienced different kinds of weather	31
Figure C- 21. Percent of time cruise ship passenger survey respondents experienced different types of weather.	32
Figure C- 22. Percent of cruise ship passenger survey respondents who visited Margerie and Grand Pacific glaciers	34
Figure C- 23. Percent of cruise ship passenger survey respondents who saw other craft at Margerie and Grand Pacific glaciers	35
Figure C- 24. Number of large cruise ships seen by cruise ship passenger survey respondents at Margerie and Grand Pacific glaciers.....	36

Figure C- 25. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers by number of cruise ships in the bay	36
Figure C- 26. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers: Current conditions versus Maximum of 2 cruise ships every day	37
Figure C- 27. Number of kayaks seen by cruise ship passenger survey respondents at Margerie and Grand Pacific glaciers	37
Figure C- 28. Number of propeller-driven airplanes seen by cruise ship passenger survey respondents at Margerie and Grand Pacific glaciers	38
Figure C- 29. Number of helicopters seen by cruise ship passenger survey respondents at Margerie and Grand Pacific glaciers	38
Figure C- 30. Percent of respondents who saw or heard large cruise ships by number of cruise ships in the bay	41
Figure C- 31. Percent of cruise ship passenger survey respondents who saw or heard large cruise ships: Current conditions versus maximum of two cruise ships per day	42
Figure C- 32. Number of hours cruise ship passenger survey respondents saw cruise ships in Glacier Bay proper	42
Figure C- 33. Heard different kinds of motorized craft.....	44
Figure C- 34. Number of hours motorized craft other than large cruise ships were heard or seen	45
Figure C- 35. Number of motorized craft other than large cruise ships heard or seen.....	45
Figure C- 36. Length of time propeller-driven airplanes were heard or seen	46
Figure C- 37. Number of propeller-driven airplanes heard or seen	46
Figure C- 38. Number of hours helicopters were heard or seen.....	47
Figure C- 39. Number of helicopters heard or seen	47
Figure C- 40. Percent of cruise ship passenger survey respondents who experienced haze from different types of vessels.....	50
Figure C- 41. Percent of cruise ship passenger survey respondents who experienced public address systems from different types of vessels	50
Figure C- 42. Experiences with engine sounds from watercraft	51
Figure C- 43. Experience with engine sounds from aircraft	51
Figure C- 44. Effect of hearing small cruise ships or tour boat engines on trip enjoyment	52
Figure C- 45. Effect of hearing propeller-driven airplane engines on trip enjoyment	52
Figure C- 46. Effect of helicopter engines on trip enjoyment.....	53
Figure C- 47. Effect of seeing large cruise ships at Margerie and Grand Pacific glaciers.....	57
Figure C- 48. Effect of seeing motorized water craft other than large cruise ships at Margerie and Grand Pacific glaciers	57
Figure C- 49. Effect of seeing kayaks at Margerie and Grand Pacific glaciers	58
Figure C- 50. Effect of seeing propeller-driven airplanes at Margerie and Grand Pacific glaciers	58
Figure C- 51. Effect of seeing helicopters at Margerie and Grand Pacific glaciers	59
Figure C- 52. Average importance ratings by average effect ratings for each type of trip experience	66

Cruise Ship Passenger Survey

Figure C- 53. Average importance ratings by average effect ratings for each trip experience dimension ...	66
Figure C- 54. Effect of encounters with large cruise ships on viewing of land animals	67
Figure C- 55. Effect of encounters with large cruise ships on viewing of marine animals.....	68
Figure C- 56. Likelihood of recommending a friend or family member visit Glacier Bay on the cruise ship	70
Figure C- 57. Overall rating of time spent boating/cruising in Glacier Bay proper.....	71
Figure C- 58. Agreement with “Large cruise ships in Glacier Bay proper are majestic”	73
Figure C- 59. Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay”	74
Figure C- 60. Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper”	75
Figure C- 61. Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper.”	75
Figure C- 62. Distribution of opinion scale scores.....	77
Figure C- 63. Detraction scale score for different education levels and opinion scores	85
Figure C- 64. Likelihood of cruise ships detracting for different agreement levels with cruise ships being in Glacier Bay proper	88
Figure C-65. Percent of all cruise ship respondents who reported detraction effects due to large cruise ships	101
Figure C-66. Percent of all cruise ship respondents who reported detraction effects due to motorized water craft other than large cruise ships.....	102
Figure C-67. Percent of all cruise ship respondents who reported detraction effects due to aircraft.....	102

List of Tables

Table C-1. Percent of cruise ship passengers entering Glacier Bay proper on one- and two-cruise ship in the bay days.....	3
Table C-2 Summary of non-response analyses for Cruise Ship Passenger Mail Survey.	6
Table C-3. Weighted and unweighted findings of key variables.	8
Table C-4. Internal consistency measure (Cronbach's alpha) for each importance dimension	27
Table C-5. Importance ratings for trip experience scales.....	28
Table C-6. Trip weather experience categories.....	32
Table C-7. Percent of cruise ship passenger survey respondents who encountered different kinds of craft.	43
Table C-8. Average number of hours different kinds of craft were heard or seen by cruise ship passenger survey respondents who saw that kind of craft	43
Table C-9. Effects of different types of craft for cruise ship passenger survey respondents who visited Margerie and Grand Pacific glaciers	56
Table C-10. Effects of different types of craft for cruise ship passenger survey respondents who saw/heard craft at Margerie and Grand Pacific glaciers.....	56
Table C-11. Effect of different craft on enjoyment of Glacier Bay proper: Percent of all respondents.....	62
Table C-12. Effect of different craft on enjoyment of Glacier Bay proper: Percent who saw craft.....	62
Table C-13. Internal consistency measure (Cronbach's alpha) for each dimension	64
Table C-14. Effects of large cruise ships on cruise ship passengers' trip experiences	65
Table C-15. Effect of experience with different craft on cruise ship passengers' future recommendations.	70
Table C-16. Correlations among agreement with opinion statements.....	75
Table C-17. Characteristics of cruise ships used as predictors in regression analyses.....	79
Table C-18. Characteristics of cruise ships that were significant predictors of effects of cruise ships.....	80
Table C-19. Summary of model for effects of cruise ships measured by cruise ship effect score for cruise ship passengers	81
Table C-20. Visitor characteristics used as predictors in regression analyses	83
Table C-21. Cruise ship passenger characteristics that were significant predictors of effects of cruise ships	84
Table C-22. Summary of model for effects of cruise ships measured by cruise ship effect score for cruise ship passengers	84
Table C-23. Model summaries for predicting likelihood that cruise ships detracted from trip enjoyment..	86
Table C-24. Summary of model with one predictor variable	86
Table C-25. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip.....	89
Table C-26. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip.....	90

Cruise Ship Passenger Survey

Table C-27. Measures used in analysis of relationships between encounters with various forms of transport and ratings of their detraction.....	91
Table C-28. Significant relationships between encounters with one type of craft and detraction measures for a different type of craft: Results of correlation and logistic regression analyses.	92
Table C-29. Summary of variables related to social value conflict	96
Table C-30. Source of conflict for other tour-boat respondents.....	97
Table C-31, Estimated increase in detraction rates for all cruise ship passengers for four trip experiences with highest detraction rates under current conditions.....	105

I. INTRODUCTION AND METHOD

Glacier Bay National Park and Preserve (GLBA) is a large park that most visitors experience as passengers on watercraft. The managers of GLBA are pursuing a research initiative arising from the vessel management planning process. This research is designed to assess whether cruise ships in Glacier Bay are affecting, a) the environment, and b) visitor experiences (See General Introduction for more background). This study is part of the research program that examined whether cruise ships affect visitor experiences.

The vast majority of visitors to GLBA are cruise ship passengers. Between 2002 and 2006, the percentage of all GLBA visitors who were cruise ship passengers increased steadily from 89% to 97%. In 2006, 278,573 of the 400,935 cruise ship visitors (69%) visited between June 1 and August 31. Because the number of seasonal cruise ship use days increased, starting in 2007, more visitors to GLBA will come by cruise ship and more of these visits will occur between June and August. Typically, cruise ships visit GLBA as part of a seven day cruise, and spend eight or nine hours in the park (FEIS, 3-76). Thus, for the purposes of this research, cruise ship passengers are classified as a type of single-day, motorized visitors.

Goals of the mail survey of Passengers aboard large cruise ships

The Cruise Ship Passenger Mail Survey was designed to address the research questions identified for the research program as a whole.

1. How do cruise ships affect, if at all, cruise ship passengers' experiences in Glacier Bay proper?
 - a. Which dimensions of cruise ship passengers' experiences in Glacier Bay proper, if any, do cruise ships affect?
 - b. If cruise ships affect cruise ship passengers' experiences in Glacier Bay proper, which features of cruise ships have effects?
2. What are estimated effects for cruise ship passengers under the Record of Decision maximum use level of 2 cruise ships per day, every day?
3. How do the effects of cruise ships on cruise ship passengers' experiences in Glacier Bay proper compare to the effects of other forms of mechanized transport?

Survey design and questionnaire development

The survey procedures and questionnaires were developed in conjunction with staff at GLBA. Survey questions were written based upon discussions with NPS staff, review of related literature, and qualitative interviews with park visitors during the summer of 2007 (see General Intro for details). To the extent possible, the questionnaires for each park user group included the same questions to allow comparison among the different groups.

The survey included an on-site questionnaire and a mail questionnaire (See Appendices C and G). The on-site questionnaire consisted of eight questions that asked about general demographics, traveling party characteristics, tours planned for Juneau, and whether the party had already visited Glacier Bay proper during their cruise. (Additionally, visitors were asked to provide their name and address to receive the mail questionnaire.) This descriptive information was used in determining whether the final sample of completed mail surveys was representative of passengers aboard cruise ships (i.e., whether non-response had biased the sample).

The mail questionnaire included questions about trip experiences, encounters with cruise ships and other motorized craft (in all areas of Glacier Bay, and specifically, at Margerie and Grand Pacific Glaciers),

Cruise Ship Passenger Survey

effects of cruise ships and other motorized craft on different aspects of the trip, attitudes about cruise ships in GLBA, and general demographics.

Drafts of these questionnaires were peer-reviewed and revised based on feedback. The revised questionnaires were reviewed and approved by the Office of Management and Budgeting under the full review process.

Sampling and visitor contact procedures

The results of the Cruise Ship Passenger Mail Survey represent the population of all visitors over the age of 17 who visited Glacier Bay proper via cruise ship between June 27, 2008 and August 31, 2008. Cruises that visited Glacier Bay proper all included a stop in Juneau, AK (either before or after their visit to GLBA). A large proportion of passengers on those ships disembark in Juneau to shop or sightsee, providing an opportunity for survey workers to make a brief contact and administer the on-site questionnaire. Logistical scoping during the summer of 2007 informed the visitor contact procedures.

Cruise Line Agencies of Alaska provides a cruise ship calendar for each year that lists the times that different ships will be in each port for each voyage during the summer season. Based on the cruise ship calendar it was possible to determine the dates that each ship would be in GLBA and Juneau. This information in conjunction with the park cruise ship schedule served as the basis for the cruise ship passenger survey sampling plan.

Probability-proportionate-to-size (PPS) sampling was used so that each person in the target population had the same probability of being selected. Probability-proportionate-to-size refers to a type of multi-stage sampling in which clusters (in this case, ships) are selected, not with equal probabilities but with probabilities proportionate to their sizes—as measured by the number of units to be sub-sampled (in this case passengers) (Babbie 2005). Because all ships were to have the same number of visitors sampled from them, larger ships had higher probabilities of being sampled than smaller ships. As ships make multiple cruises to Glacier Bay proper each summer, clusters were defined by ship-voyages (e.g., 1st cruise by ship A). Using the probabilities calculated by PPS, randomly selecting ship-voyages and then randomly selecting individuals from that ship was expected to produce a representative sample of visitors to Glacier Bay proper.

The original sampling plan for June 1 to August 31, 2008 used PPS sampling to select ship-voyages while maintaining the 1:2 ratio of one- and two-cruise ships in the bay days. However, with the start of sampling delayed until June 27 (see General Introduction), there were more constraints and the revised sampling plan resulted in 24% (rather than 33%) of the ship-voyages being on one-cruise ship in the bay days. Because the final sample was weighted to reflect the actual percentage of passengers visiting on one-cruise ship in the bay days (see below), this change does not affect the representativeness of the data. However, because the number of visitors sampled on one-cruise ship in the bay days was less than originally planned, the power for the tests comparing one- and two-cruise ship in the bay days was reduced. The reduction in power was partially offset by the higher than anticipated response rate to the mail survey resulting in a larger sample of completed mail surveys than planned ($n = 406$ vs. $n = 384$, respectively). The net effect of these two changes in sampling resulted in power being reduced from the planned 80% to 75.3%.¹

The sampling plan and procedures also resulted in a sample that did not reflect the actual breakout of passengers entering on one- and two-cruise ship in the bay days. Per actual visits reported by the park, 18% of cruise ship passengers entered Glacier Bay proper on one-cruise ship in the bay days (see Table C-1). In

¹ The power calculation assumes the same expected percentage differences and alpha level as planned. Thus, the 75.3% was not the actual final power but rather reflects the reduction in power due to the change in sampling.

comparison, 25.1% of cruise ship passengers agreeing to participate and 26.4% of cruise ship passengers returning their mail surveys were contacted on one-cruise ship in the bay days. Thus, simple aggregation of the sample data would not represent current conditions. In order to represent current conditions, the data were weighted to reflect the actual percentage of cruise ship passengers entering on one- and two-cruise ships days (18% versus 82%, respectively).

Table C-1. Percent of cruise ship passengers entering Glacier Bay proper on one- and two-cruise ship in the bay days

	Entered Glacier Bay on	
	1 cruise ship in bay day	2 cruise ships in bay day
Actual 2008 visitation for sampling period	18.0%	82.0%
Contacts (n = 670)	23.5%	76.5%
Participate (n = 487)	25.1%	74.9%
Mail survey (n = 405)	26.4%	73.6%

Passengers were contacted by the survey worker as they disembarked in Juneau. The interval between passengers who were selected for the sample was set by dividing the amount of time in which passengers consistently left a particular ship by the number of passengers needed to fulfill the sampling plan. The width of the gangplank dictated that the vast majority of individuals walk single-file. At each time when a passenger was to be selected, the survey worker identified a passenger leaving the gangplank, approached, introduced the survey, and asked him or her to participate. If the passenger refused to participate, the survey worker logged the time, party size, and gender of the refusing individual. After such a refusal, the next individual was stopped and asked to participate. The on-site questionnaire took approximately 3 minutes to complete (see Appendix C). Respondents completed the on-site questionnaire and returned it to the survey worker. The survey worker thanked the person for his or her participation.

Of the 670 cruise ship passengers contacted, 487 (72.7%) agreed to participate in the mail survey. Because the refusal rate exceeded the anticipated 20%, analyses were conducted to determine if those who refused to participate in the mail survey differed systematically from those who agreed to participate. These analyses are reported below in the Non-response section.

Administration of mailings

Mailings were administered by employees of the Protected Area Social Research Unit (PASRU) in Seattle, Washington. The names and addresses from the contact sheets were entered by the survey worker and sent electronically to the PASRU where they were compiled into a database. This database served as the basis for administering the mailings. All visitors who provided a name and address were mailed a questionnaire, a map of GLBA, and a cover letter from the PASRU. Respondents were instructed to complete the questionnaire and return it by mail in the postage-paid envelopes. As a follow-up, all respondents were sent a thank you/reminder letter about one week after they received the questionnaire. Non-respondents received a second reminder letter and an additional copy of the questionnaire about 14 days after the first reminder letter. For those who did not respond after the second reminder, a third reminder letter was sent about 14 days after the second reminder letter. This multi-phased approach is the recommended technique to maximize response rates (Dillman 2000). Of the 487 visitors who agreed to participate in the survey, 1 did not provide a mailing address and 7 were returned due to incorrect or out-of-date addresses. The final response rate was 85.1%, with 406 of 487 questionnaires completed and entered in the data file.

Statistical considerations

Consistent with convention, statistical significance was set at the **.05 level** for analyses included in this report. Statistical tests with p -values equal to or less than .05 are interpreted as indicating effects that are reliable or real (there is a probability of 5 percent or less that the observed effects are due to chance alone). Although the analyses highlight statistically significant effects, they do not reveal whether effects have important practical implications. Some effects that fall just short of the .05 significance level may have large practical implications while other effects with high statistical significance may have no practical implications. Thus, it is important to consider both the statistical significance and the practical implications of these data.

Limitations

The Cruise Ship Passenger Mail Survey has several general limitations that should be kept in mind when interpreting the data. 1) In all surveys, it is assumed that respondents provide accurate and honest answers to the questions asked. 2) The data represent visitor attitudes, opinions, and evaluations of their experience at a particular point in time (i.e., the time of the survey) and people's attitudes, opinions, and experience evaluations are dynamic so changes can occur at any time. 3) Statistical inferences can only be made for the subset of GLBA visitors who were passengers on cruise ships. In addition, there are other limitations noted in the body of the report that are due to the manner in which individual questions were interpreted. Finally, there are limitations that revolve around the issue of non-response (i.e., possible bias in the sample due to differences between the visitors who completed the questionnaires and those who didn't). Potential limitations associated with non-response are discussed below.

Non-response

There were two points at which visitors could elect not to participate in the survey. The first point was when the fieldworker approached them, introduced the study, and asked them to participate. The second point was when visitors who received the mail survey chose whether to complete and return it. Because decisions whether to participate are unlikely to be random, the survey responses of visitors who agree to participate may differ from those who do not. In that case, the sample data will not accurately represent the population. Such inaccuracy is said to be the result of non-response bias.

Potential non-response bias is generally assessed by comparing respondents to non-respondents for all known characteristics. In this survey, visitors who completed the on-site questionnaire but failed to return the mail questionnaire were more fully described than visitors who refused to participate on-site (and provided no information beyond what the survey worker could observe). However, the rate of on-site refusals was higher than anticipated (27.3% vs. 20.0%) -- high enough to create the potential for non-response bias. Accordingly, two sets of non-response analyses were conducted, one to determine if visitors who refused to participate on-site differed from those who agreed to participate when initially contacted, and the second to determine whether visitors who were sent the mail questionnaire and failed to return it differed from visitors who returned the questionnaire. Each set of analyses is described below.

It should be noted that although the rate of on-site refusals was higher than anticipated, that increase may have been partially or entirely offset if those visitors who did agree to participate were more likely to return their mail questionnaires. Results from prior surveys suggest that such an offsetting effect is possible. The scenario that explains such an effect is: a) some portion of any target population is made up of individuals who are relatively unwilling to participate in surveys, b) when the circumstances of the initial contact make it awkward for such persons to refuse participation, they are likely to become non-respondents at a later time, therefore c) changes in the rate of on-site refusal are often offset by changes in the mail survey response because the unwilling individuals simply drop out of the sample at different times.

Refusal non-response analyses

To determine if visitors who refused to participate in the survey at all differed from those who agreed to participate, a series of statistical tests were done to identify differences between visitors who agreed to participate and those who refused. Specifically, possible differences were assessed using Chi-square tests for independence or *t*-tests to determine whether response rates were independent of a particular characteristic (using a .05 significance level). The characteristics that were used in assessing possible refusal non-response bias were: 1) gender, 2) party size, 3) weather, 4) fieldworker, 5) ship, and 6) whether visitors were contacted as they disembarked or as they returned to the ship. Statistically significant differences in response rates were found for three of these six variables. Each of the differences will be discussed below.

The standard protocol was to contact passengers as they disembarked. However, for one voyage of the Sapphire Princess, the temporary survey worker arrived in Juneau too late to contact visitors as they disembarked. Rather than miss all the contacts for this voyage, he made contacts during the afternoon as visitors returned to the ship. He found that visitors were eager to return to the ship and were less willing to participate (32 out of 55 refused). Analyses found that refusal rates were significantly higher for visitors contacted as they returned to the ship (58.2%) than visitors contacted as they disembarked (24.8%), $\chi^2(1, 672) = 28.21, p < .001$. Because the number of visitors involved is such a small percentage of the whole sample, the survey results should not be biased by this difference in refusal rates. The remaining analyses of refusals were done only on passengers contacted as they disembarked.

Refusal rates were significantly higher for males (28.5%) than females (21.6%), $\chi^2(1, 614) = 3.84, p = .050$. Because the information of greatest interest was collected in the mail survey, the issue of greatest concern is not whether the visitors who refused differed from those who agreed to participate, but whether the final sample of visitors who completed the mail questionnaire represents the target population. In order to assess the representativeness of the final sample, further analyses compared visitors who participated fully in the study (i.e., completed the on-site contact sheet and the mail survey) with those who did not participate fully (i.e., refused to participate or only completed the contact sheet). These analyses of full participation found no significant differences between male and female visitors (59.7% and 65.2%, respectively), $\chi^2(1, 614) = 2.01, p = .156$.

Because there were no significant gender differences in participation rates for the complete survey, non-response bias of the mail survey due to gender was unlikely. However, because more men refused to participate in the on-site contact sheet, analyses were done to determine if there were gender differences on the other contact sheet variables. The only significant gender difference was for party type, $\chi^2(2, 480) = 14.08, p = .001$. Compared to males, females were less likely to travel with family (70.6% vs. 82.1%, respectively) and more likely to travel with friends (17.2% vs. 6.0%). This finding is reported in the body of the report below.

On average, visitors who refused to participate in the survey were from smaller parties than visitors who agreed ($M = 2.5$ and $M = 3.7$, respectively), $t(611) = 4.46, p < .001$. Analyses examining whether party sizes differed for visitors who did or did not participate fully in the complete survey (i.e., contact sheet and mail survey) found no significant differences ($M = 3.6$ and $M = 3.0$, respectively), $t(582) = -1.72, p = .087$.² However, because visitors from smaller parties were less likely to participate in the on-site contact sheet, analyses were done to determine if there were differences in party size for the other contact sheet variables. Two significant differences were found. The first was for party type, $F(4, 474) = 35.97, p < .001$. Visitors travelling with “Family and friends” and visitors travelling in “Other types of parties” were travelling in

² The *t*-test reported here does not assume equal variances because the Levene’s test for equality of variances was significant $p = .026$.

Cruise Ship Passenger Survey

larger parties ($M = 7.3$ and $M = 20.0$ versus M 's less than or equal to 4.0). The second significant difference was for whether visitors planned tours in Juneau, $F(3, 478) = 3.04, p = .029$; Visitors who "Didn't know/Hadn't decided" were travelling with larger parties ($M = 7.4$ vs. M 's less than or equal to 4.6). Further examination revealed that this effect was being driven by one person who reported travelling with 51 visitors as part of an Eastern Star group. When this person was excluded, there were no significant differences for party type. These two findings are reported in the body of the report below.

Mail survey non-response analyses

A variety of data from the on-site questionnaire provided an opportunity for the use of statistical tests to identify differences between respondents and non-respondents to the mail questionnaire. Specifically, possible differences were assessed using Chi-square tests for independence or t -tests to determine whether response rates were independent of specific visitor characteristics (using a .05 significance level). The visitor characteristics that were used in assessing possible non-response bias were party size, type of personal group, whether they had visited Glacier Bay proper before visiting Juneau, gender, age, location of residence, whether they had planned tours in Juneau and which tours they planned to take, whether they visited on one versus two cruise ships in the bay, and which survey worker contacted them to participate in the study.

Statistically significant differences in response rates were found for one of the eighteen visitor characteristics listed above. This finding is reported in Table C-2.

Table C-2 Summary of non-response analyses for Cruise Ship Passenger Mail Survey.

Characteristic	Statistical Result	Description of finding
Type of party	$\chi^2(2, 480) = 10.15, p = .006$ (combined "Individual" with Family and "Family and Friends" with "Other" and to eliminate frequency < 5)	Cruise passengers travelling with "Family and Friends" or "Other party type" were less likely to return the mail questionnaire whereas people in parties that were comprised of "Individual", "Family," or "Friends" were more likely to return the mail survey.

Because it was possible that visitors' experiences of Glacier Bay proper differed based on party type, key dependent measures of people's experiences with cruise ships were selected and a comparison was made between unweighted results and results weighted to correct for the observed difference in response. The key dependent measures were 1) whether visitors saw large cruise ships during their trip, 2) how seeing or hearing large cruise ships affected visitors' enjoyment of Glacier Bay proper, 3) how the presence of large cruise ships affected visitors' enjoyment of Margerie/Grand Pacific glaciers, and 4) Overall rating of time spent boating in Glacier Bay proper.

Table C-3 summarizes the unweighted and weighted findings for this variable. As can be seen, none of the weighted findings differ by even 1 percent (the largest difference was 0.8 percent). Given the small differences on these key variables, the difference in response rates observed were deemed unlikely to bias the findings and conclusions of the cruise ship passenger survey.

Cruise Ship Passenger Survey

Table C-3. Weighted and unweighted findings of key variables.

Variable/ Response option	Party type	
	Findings (not weighted)	Weighted Findings
Saw large cruise ships		
No	59.6	59.8
Don't Know	4.5	4.7
Yes	35.8	35.6
How seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper		
Did not see	64.6	64.8
Detracted greatly	0.5	0.5
Detracted somewhat	4.5	4.5
No effect	28.1	27.9
Added somewhat	1.3	1.2
Added greatly	1.0	1.0
How the presence of large cruise ships affected their enjoyment of Margerie/Grand Pacific glaciers		
Did not see	65.4	64.7
Detracted greatly	0.0	0.0
Detracted somewhat	4.7	4.7
No effect	25.2	26.0
Added somewhat	2.8	2.8
Added greatly	1.9	1.9
Overall rating of time spent boating in Glacier Bay proper		
Extremely poor	0.3	0.2
Very poor	0.0	0.0
Poor	0.8	0.7
Good	7.8	7.6
Very good	32.7	32.6
Extremely good	58.5	58.8

Accuracy of the sample

Assuming a random sample and questions of the yes/no type in which the true occurrences of these values in the population are 50%/50%, the data from the larger sample from the contact sheet (i.e., 487 respondents) can be generalized to the target population with a 95 percent assurance that the obtained or observed percentages to any item will vary no more than $\pm 4.4\%$. Assuming a random sample and questions of the yes/no type in which the true occurrences of these values in the population are 50%/50%, the data from the smaller sample from the mail survey (i.e., 405 respondents) can be generalized to the target population with a 95 percent assurance that the obtained or observed percentages to any item will vary no more than $\pm 4.8\%$.

Subject to the limitations stated previously, the authors generally believe that the data are representative of persons over the age of 17 who visited Glacier Bay proper and were passengers on cruise ships during the time of the survey. This confidence is based on the large sample size, the fact that deviations from the sampling plan were relatively minor, and that corrections for differences in response rates were extremely small for key questions.

Estimates for current and maximum allowed seasonal use days

Cruise ship use level during the 2008 peak season was 153 seasonal use days (a.k.a. current conditions). This level of use corresponds to a 1:2 ratio of 1-cruise-ship in the bay days and 2-cruise-ships in the bay days. This ratio held true during the 2008 sampling period. As the day-boat sample was representative of visitors during the 2008 peak season, the best estimates for current conditions (153 seasonal use days) were observed effects for all respondents to the survey.

The maximum allowed under the Record of Decision is two cruise ships entering the bay every day. Day-boat visitors are typically single day visitors and thus, under the maximum-allowed conditions they should experience conditions comparable to current day-boat passengers who visit the bay on 2-cruise ships in the bay days. If analyses examining differences between day-boat passengers who entered on 1-cruise-ship days and those who entered on 2-cruise-ship in the bay days were statistically significant, then the best estimates of future effects of day-boat visitors are observed effects for day-boat passengers who enter Glacier Bay on 2-cruise ships in the bay days. However, if analyses showed no significant difference in day-boat visitors' responses due to 1- and 2-cruise ships in the bay days, then it was assumed that there would be no significant change when increasing cruise ship use levels to the maximum-allowed conditions of all 2-cruise ships in the bay days. The maximum allowed estimate in these cases was the observed effect for all respondents (i.e., same as current conditions).

Comparisons between current conditions and the maximum allowed were made on key variables. It should be noted that differences, if any, between current conditions (66% are 2-cruise ship days) and the maximum allowed (100% 2-cruise ship days) will be smaller than observed significant differences between 1- and 2-cruise ships in the bay days (0% and 100% 2-cruise ship days, respectively). Be that as it may, park managers will need to assess whether the observed differences in rates are 1) practically meaningful and 2) acceptable.

Conventions followed in this report

As mentioned previously, an on-site questionnaire and a mail questionnaire were used to collect the data presented in this report. These questionnaires are included below (see Appendices C and G), and it is recommended that they be reviewed before reading the body of this report.

As noted above, the data were weighted to reflect the current mix of cruise ship passengers who visit on one- and two-cruise ship in the bay days. The only charts that do not contain weighted data are those that present the data by number of cruise ships in the bay (either one versus two-cruise ship in the bay days, or one versus two-staggered entries versus two concurrent entries). The numbers of respondents (n) reported in all charts are unweighted n's.

In the body of this report, each question is presented as it appeared on the questionnaire, followed by corresponding graphs, tables, or analyses. The specific survey instrument and question used to collect the data reported in each chart are noted in the chart titles. The number of respondents (n) whose data are represented in each chart is also reported, generally at the bottom of the chart.

When a chart reports data for a subset of respondents (*c.f. Figure C- 12. Purchased a tour prior to arriving in Juneau*), a note describes the sub-sample included in the chart.

Cruise Ship Passenger Survey

Missing data for up to 10 percent of respondents to a particular question are generally not considered likely to alter the interpretation of that question. Throughout this report, few questions had more than 10 percent missing data. Exceptions are noted in the text and charts.

It is neither possible nor desirable that this report describes all possible analyses of the data collected by the survey, or even all analyses that are potentially of interest to park managers. However, some analyses that may be of interest are briefly noted throughout this report and described as the potential focus of future work.

II. VISITOR PROFILE

A variety of demographic questions are used in this section to describe or provide a profile of cruise ship passengers. Each question is presented along with the findings in chart format. Highlights of this section are listed below.

Highlights

- The majority of cruise ship passengers were between age 50 and 69 (63.1%) and less than 10% of cruise ship passengers were under age 40. The average age of cruise ship passengers was 56.0 years. More cruise ship passengers were female than male (54.8% vs. 45.2%).
- Cruise ship passengers were highly educated with 41.3% of passengers having graduate or professional training, and the average number of years of education being 16.4 (equivalent to a college degree).
- Most cruise ship passengers were non-Alaskan U.S. residents (84.6%). Non-U.S. residents comprised 15.4% of cruise ship passengers. None of the sampled cruise ship passengers were Alaskan residents.
- The vast majority of cruise ship passengers reported that they were White (97.7%) followed by multi-racial (1.0%) and Asian (1.0%). Hispanic ethnicity was reported by 1.3% of cruise ship passengers.
- For 93.8% of cruise ship passengers, this trip was their first to Glacier Bay National Park. Most repeat visitors had visited one other time during the last 10 years.

Gender and age

Contact Sheet

3. What year were you born? 19 __ __

7. Are you: ☐ FEMALE ☐ MALE

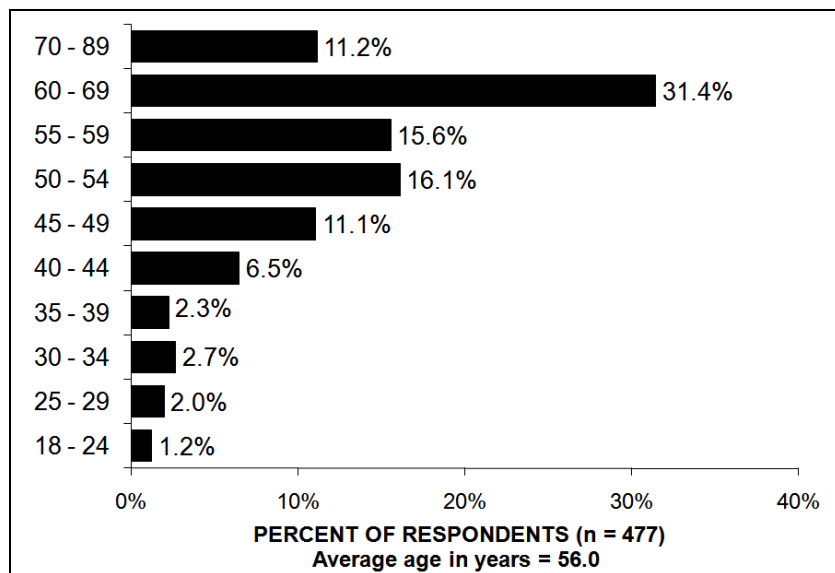


Figure C- 1. Cruise ship passenger survey respondent's age

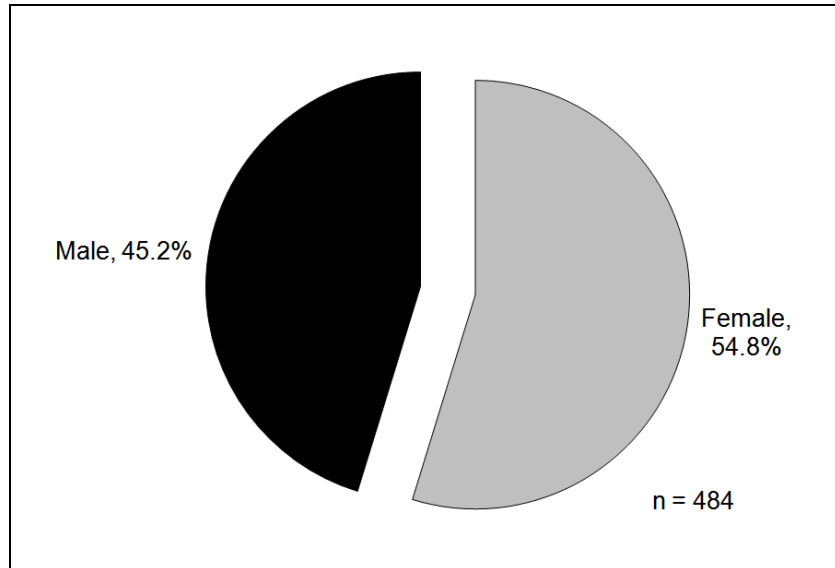


Figure C- 2. Cruise ship passenger survey respondent's gender

Education

Mail questionnaire

22. What is the highest level of formal schooling you have completed? *(Circle the appropriate number.)*

1 2 3 4 5 6 7 8 9 10 11 12

13 14 15 16

17 18 19 20 21 22 23 24+

(Elementary thru High School)

(College/Vocational)

(Graduate/Professional)

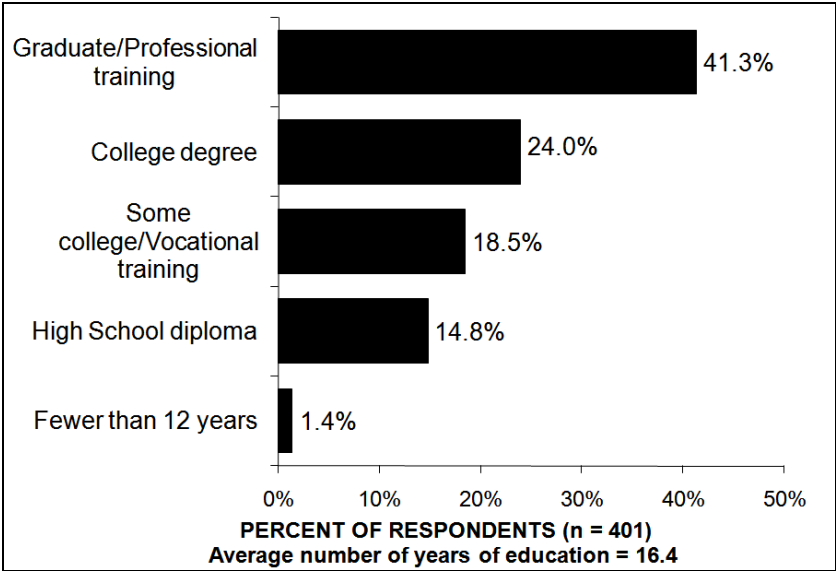


Figure C- 3. Highest level of formal education completed by cruise ship passenger survey respondents

Residence

Contact Sheet

8. What is your home Zip or Postal Code? *(If you live outside of the United States, please write the name of your country.)*

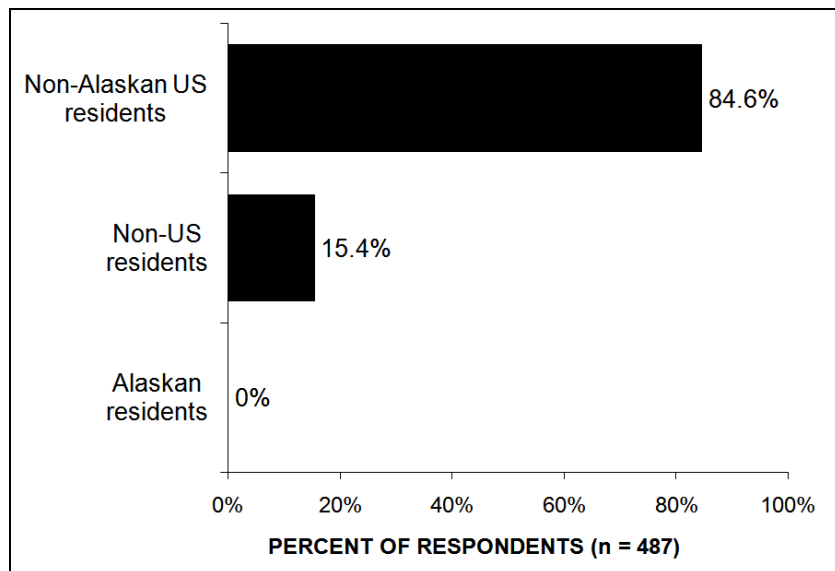


Figure C- 4. Residence location of cruise ship passenger survey respondents

Ethnicity and race

Mail Survey

23. Are you Hispanic or Latino?

- ☐ YES – Hispanic or Latino
- ☐ NO – Not Hispanic or Latino

24. What is your race? (Check one or more races to indicate what you consider yourself to be)

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or other Pacific Islander
- ☐ White

Four respondents (1%) indicated that they were multi-racial. Two indicated American Indian or Alaska Native and White, one indicated Black or African American and White, and one indicated Asian and White.

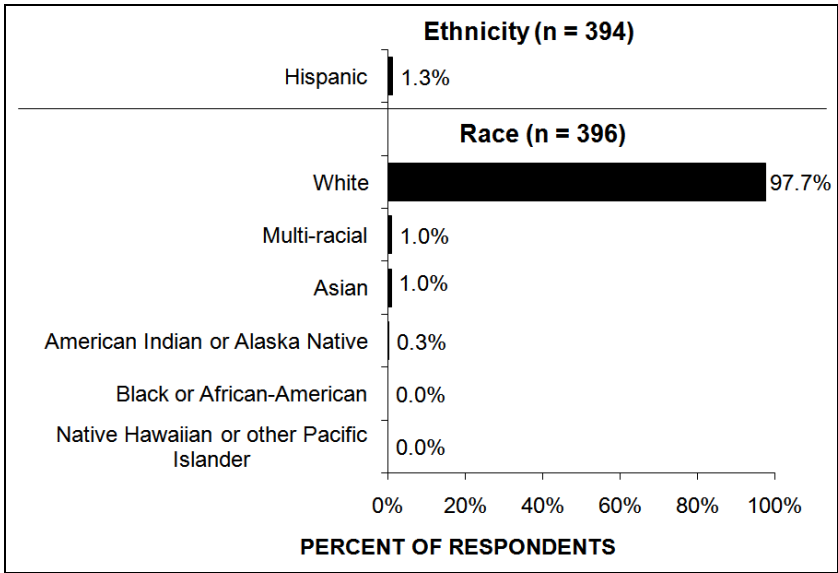


Figure C- 5. Ethnicity and race of cruise ship passenger survey respondents

Number of trips to Glacier Bay National Park in last 10 years

Mail Survey

1. Was the trip during which you were contacted your first trip to Glacier Bay National Park and Preserve?
- ☐ Yes → GO TO QUESTION 2
 - ☐ No → 1a. **Including the trip during which you were contacted**, how many times have you visited Glacier Bay National Park and Preserve in the last 10 years?

_____ NUMBER OF VISITS TO GLACIER BAY NPP IN LAST 10 YEARS

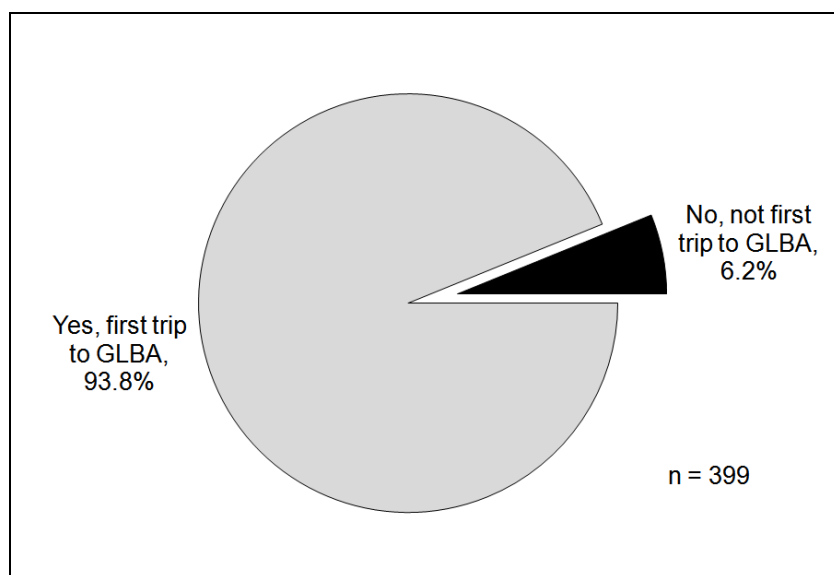


Figure C- 6. First trip to GLBA for cruise ship passenger survey respondents

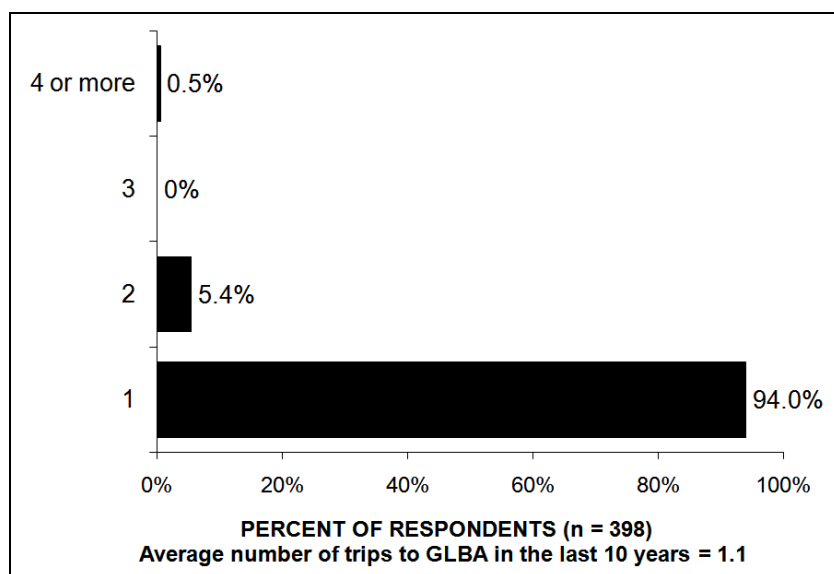


Figure C- 7. Number of trips to GLBA in last 10 years for cruise ship passenger survey respondents

III. TRIP CHARACTERISTICS

Cruise ship passengers were asked a variety of questions about their trips. In this section, each of those questions is presented along with the findings in chart format. Highlights of this section are listed below.

Highlights

- Over half (60.4%) of respondents' parties consisted of two people and the average party size was 3.7 people. Three-fourths (75.6%) of respondents were travelling with family.
- Over 85% of respondents purchased activities in Juneau prior to arriving there. The Mendenhall Glacier Tour was the most popular with 43.0% of respondents taking that tour during their stay.
- In determining their choice of cruises, 52.8% of respondents reported that visiting Glacier Bay proper was extremely important or very important. For a small percentage of respondents (8.2%) visiting Glacier Bay proper was not important in their cruise selection.
- The top four activities cruise ship passengers reported they engaged in during their trip were: 1) Viewing general scenery (95.4%), 2) Viewing tidewater glaciers (90.6%), 3) Taking photographs (89.0%), and 4) Viewing wildlife (79.4%).
- During the day they were in Glacier Bay proper, cruise ship passengers on average spent six hours in places where they could view the scenery and features of Glacier Bay. Half (50.3%) of respondents spent between 6 and 8.9 hours in places where they could view the scenery and features of Glacier Bay. About 12% spent less than four hours in places where they could view Glacier Bay.
- Two-thirds (66.7%) of respondents visited Margerie and Grand Pacific tidewater glaciers. The other tidewater glacier most frequently visited was Johns Hopkins (52.3%) followed by Lamplugh (19.1%). More than one third (35.1%) of visitors did not know/remember if they visited other tidewater glaciers and 13.6% did not know/remember if they visited Margerie and Grand Pacific tidewater glaciers.
- Most respondents reported experiencing a variety of changing weather conditions during their trip to Glacier Bay proper. The most common weather reported was "Sunny and/or partly cloudy" (59.6%) followed by "Cloudy without fog" (40.6%).
- Cruise ship passengers were asked the importance of 8 different possible trip experiences (rated on a five-point scale from 1 = not at all important to 5 = extremely important) and none of these differed for respondents visiting on one- or two-cruise ships days. Three trip experience dimensions had average importance ratings between "4 = very important" and "5 = extremely important": 1) Experience the scenic beauty, 2) Experience the wonder of nature, and 3) Pristine environment. The trip experience with the lowest average importance rating was "Solitude." It was rated on average as "3 = moderately important" and for over half of respondents solitude was at least moderately important (65% of respondents scored 3 or higher on the Solitude scale). Solitude is difficult to have in Glacier Bay without kayaking or being on a smaller boat (e.g., charter or private vessel), both of which can be costly and/or require physical skills.

Party size

Contact sheet

1. How many people are in your personal traveling party?

_____ Number of people

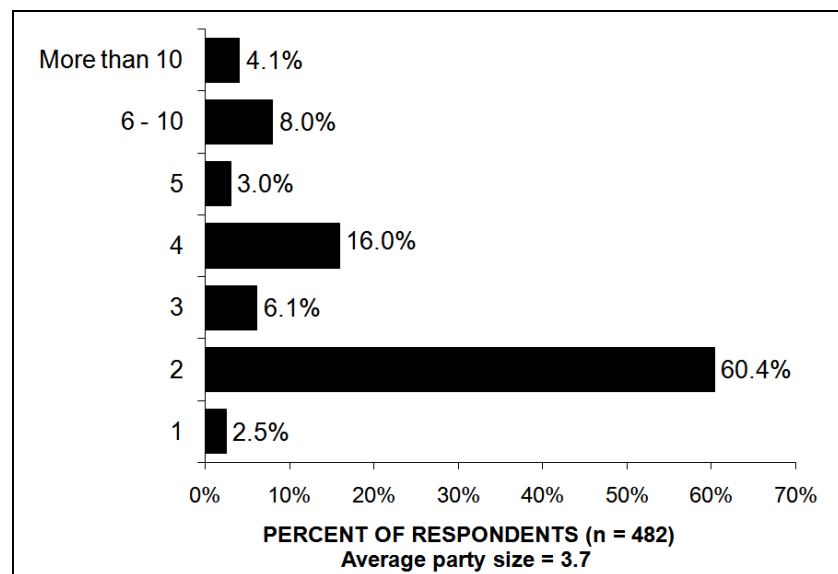


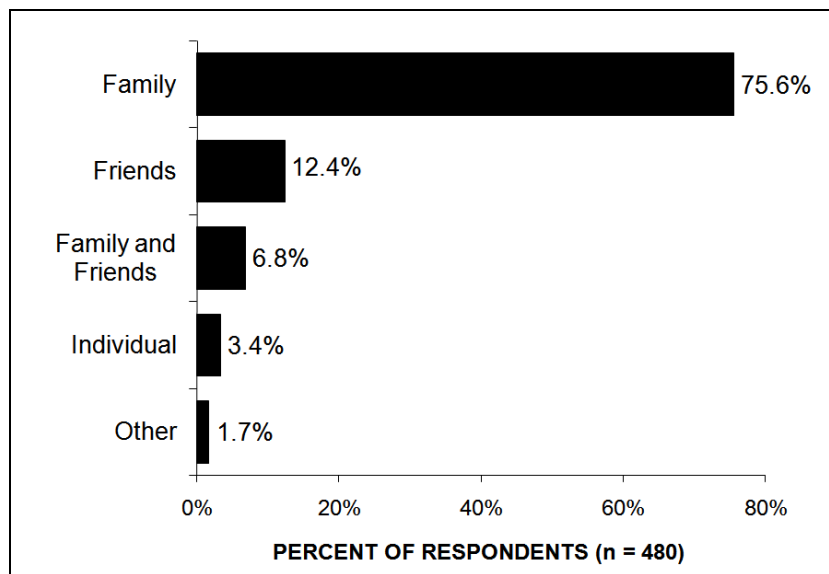
Figure C- 8. Party size of cruise ship passenger survey respondents

Party type

Contact sheet

2. Please check the makeup of your personal traveling party:

- ☐ Individual
☐ Family
☐ Friends
☐ Family and friends
☐ Other _____
(please specify)

**Figure C- 9. Type of party for cruise ship passenger survey respondents**

Non-response analyses revealed two significant differences associated with party type and these effects are reported here for completeness. First, compared to males, females were less likely to travel with family (70.6% vs. 82.1%, respectively) and more likely to travel with friends (17.2% vs. 6.0%), $\chi^2(2, 480) = 14.08$, $p = .001$. Second, visitors travelling with “Family and friends” and visitors travelling in “Other types of parties” were travelling in larger parties ($M = 7.3$ and $M = 20.0$ versus M ’s less than or equal to 4.0), $F(4, 474) = 35.97$, $p < .001$.

Visited Glacier Bay before Juneau

Contact Sheet

5. During this cruise, have you already visited Glacier Bay National Park and Preserve?

- ☐ Yes
- ☐ No
- ☐ Don't know

Depending on the cruise ship's itinerary, some cruise ship passengers contacted in Juneau had already visited GLBA whereas others were scheduled to visit the park after their stop in Juneau. The contact sheet asked passengers on cruise ships whether they had already visited GLBA. Based on the ship, the date contacted, and the cruise ship schedules, it was also possible to determine objectively whether each respondent had already visited GLBA when contacted. Whereas 37.8% of cruise ship passengers reported having already visited the park (see Figure C- 10), 45.0% actually had visited GLBA prior to arriving in Juneau (see Figure C- 11). Further examination indicated that people who actually visited were about as likely to say they had not visited (14.1%) as people who actually had not visited were likely to say they had (17.5%).

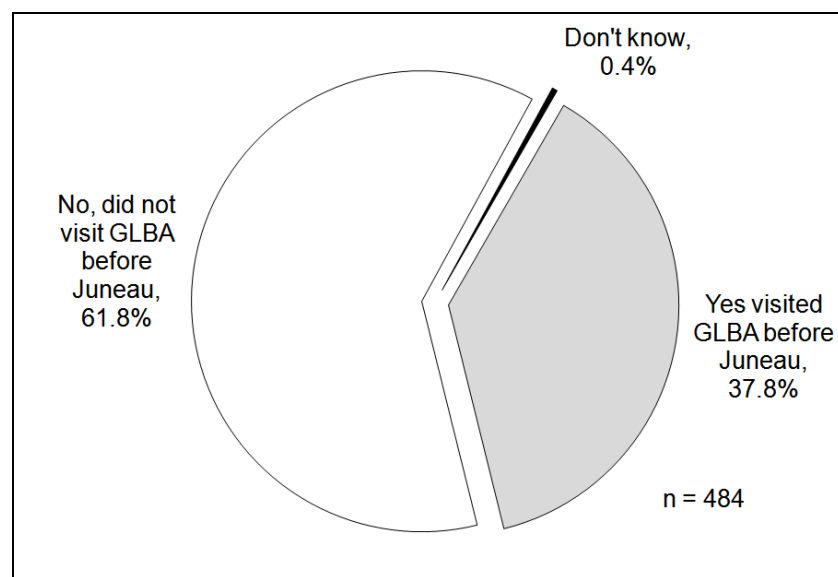


Figure C- 10. Cruise ship passenger survey respondents' self-reported order of visits

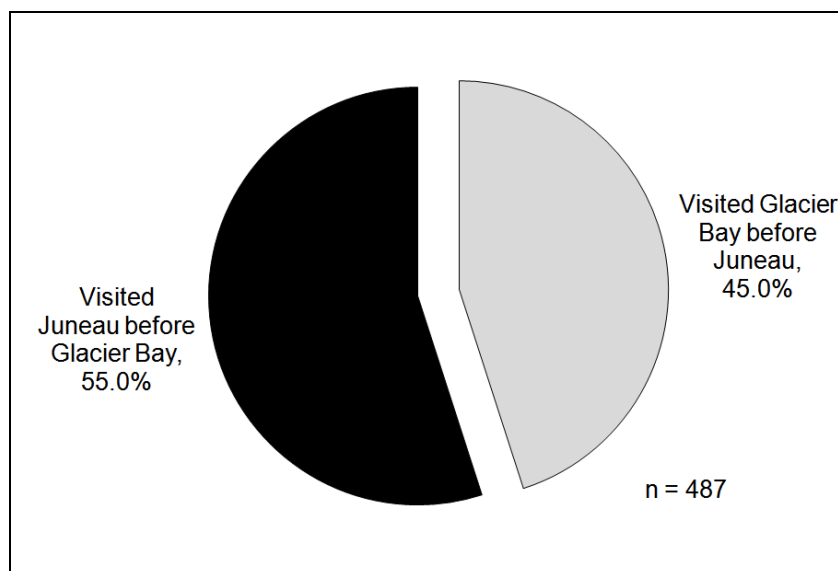


Figure C- 11. Actual order of visits for cruise ship passenger survey respondents, based on known cruise ship itineraries.

Sightseeing tours during stay in Juneau

Contact Sheet

6. Have you purchased a tour to participate in during your stay in Juneau?

- ☐ Yes, I purchased a tour prior to arriving in Juneau
- ☐ No, but I plan to purchase (take) a tour during my stay in Juneau
- ☐ No, I don't plan to take a tour during my stay in Juneau → GO TO QUESTION 7
- ☐ Don't know/Haven't decided → GO TO QUESTION 7

6a. Which tour(s) will you take during your stay in Juneau?

- ☐ Mendenhall Glacier Tour
- ☐ Mt. Roberts Tramway
- ☐ City tours (bus/van)
- ☐ Whale watching cruise
- ☐ Helicopter flightseeing
- ☐ Salmon bake
- ☐ Fish hatchery tour
- ☐ Other (please specify) _____

Cruise Ship Passenger Survey

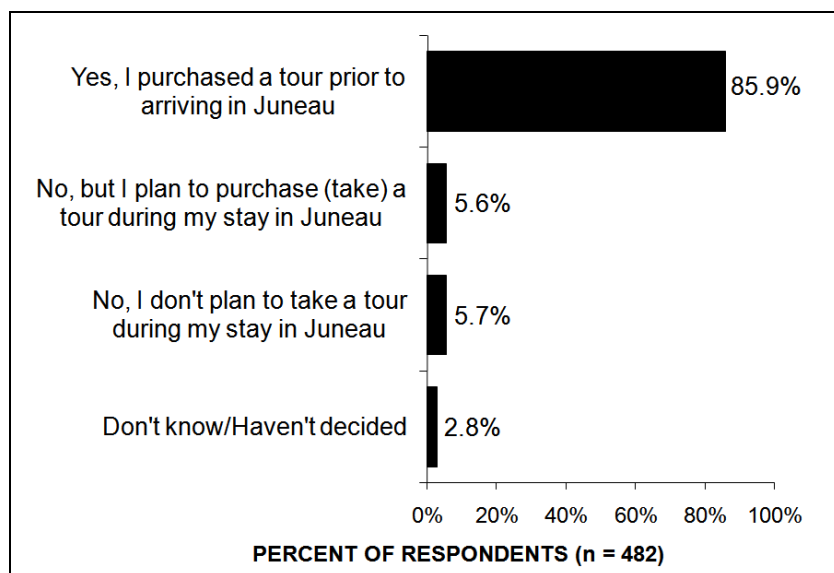


Figure C- 12. Purchased a tour prior to arriving in Juneau

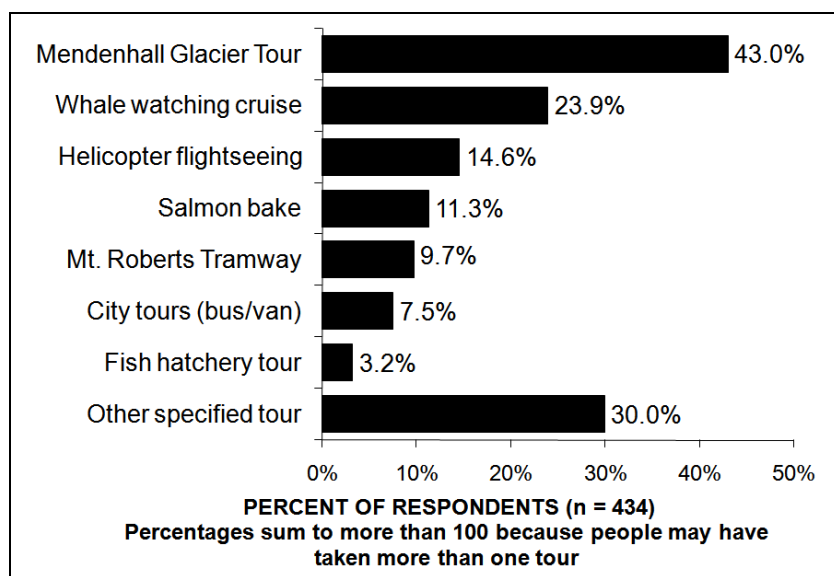


Figure C- 13. Tours taken in Juneau

Importance of visiting GLBA in selecting cruise

Mail Survey

2. How important was visiting Glacier Bay National Park in determining your choice of cruises?

- ☐ Not important
- ☐ Slightly important
- ☐ Moderately important
- ☐ Very important
- ☐ Extremely important

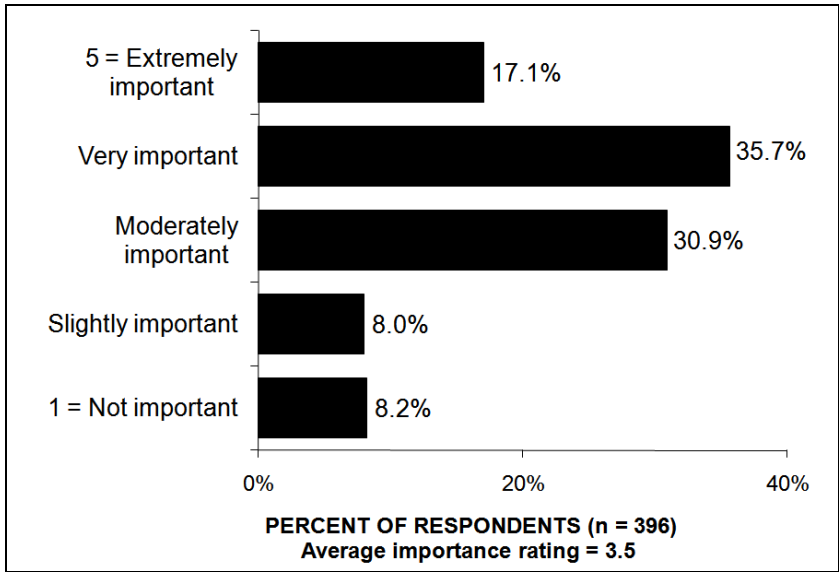


Figure C- 14. Importance of visiting GLBA in selecting cruise

Activities engaged in during trip to Glacier Bay National Park

Mail Survey

3. On the trip to Glacier Bay National Park and Preserve during which you were contacted for this survey, which of the following activities did you engage in? *(Circle as many numbers as apply.)*

1. Viewing tidewater glaciers
2. Viewing wildlife
3. Viewing general scenery
4. Kayaking or canoeing
5. Hiking
6. Fishing
7. Taking photographs
8. Staying at Glacier Bay Lodge (in park)
9. Staying at Bartlett Cove campground
10. Camping in backcountry
11. Other(*please specify*) _____

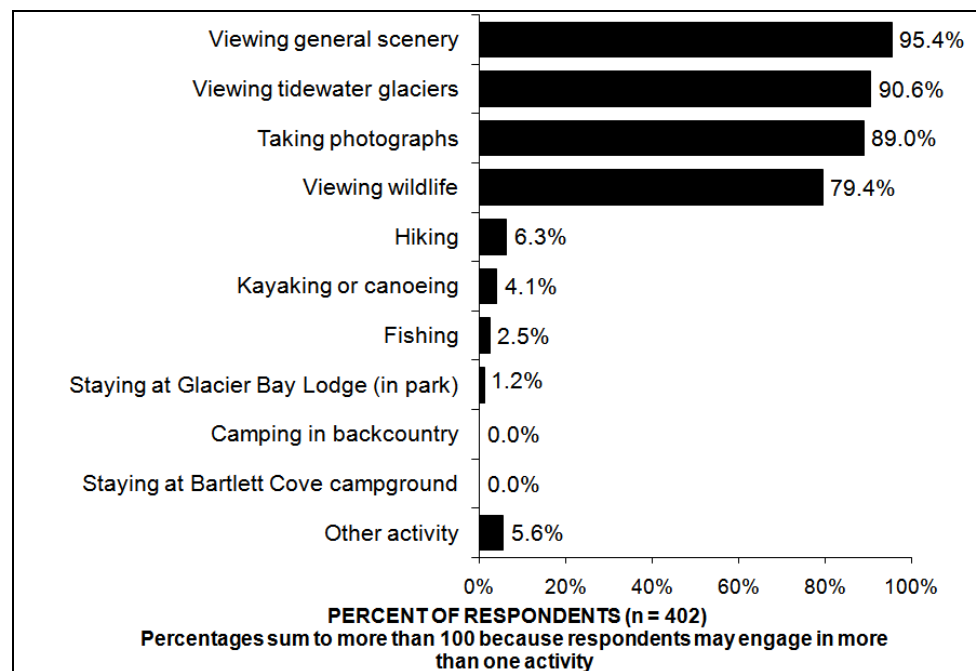


Figure C- 15. Activities engaged in by cruise ship passenger survey respondents during trip to Glacier Bay National Park

Number of hours respondent spent where they could view Glacier Bay proper

Mail Survey

6. On the day you were in Glacier Bay proper, how many hours did you spend in places (e.g., on deck, in a room with windows) where you could view the scenery and features of Glacier Bay?

_____ NUMBER OF HOURS SPENT WHERE COULD VIEW GLACIER BAY PROPER

☐ Don't remember

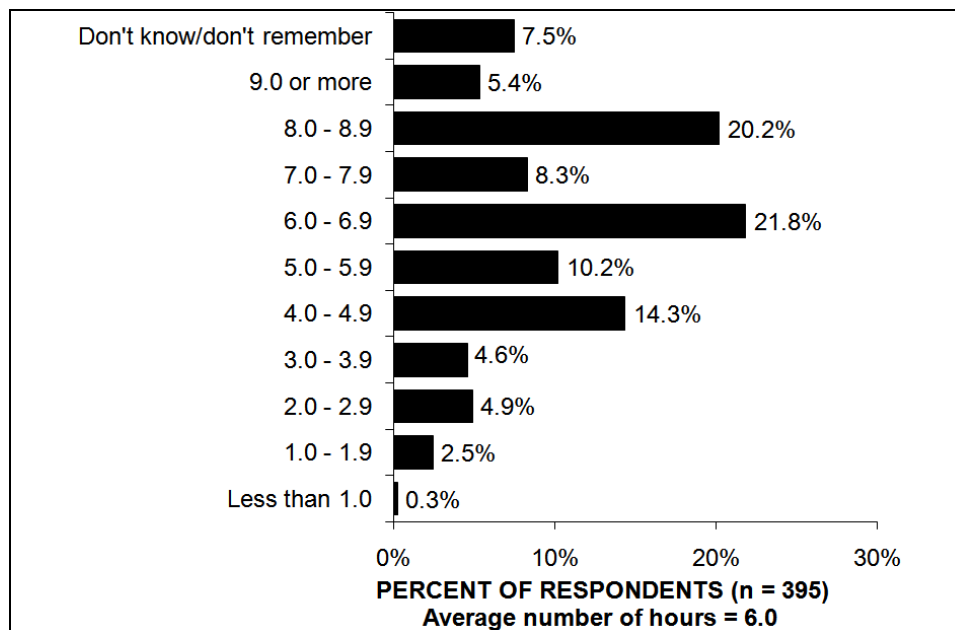


Figure C- 16. Number of hours cruise ship passenger survey respondent spent where he/she could view Glacier Bay proper

Importance of different trip experiences

The qualitative interviews conducted during Summer 2007 revealed seven dimensions of visitor experience that were affected by cruise ships. These identified dimensions of visitor experience had significant overlap with dimensions of visitor experience measured by the list of Recreational Experience Preference (REP) items. To have two items for each dimension, 9 REP items were selected and 5 new items were constructed using the REP format (see general Introduction for more detail). Respondents were asked the importance of each of these experiences during their visit to Glacier Bay. Additionally respondents were asked how hearing or seeing a large cruise ship affected each possible trip experience (see Section VIII).

Cruise Ship Passenger Survey

Mail Survey

5. Some possible experiences of people who visit recreation areas are listed below. How important to you was each of the following experiences during the visit to Glacier Bay proper in which you were contacted? (Circle one response for each reason.)

	How important to you was each experience during this visit to Glacier Bay proper?				
	not important	slightly important	moderately important	very important	extremely important
A. EXPERIENCE THE SCENIC BEAUTY	not important	slightly important	moderately important	very important	extremely important
B. EXPERIENCE TRANQUILITY	not important	slightly important	moderately important	very important	extremely important
C. BE AMAZED BY NATURE	not important	slightly important	moderately important	very important	extremely important
D. EXPERIENCE A PRISTINE SETTING	not important	slightly important	moderately important	very important	extremely important
E. ENJOY THE SOUNDS OF NATURE	not important	slightly important	moderately important	very important	extremely important
F. EXPERIENCE SOLITUDE	not important	slightly important	moderately important	very important	extremely important
G. EXPERIENCE NATURE UNTOUCHED BY HUMANS	not important	slightly important	moderately important	very important	extremely important
H. HAVE PERSONAL EXPERIENCES WITH NATURE	not important	slightly important	moderately important	very important	extremely important
I. VIEW WILDLIFE	not important	slightly important	moderately important	very important	extremely important
J. EXPERIENCE NATURE'S WONDERS	not important	slightly important	moderately important	very important	extremely important
K. BE CLOSE TO NATURE	not important	slightly important	moderately important	very important	extremely important
L. FEEL ALONE WITH NATURE	not important	slightly important	moderately important	very important	extremely important
M. EXPERIENCE PEACE AND CALM	not important	slightly important	moderately important	very important	extremely important
N. EXPERIENCE THE NATURAL SOUNDS	not important	slightly important	moderately important	very important	extremely important

Cronbach's alpha was calculated for each of the seven dimensions to assess the internal consistency of the two scale items selected to measure the effect of cruise ships on each dimension. George and Mallery (2003) provide the following rules of thumb: “ $\alpha > .9$ – Excellent, $\alpha > .8$ – Good, $\alpha > .7$ – Acceptable, $\alpha > .6$ – Questionable, $\alpha > .5$ – Poor, and $\alpha < .5$ – Unacceptable” (p. 231). As can be seen in Table C-4, Cronbach's alpha was over 0.7 for 6 of the 7 scales indicating acceptable or better reliability of those scales. The Cronbach's alpha for the scale for “Seeing nature” was 0.562 indicating poor reliability. Because it was unlikely that the same latent variable underlies these two items for cruise ship passengers, these two items were treated as two separate scales measuring different dimensions. Thus, a total of 8 scales representing 8 dimensions were used in subsequent analyses. It should be noted that this pattern of findings is analogous to that found for the 14 items measuring detractor of cruise ships on these visitor experience dimensions.

Table C-4. Internal consistency measure (Cronbach's alpha) for each importance dimension

Scale	Items	Cronbach's alpha
Seeing nature		0.562
	View wildlife	
	Experience the scenic beauty	
Experiencing the wonder of nature		0.791
	Be amazed by nature	
	Experience nature's wonders	
Intimate experience with nature		0.735
	Have personal experiences with nature	
	Be close to nature	
Hear the sounds of nature		0.858
	Enjoy the sounds of nature	
	Experience the natural sounds	
Tranquility		0.806
	Experience tranquility	
	Experience peace and calm	
Solitude		0.864
	Experience solitude	
	Feel alone with nature	
Pristine environment		0.725
	Experience a pristine setting	
	Experience nature untouched by humans	

The importance of each of these 8 trip experience dimensions did not differ for respondents visiting on one- or two-cruise ship days. Table C-5 presents the percent of respondents with each scale score and the average importance rating for that trip experience dimension. Three trip experience dimensions had average importance ratings between “4 = very important” and “5 = extremely important”: 1) Experience the scenic beauty, 2) Experience the wonder of nature, and 3) Pristine environment. The trip experience with the lowest average importance rating was “Solitude.” It was rated on average as “3 = moderately important” and for over half of respondents solitude was at least moderately important (65% of respondents scored 3 or higher on the Solitude scale). Solitude is difficult to have in Glacier Bay without kayaking or being on a smaller boat (e.g., charter or private vessel), both of which can be costly and/or require physical skills.

Cruise Ship Passenger Survey

Table C-5. Importance ratings for trip experience scales

Trip Experiences	N	Mean	Percent of people rating how important each dimension was to their trip experience in Glacier Bay proper ¹								
			1	1.5	2	2.5	3	3.5	4	4.5	5
Experience the scenic beauty	394	4.49	0.0		0.3		5.5		39.5		54.6
Experiencing the wonder of nature	395	4.39	0.0	0.0	0.7	1.1	4.3	9.4	25.8	15.2	43.5
Pristine environment	393	4.09	0.6	0.3	2.8	4.2	5.5	14.1	27.6	18.5	26.5
View wildlife	393	3.93	0.3		6.1		24.2		39.1		30.4
Intimate experience with nature	387	3.69	1.1	2.0	4.1	6.9	16.2	16.0	27.9	11.9	14.0
Hear the sounds of nature	392	3.69	1.5	0.6	6.9	7.2	17.2	14.4	24.4	8.9	19.0
Tranquility	394	3.61	1.5	3.3	5.5	8.7	16.3	15.3	22.5	9.8	17.1
Solitude	390	3.08	9.2	5.7	12.2	8.3	20.7	9.7	18.3	6.7	9.2

¹The rating scale included for each item was: 1 = Not at all important, 2 = Slightly important, 3 = Moderately important, 4 = Very important, 5 = Extremely important. Scale values that fall between the 5 points on the rating scale are due to averaging the ratings for the two scale items for a dimension.

Visited Margerie and Grand Pacific glaciers

Mail Survey

11. During your trip to Glacier Bay proper, did you visit Margerie/Grand Pacific tidewater glaciers?

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes

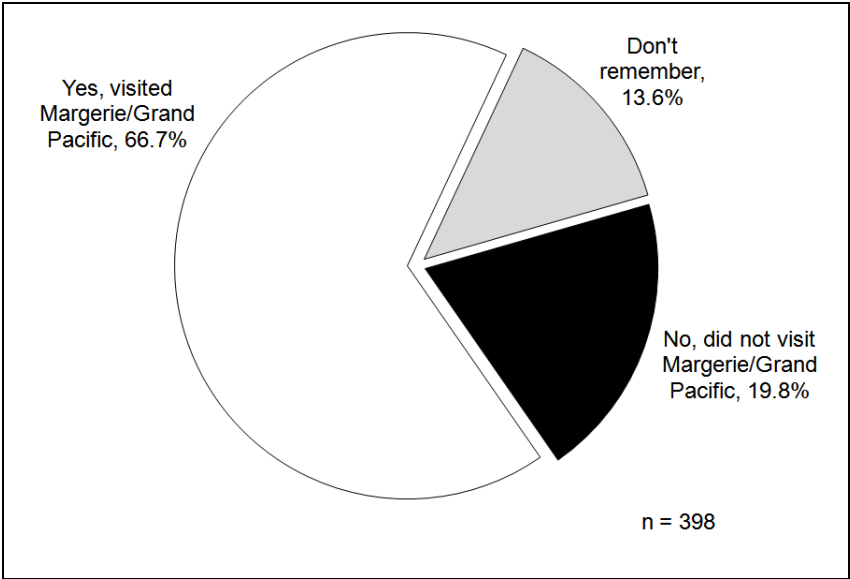


Figure C- 17. Percent of cruise ship passenger survey respondents who reported visiting Margerie and Grand Pacific glaciers

Other tidewater glacier visited

Mail survey

12. During your trip to Glacier Bay proper, which of the other tidewater glaciers, if any, did you visit?

- ☐ Did not visit any other tidewater glaciers.
- ☐ Johns Hopkins
- ☐ Lamplugh
- ☐ McBride
- ☐ Reid
- ☐ Other (*please specify*) _____
- ☐ Don't know/Don't remember

Cruise Ship Passenger Survey

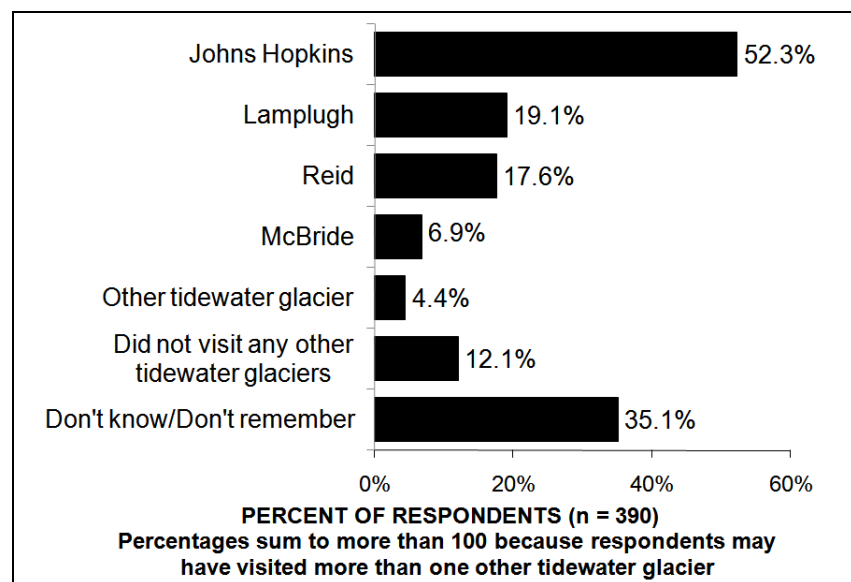


Figure C- 18. Other tidewater glaciers visited

The likelihood of visiting Reid glacier differed by the number of cruise ships in the bay, $\chi^2(2, 391) = 7.06$, $p = .029$. As can be seen in Figure C- 19, more people visited Reid glacier when two cruise ships entered the bay at the same time (24.2%) than when the two cruise ships entered at staggered times (12.2%). When the two-cruise ship conditions are combined, the likelihood of visiting Reid glacier did not differ significantly from the one-cruise ship in the bay condition, $\chi^2(1, 391) = 0.06$, $p = .804$. Provided that the mix of staggered and concurrent entries on two cruise ship days remains consistent under the maximum scenario of two cruise ships in the bay every day, no significant difference between the maximum scenario and current conditions would be expected.

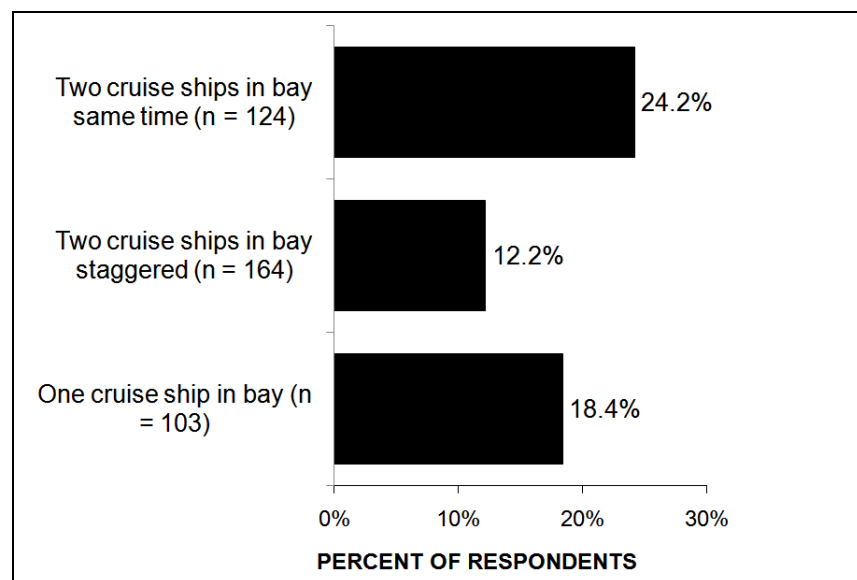


Figure C- 19. Percent of cruise ship passenger survey respondents who visited Reid glacier by number of cruise ships in the bay per day

Weather

Mail Survey

4. We are interested in the kinds of weather you experienced during your trip in Glacier Bay proper. Please indicate each type of weather you experienced and then estimate the number of hours that weather was present. (*Check as many as apply.*)

- ☐ Sunny and/or partly cloudy → About _____ hours OR Don't remember _____
☐ Cloudy without fog → About _____ hours OR Don't remember _____
☐ Cloudy with fog → About _____ hours OR Don't remember _____
☐ Rain with or without fog → About _____ hours OR Don't remember _____

Respondents were asked to report the different types of weather they experienced and how many hours of each type of weather they experienced (see Figure C- 20). The responses to the number of hours each type of weather was experienced suggested that this task was difficult for many people and the data were not included in the report because their validity was unclear. To get a sense of the overall weather people experienced during their time in Glacier Bay proper, people were classified into mutually exclusive categories of increasing bad weather ranging from “Sunny and/or partly cloudy” to “All rain.” As can be seen in Figure C- 21, the most common weather experience for the overall time large cruise ship passengers spent in Glacier Bay was “Sunny and/or partly cloudy” (35.2%) and the least common overall weather experience for large cruise ship passengers was “All rain” (9.8%).

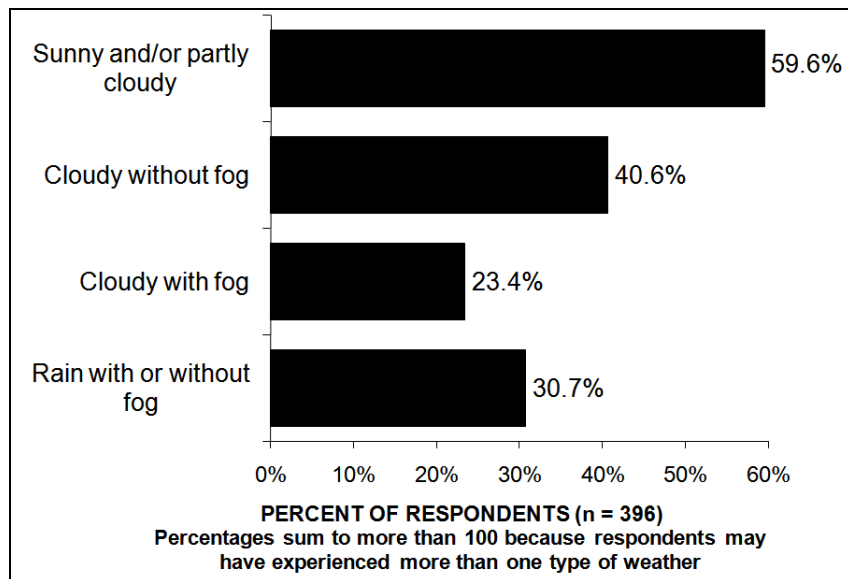


Figure C- 20. Percent of cruise ship passenger survey respondents who experienced different kinds of weather

Question 4 also asked respondents to report about how many hours they experienced each type of weather during their trip in Glacier Bay proper. It was thought that for most respondents their time in Glacier Bay proper would correspond primarily to the approximately 8 hours the cruise ships spend in the bay. However, review of the hour data indicated significantly longer time frames or missing data for some responses for many respondents. Thus, there is uncertainty as to the extent to which the weather data reported correspond to time actually spent in Glacier Bay proper. Because of this uncertainty and the

Cruise Ship Passenger Survey

increased difficulty of accurately recalling times over longer time frames (often multiple days), the hour data are not reported. Instead, a series of mutually exclusive trip weather experience categories were created that generally reflect an ordinal scale of weather experienced during visitors' trips (e.g., mostly sunny to all rain). People were assigned to these categories based on their responses to having experienced each kind of weather listed in Question 4 (see Table C-6).

Table C-6. Trip weather experience categories

Trip weather experience category	Kinds of weather checked in Question 4
Only sunny and/or partly cloudy	Only "Sunny and/or partly cloudy" checked
No fog or rain	"Cloudy without fog" checked, "Sunny and/or partly cloudy" may or may not be checked
Some fog, but no rain	"Cloudy with fog" must be checked, "Sunny and/or partly cloudy" and/or "Cloudy without fog" must also be checked
Some rain	"Rain with or without fog" must be checked and at least one other kind of weather
All fog with or without rain	"Cloudy with fog" must be checked and "Rain with or without fog" may or may not be checked
All rain	Only "Rain with or without fog" checked

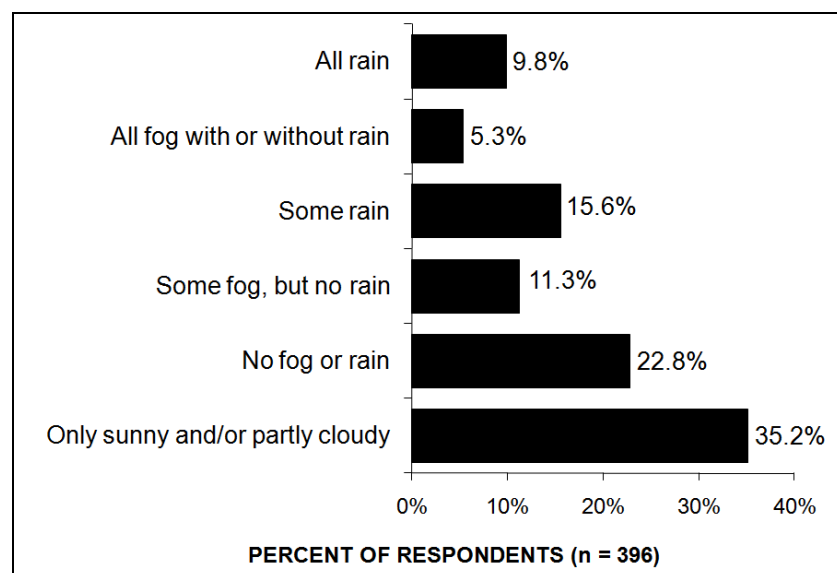


Figure C- 21. Percent of time cruise ship passenger survey respondents experienced different types of weather.

IV. ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS

Cruise ship passengers were asked about encounters with cruise ships and other motorized craft. Some questions asked about seeing or hearing different kinds of craft for their trip as a whole and other questions focused on seeing or hearing different kinds of craft while visitors were at Margerie and Grand Pacific glaciers. This section reports the findings about encounters during their time at Margerie and Grand Pacific glaciers.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 9).

Highlights

- Of the 66.7% of cruise ship passenger survey respondents who visited Margerie and Grand Pacific glaciers, half (51%) reported not seeing other craft when at the glaciers and 9% did not remember if they saw other craft.
- Of the 40% of cruise ship passengers that saw other craft at Margerie and Grand Pacific glaciers, most saw motorized craft other than large cruise ships (73%). Smaller proportions saw other large cruise ships (35%), kayaks (21%), propeller-driven airplanes (6%) or helicopters (5%).
- The primary type of craft reported as being seen at Margerie and Grand Pacific glaciers were motorized craft other than large cruise ships and the number of them depended on how many cruise ships were in the bay. Compared to one cruise ship in the bay days, on two cruise ships in the bay days fewer motorized craft other than large cruise ships were reported ($M = 1.74$ and $M = 0.97$, respectively). This finding suggested that more motorized craft other than cruise ships are reported on days when there is only one cruise ship in the bay (possibly because the smaller vessels are more likely to visit the glaciers on those days). Looking at the data broken out by whether the two cruise ships entered at the same time or were staggered revealed that the fewest other motorized craft were reported on days when two cruise ships entered at the same time. Finally, comparing current conditions (a 1:2 ratio of 1 vs. 2 cruise ships in the bay days) with the maximum allowed conditions (two cruise ships in the bay each day) revealed minimal differences in encounters with different types of craft.

Cruise Ship Passenger Survey

Mail Survey

11. During your trip to Glacier Bay proper, did you visit Margerie/Grand Pacific tidewater glaciers?

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes



11a. At any time while you were at the Margerie/Grand Pacific tidewater glaciers, did you see one or more other water or air craft present (besides your own)?

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes



11b. Please indicate how many of each type of craft was present (excluding your own vessel) while you were at the Margerie/Grand Pacific tidewater glaciers.

- _____ Large cruise ships
- _____ Motorized water craft other than large cruise ships (other than the one you were on)
- _____ Kayaks
- _____ Propeller-driven airplanes
- _____ Helicopters

Visited Margerie and Grand Pacific glaciers

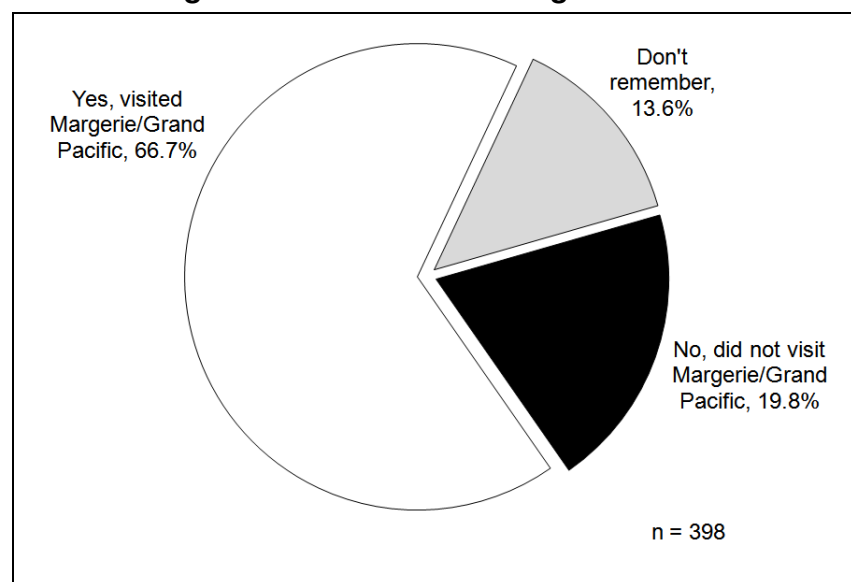


Figure C- 22. Percent of cruise ship passenger survey respondents who visited Margerie and Grand Pacific glaciers

Saw other craft at Margerie and Grand Pacific glaciers

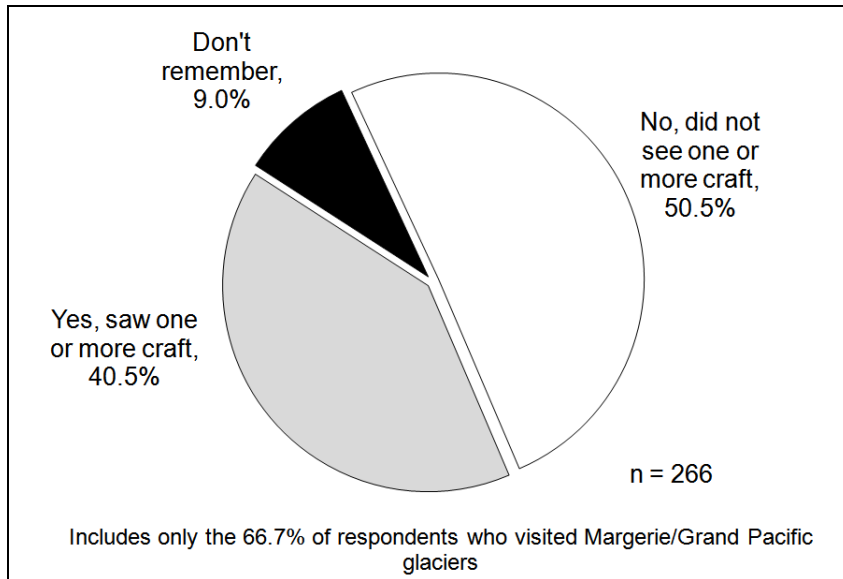


Figure C- 23. Percent of cruise ship passenger survey respondents who saw other craft at Margerie and Grand Pacific glaciers

Number of different types of craft seen at Margerie and Grand Pacific glaciers

Cruise ship passenger survey respondents who reported seeing craft at Margerie and Grand Pacific glaciers were asked to report how many of five different types of craft they saw: 1) Large cruise ships, 2) Motorized craft other than large cruise ships, 3) kayaks, 4) propeller driven airplanes, and 5) helicopters.

As can be seen in Figure C- 24, 30.7% of respondents reported seeing one large cruise ship and 1.0% reported seeing two large cruise ships at Margerie and Grand Pacific glaciers. As there are never more than 2 large cruise ships in the bay on any day and the question asked people to exclude their own vessel, it is unclear whether the person reporting 2 large cruise ships is 1) including his/her own ship or 2) including a large vessel they saw that was not a large cruise ship by our definition. Similarly, 5 of the 32 people who reported seeing one large cruise ship at Margerie and Grand Pacific glaciers visited on a one cruise ship in the bay so the same uncertainty exists about their experience.

The number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers varied by the number of cruise ships in the bay, $F(2, 89) = 3.95$, $p = .023$. Post hoc Tukey tests indicated that visitors on one cruise ship in the bay days reported seeing on average more other motorized craft at the Margerie and Grand Pacific glaciers than those visiting on days when two cruise entered the bay at the same time (see Figure C- 25). Additional analyses combined the two cruise ship in the bay categories into one and compared it to the one-cruise ship in the bay category. These analyses found no significant differences between one- and two-cruise in the bay days. Provided the mix of staggered and concurrent entries on two cruise ship days does not change under the maximum allowed scenario of two-cruise ships in the bay every day, then no differences in the number of other motorized craft seen at Margerie and Grand Pacific glaciers would be expected by moving from the current conditions to the maximum allowed (see Figure C- 26).

Cruise Ship Passenger Survey

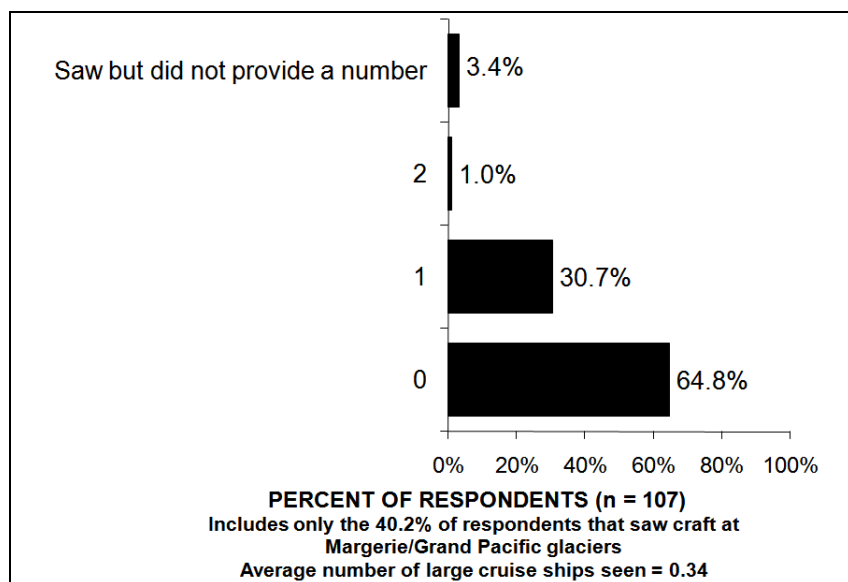


Figure C- 24. Number of large cruise ships seen by cruise ship passenger survey respondents at Margerie and Grand Pacific glaciers

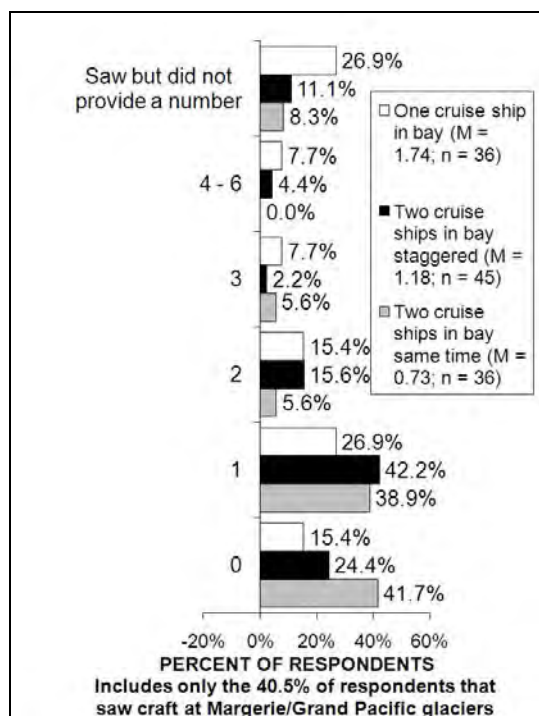


Figure C- 25. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers by number of cruise ships in the bay

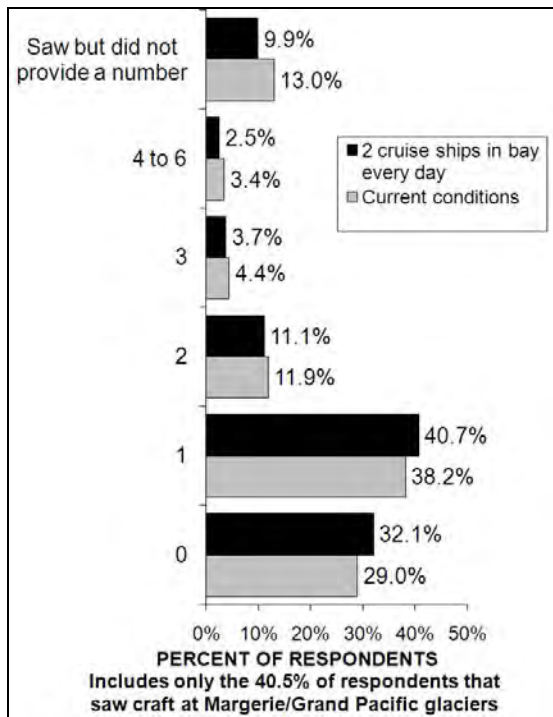


Figure C- 26. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers: Current conditions versus Maximum of 2 cruise ships every day

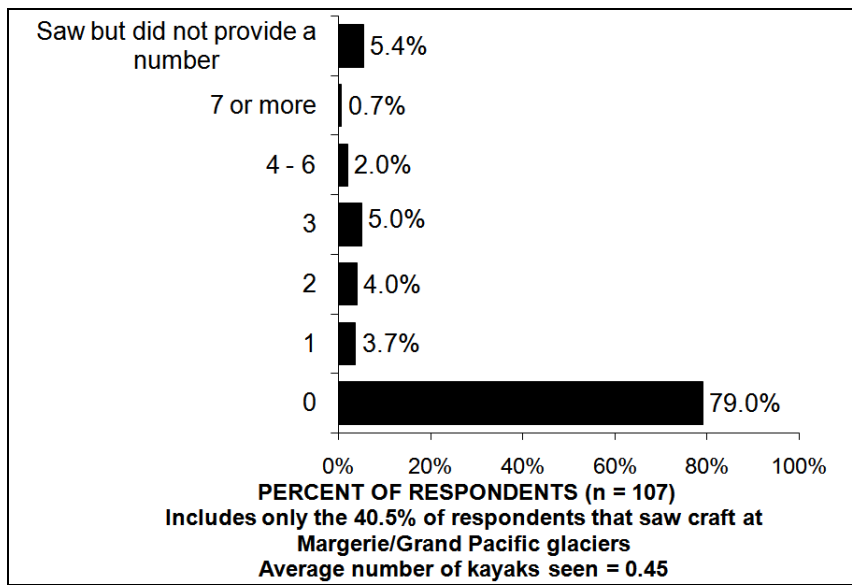


Figure C- 27. Number of kayaks seen by cruise ship passenger survey respondents at Margerie and Grand Pacific glaciers

Cruise Ship Passenger Survey

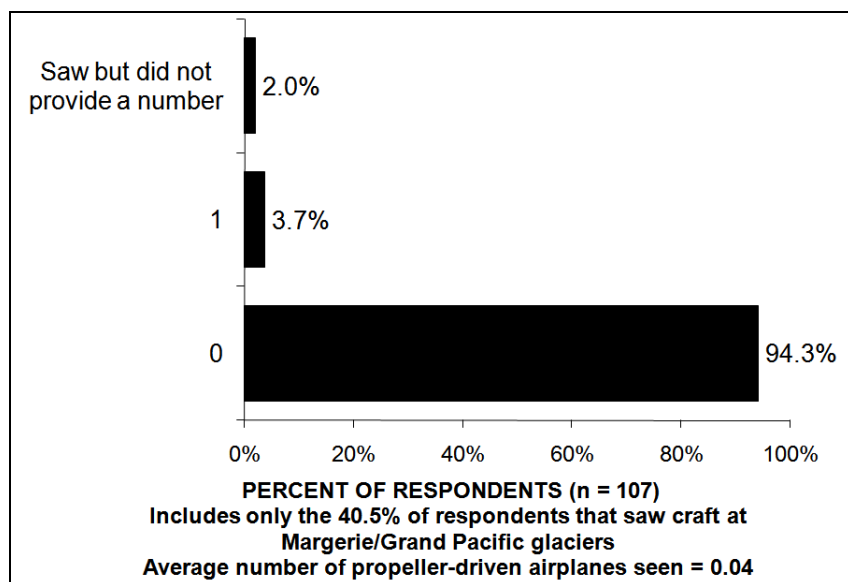


Figure C- 28. Number of propeller-driven airplanes seen by cruise ship passenger survey respondents at Margerie and Grand Pacific glaciers

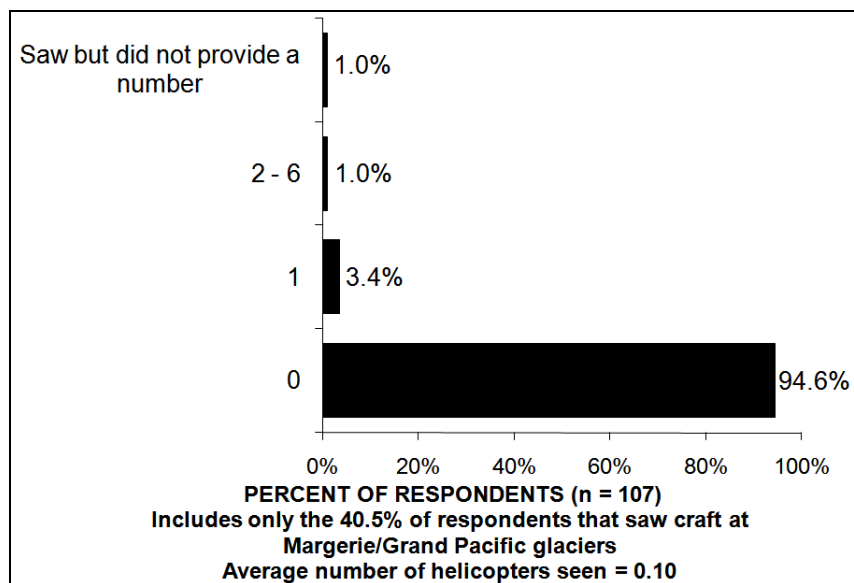


Figure C- 29. Number of helicopters seen by cruise ship passenger survey respondents at Margerie and Grand Pacific glaciers

V. ENCOUNTERS: ENTIRE TRIP

Cruise ship passengers were asked about encounters with cruise ships and other motorized craft. Some questions asked about seeing or hearing different kinds of craft for their trip as a whole and other questions focused on seeing or hearing different kinds of craft while visitors were at Margerie and Grand Pacific glaciers. This section reports the findings about encounters for the trip as a whole.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 9).

Highlights

- The likelihood of cruise ship passengers reporting that they heard or saw a large cruise ship depended on whether they visited on one- or two-cruise ships in the bay days. When two cruise ships were in the bay, 44% of cruise passengers reported hearing or seeing large cruise ships. When one cruise ship was in the bay, 13% of cruise passengers reported hearing or seeing large cruise ships. It should be noted that on one-cruise ship in the bay days, no cruise ship passengers should have seen another large cruise ship. Thus, the 13% reporting seeing a cruise ship may have confused another vessel as a large cruise ship or misremembered experiences outside of Glacier Bay proper as occurring in the bay.
- Changing from the current conditions to the maximum allowed would be expected to increase the percentage of large cruise ship passengers hearing or seeing large cruise ships from 38% to 44%.
- The total length of time cruise ship passengers saw or heard large cruise ships during their visit to Glacier Bay proper did not differ by the number of cruise ships in the bay. Of passengers who saw or heard large cruise ships, 45% reporting hearing or seeing them for less than one hour and 24% reported hearing them for 1 to 1.9 hours. A small percentage (7%) reporting hearing or seeing them for 3 or more hours.
- On the different types of craft, motorized water craft other than large cruise ships were seen by the most cruise ship passengers (57%). Large cruise ships were the next most frequent type of craft for people who visited on two cruise ship days (44%). Aircraft (propeller-driven airplanes and helicopters) were seen or heard by substantially fewer respondents (< 14%).
- Motorized water craft other than large cruise ships were heard or seen for the same amount of time that large cruise ships were heard or seen ($M = 1.2$ and $M = 1.2$, respectively). Propeller-driven airplanes and helicopters were seen or heard for less than one hour, on average.

Cruise Ship Passenger Survey

Question 7 of the mail survey asked about seeing or hearing large cruise ships while Question 9 asked about hearing and seeing other types of craft (see questions below).

Mail Survey

7. During your time in Glacier Bay proper, did you see or hear large cruise ships?

- ☐ No → GO TO QUESTION 9
☐ Don't know → GO TO QUESTION 9
☐ Yes

7a. During your time in Glacier Bay proper, how long did you see or hear large cruise ships?

_____ NUMBER OF HOURS SAW OR HEARD LARGE CRUISE SHIPS IN GLACIER BAY (*Please list partial hours as 1/4, 1/2, etc.*)

- ☐ DON'T know/DON'T REMEMBER

Mail Survey

9. During your time in Glacier Bay proper on this trip, you may have seen or heard different kinds of motorized craft. For each type of craft, please indicate if you heard or saw it during your time in Glacier Bay proper. Then, report the total time you heard or saw that type of craft and how many different craft of that type you saw or heard. (*Please do not include your own vehicle.*)

During your time in Glacier Bay proper...

Type of craft	Did you hear or see? (Circle one for each type)	Total hours heard or seen (Report partial hours as 1/4, 1/2, etc.)	Number of craft heard or seen
A. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	YES→ NO DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW
B. PROPELLER-DRIVEN AIRPLANES	YES→ NO DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW
C. HELICOPTERS	YES→ NO DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW

This section will report the findings in the following order: 1) large cruise ship encounters, 2) comparison of large cruise ship encounters with other motorized craft encounters, and 3) details of other motorized craft encounters.

Saw or heard large cruise ships

The percentage of cruise ship passengers reporting seeing or hearing large cruise ships differed by the number of cruise ships in the bay, $\chi^2(2, 381) = 32.76, p < .001$ (excludes Don't know/Don't remember to eliminate frequencies < 5). Respondents visiting on one-cruise ship in the bay days were less likely to report seeing or hearing large cruise ships than respondents visiting on two-cruise ship in the bay days whether the ships entered the bay at the same time or staggered (13.2% vs. 46.8% and 41.9%, respectively). No significant differences were observed for whether the two cruise ships entered at the same time or were staggered (47% vs. 42%, respectively, $p = .404$).

It should be noted that although passengers on large cruise ships that enter on one-cruise ship in the bay days cannot see another large cruise ship in Glacier Bay proper, 13.2% reported seeing another large cruise ship. It is unclear whether these respondents were 1) uncertain about when they were in Glacier Bay proper and so were reporting about time outside the bay or 2) confused that another vessel was a large cruise despite the information provided in the survey to help them distinguish the various types of vessels.

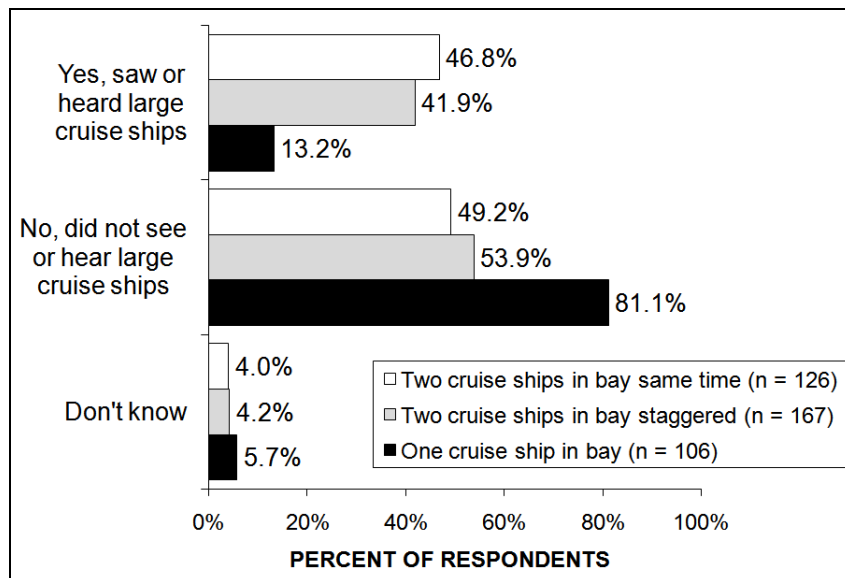


Figure C- 30. Percent of respondents who saw or heard large cruise ships by number of cruise ships in the bay

The percentage of cruise ship passengers who see or hear large cruise ships under current cruise ship levels is the percentage of all respondents who reported seeing or hearing large cruise ships. Moving from current cruise ship levels to the maximum allowed of two cruise ships in the bay everyday would be expected to increase the percentage of cruise ship passengers that see or hear large cruise ships from 37.8% to 44.0% (see Figure C- 31).

Cruise Ship Passenger Survey

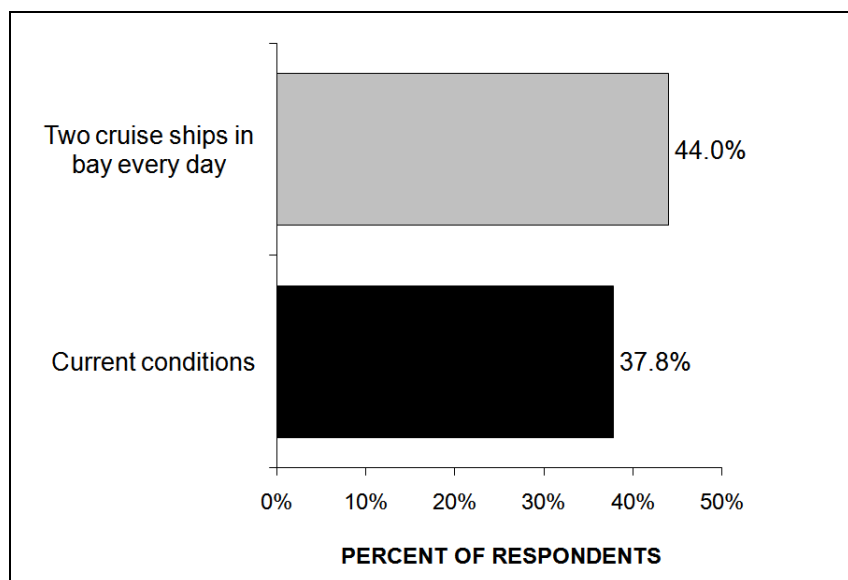


Figure C- 31. Percent of cruise ship passenger survey respondents who saw or heard large cruise ships: Current conditions versus maximum of two cruise ships per day

Number of hours saw or heard large cruise ships

Cruise ship passenger survey respondents were asked to report the number of hours they saw or heard large cruise ships during their stay in Glacier Bay proper. Although this measure of exposure is more subjective than number of cruise ships in the bay per day, it provided more detailed information about exposure to cruise ships. As was the case for cruise ship passengers that saw or heard cruise ships, the number of hours cruise ships were heard or seen did not differ by the number of cruise ships in the bay. However, it may be that the effect of cruise ships heard or seen depended on the length of time that cruise ship passengers heard or saw cruise ships regardless of the number of cruise ships in the bay the day they visited. These analyses are described and reported in Section X.

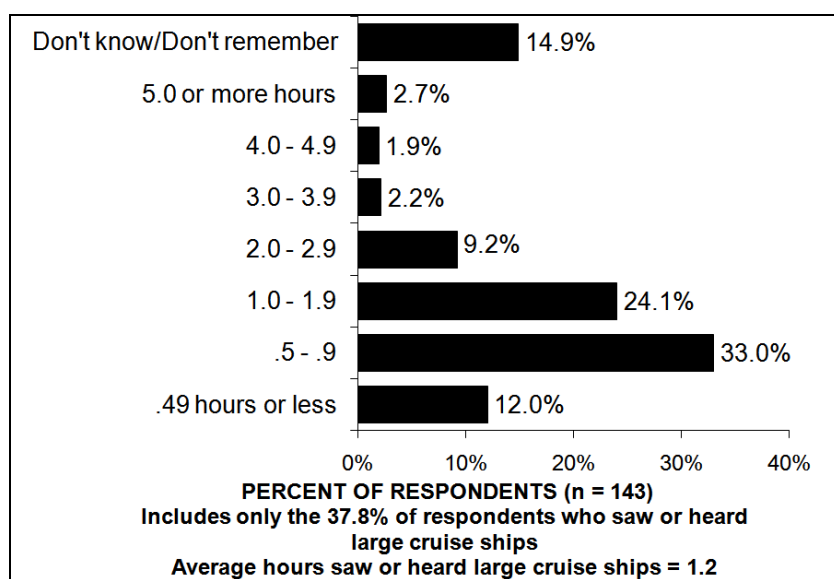


Figure C- 32. Number of hours cruise ship passenger survey respondents saw cruise ships in Glacier Bay proper

Comparison of large cruise ship and other motorized craft encounters

Respondents were asked about encounters with other motorized craft to provide a context for the findings regarding large cruise ships. This section compares the findings from large cruise ships with those of other motorized craft. The detailed findings including charts for other motorized craft are presented in the following section.

Table C-7 summarizes the percent of respondents who saw or heard the different types of craft. As can be seen in Table C-7, motorized water craft excluding large cruise ships were the most frequently heard or seen type of craft. Large cruise ships were next most frequent for people visiting on two cruise ship days. Aircraft were heard or seen by substantially fewer respondents.

Table C-7. Percent of cruise ship passenger survey respondents who encountered different kinds of craft.

Type of craft	Heard or saw craft (percent of respondents)		
	Yes	No	Don't know
Large cruise ship:			
One cruise in the bay days (n = 106)	13.2%	81.1%	5.7%
Two cruise ships in the bay days (n = 293)	44.0%	51.9%	4.1%
Current conditions (combined and weighted)	37.8%	57.8%	4.4%
Motorized water craft other than large cruise ships (n = 392)	56.6%	38.4%	5.0%
Propeller-driven airplanes (n = 390)	13.6%	81.2%	5.2%
Helicopters (n = 390)	9.7%	85.8%	4.6%

For those who reported seeing or hearing each type of craft, the average number of hours and the average number of craft seen for that type were calculated (see Table C-8). The average number of hours that cruise ships were heard or seen and the average number of hours that motorized water craft were heard or seen were both about 1 hour 12 minutes. Propeller-driven airplanes and helicopters were each seen or heard for less than an hour.

Table C-8. Average number of hours different kinds of craft were heard or seen by cruise ship passenger survey respondents who saw that kind of craft

Type of craft	Average hours	Average number of craft
Large cruise ship (n = 122)	1.2	
Motorized water craft other than large cruise ships (n = 189)	1.2	2.3
Propeller-driven airplanes (n = 29)	0.9	2.1
Helicopters (n = 19)	0.5	3.0

Heard or saw different kinds of motorized craft

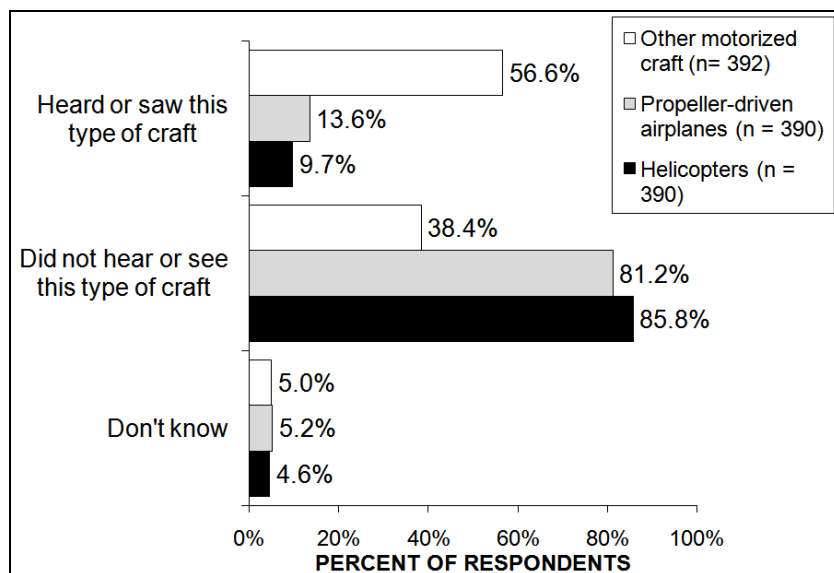


Figure C- 33. Heard different kinds of motorized craft.

Motorized water craft other than large cruise ships: Length of time and number heard or seen

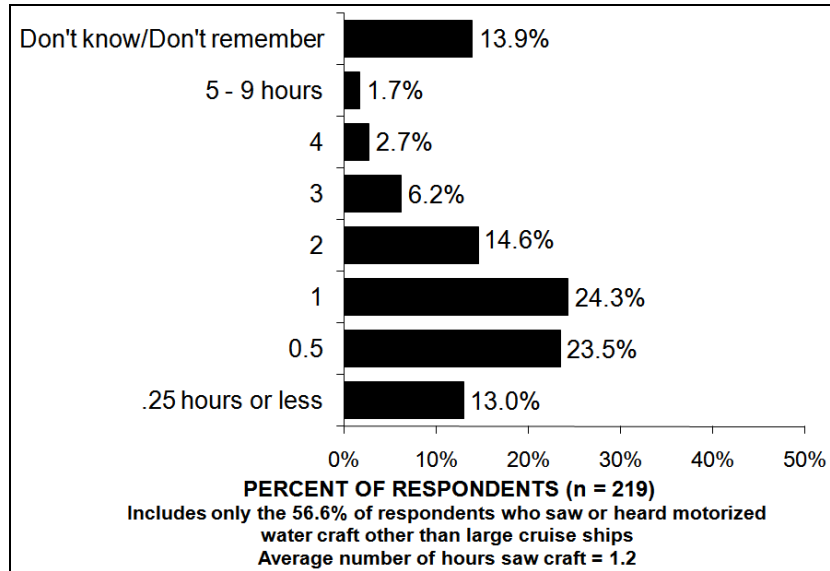


Figure C- 34. Number of hours motorized craft other than large cruise ships were heard or seen

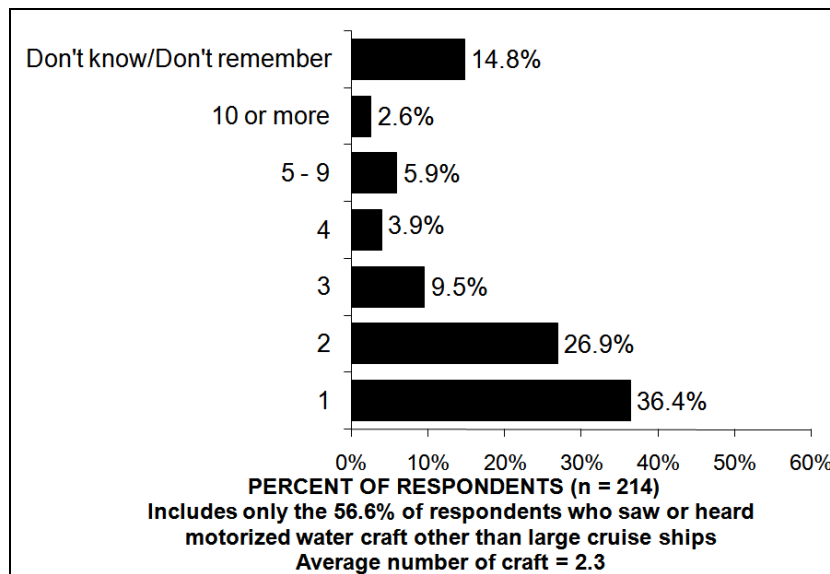


Figure C- 35. Number of motorized craft other than large cruise ships heard or seen

Propeller-driven airplanes: Length of time and number heard or seen

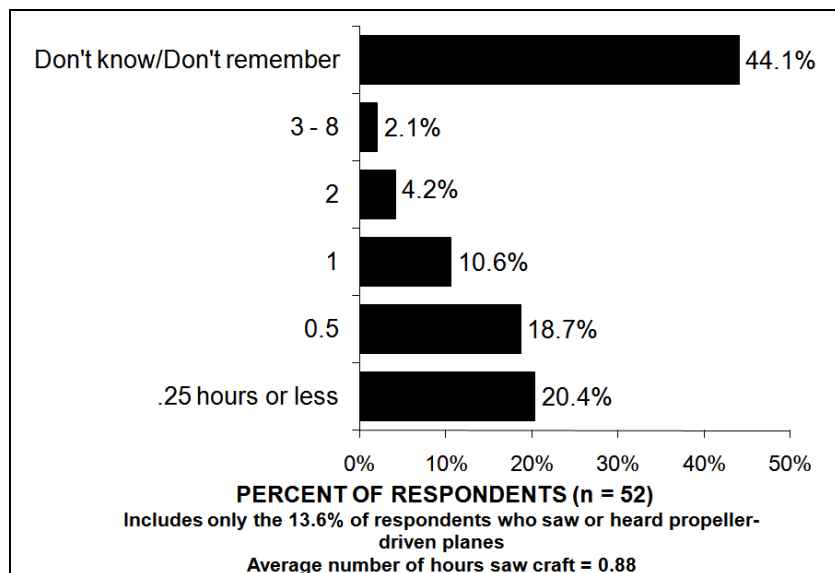


Figure C- 36. Length of time propeller-driven airplanes were heard or seen

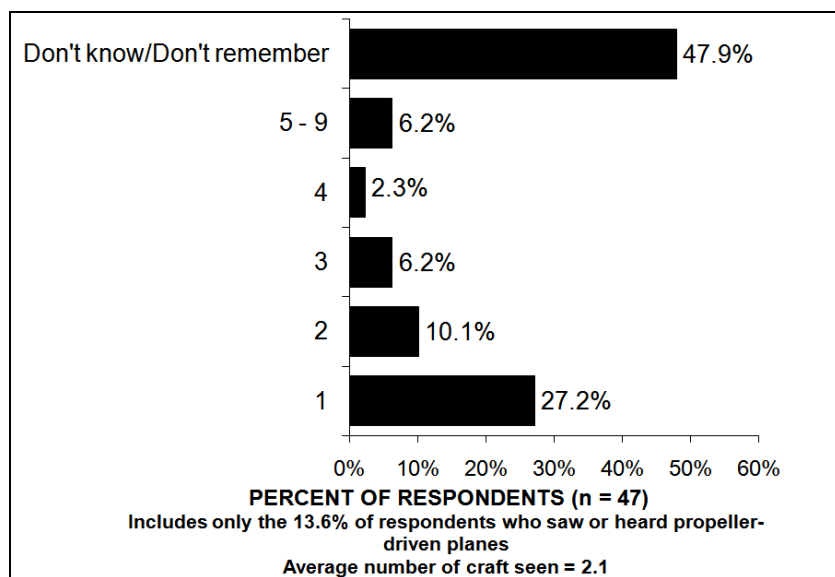


Figure C- 37. Number of propeller-driven airplanes heard or seen

Helicopters: Length of time and number heard or seen

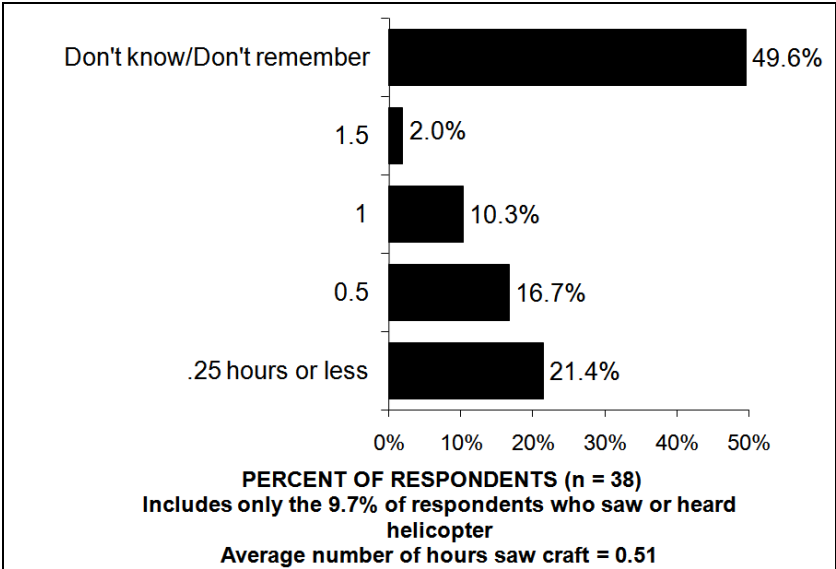


Figure C- 38. Number of hours helicopters were heard or seen

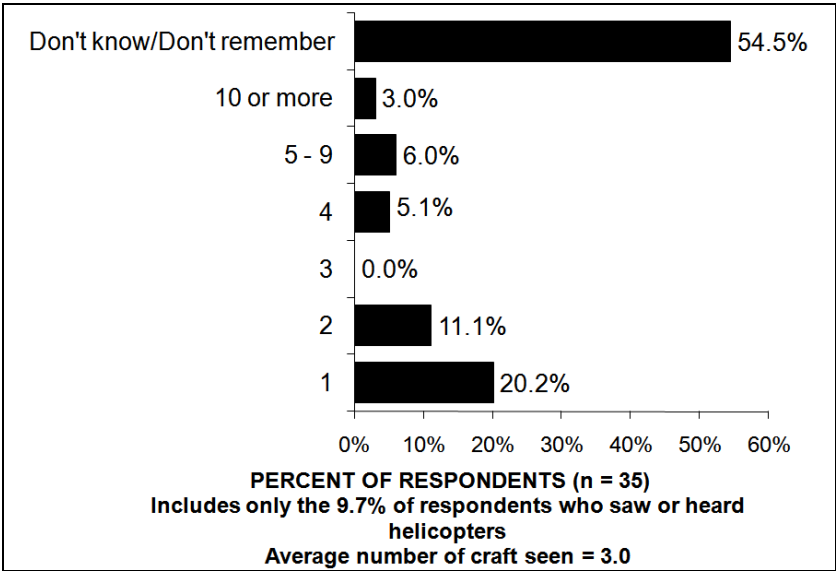


Figure C- 39. Number of helicopters heard or seen

VI. EXPERIENCES WITH HAZE, PUBLIC ADDRESS SYSTEMS, AND ENGINE SOUNDS

Some aspects of encounters with different craft that may affect the quality of visitors' trip experiences in Glacier Bay National Park include haze and sounds from public address systems and engines. Cruise ship passengers were asked whether they experienced these different aspects and asked about the effect these aspects had on their enjoyment of Glacier Bay proper. This section reports the results of these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 9).

Highlights

- Less than 1% of cruise ship passengers reported seeing haze from any type of vessel. Of the three people who reported seeing haze from large cruise ships, one reported it detracted slightly, one reported no effect, and one reported it added somewhat.
- Less than 2% of cruise ship passengers reported hearing public address systems from any type of vessel. Of those that heard PA systems, the majority reported no effect. One person indicated that hearing a PA system detracted greatly and this sound was from an unidentified vessel.
- Cruise ship passengers were the least likely to report hearing engines from other large cruise ships of the different craft (less than 2%). Of the six people who heard large cruise ships engines, 4 reported no effect on their trip enjoyment and 2 reported they detracted somewhat from their trip enjoyment.
- Engines from small cruise or tour boats, helicopters, and propeller-driven airplanes were heard by slightly more cruise ship passengers (6% - 10%). For those hearing these types of engines, the majority (73% -76%) indicated they had no effect on their trip enjoyment. Whereas 11% to 18% of respondents who heard these engines reported that hearing these engines detracted from their trip enjoyment, 7% -13% of respondents who heard these engines reported that the sounds added to their trip enjoyment.

Mail survey

16. On the trip to Glacier Bay proper during which you were contacted for this survey, a variety of events may have occurred. For each event below, please indicate if it occurred and then circle how it affected your trip enjoyment of Glacier Bay proper.

	<u>Did it occur?</u>	How did the event affect your trip enjoyment of Glacier Bay proper?				
		↓	↓	↓	↓	↓
<u>EXPERIENCES WITH HAZE.</u>						
A. Haze from large cruise ship exhaust affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
B. Haze from small cruise ship or tour boat exhaust affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
C. Haze from unidentified vessel affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
<u>EXPERIENCES WITH PUBLIC ADDRESS SYSTEMS</u>						
D. Heard sound from large cruise ship public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
E. Heard sound from small cruise ship or tour boat public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
F. Heard sound from unidentified public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
<u>EXPERIENCES WITH ENGINE SOUNDS</u>						
G. Heard large cruise ship engines.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
H. Heard engines of boats other than large cruise ships.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
I. Heard propeller-driven airplanes.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
J. Heard helicopters.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly

Experiences with haze

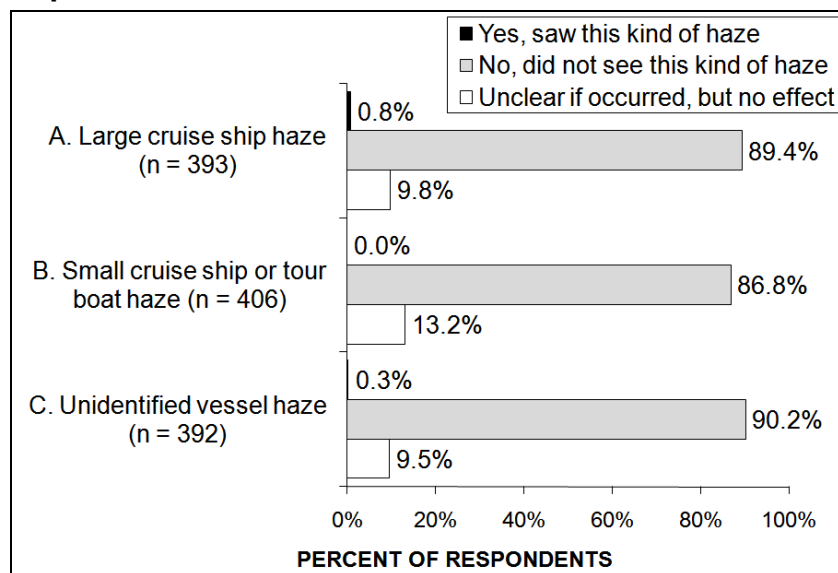


Figure C- 40. Percent of cruise ship passenger survey respondents who experienced haze from different types of vessels

Of the 3 people who reported seeing haze from large cruise ships, 1 reported it detracted somewhat, 1 reported no effect, and 1 reported it added somewhat. One person reported seeing haze from an unidentified vessel and reported that it added somewhat.

Experiences with public address systems

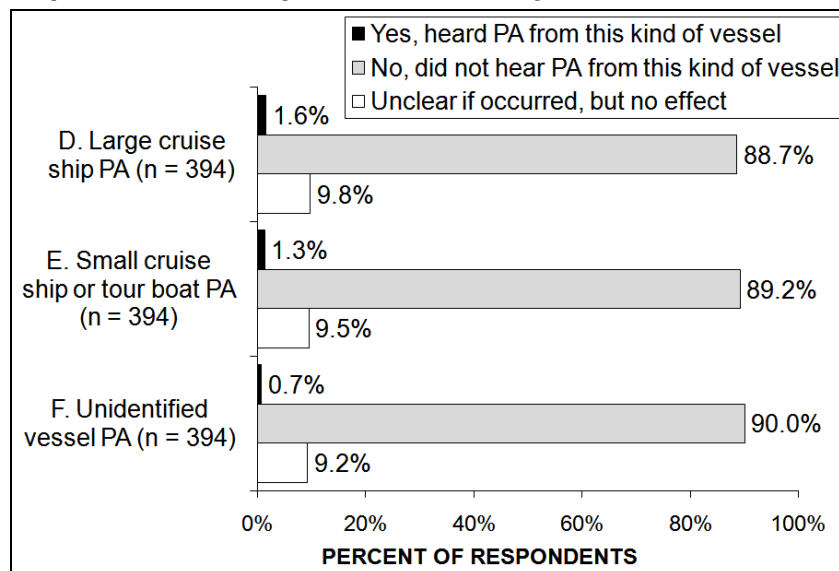


Figure C- 41. Percent of cruise ship passenger survey respondents who experienced public address systems from different types of vessels

The effects of experiences with public address systems were minimal. Of the 6 cruise ship passengers who reported hearing the public address system from large cruise ships, 4 reported it had no effect, 1 reported it added somewhat, and 1 reported it added greatly. Although two people reported that hearing PA systems of a large cruise ship added to their experience, it was possible that they were reporting about their own ship's PA system even though the question asked them to exclude their own vessel.

Of the 5 cruise ship passengers who reported hearing the public address system from a small cruise ship or other tour boat, 4 reported it had no effect, and 1 reported it detracted somewhat. Of the 3 people who reported hearing an unidentified public address system, 1 reported it detracted greatly, 1 reported it detracted somewhat, and 1 report it had no effect.

Experiences with engine sounds

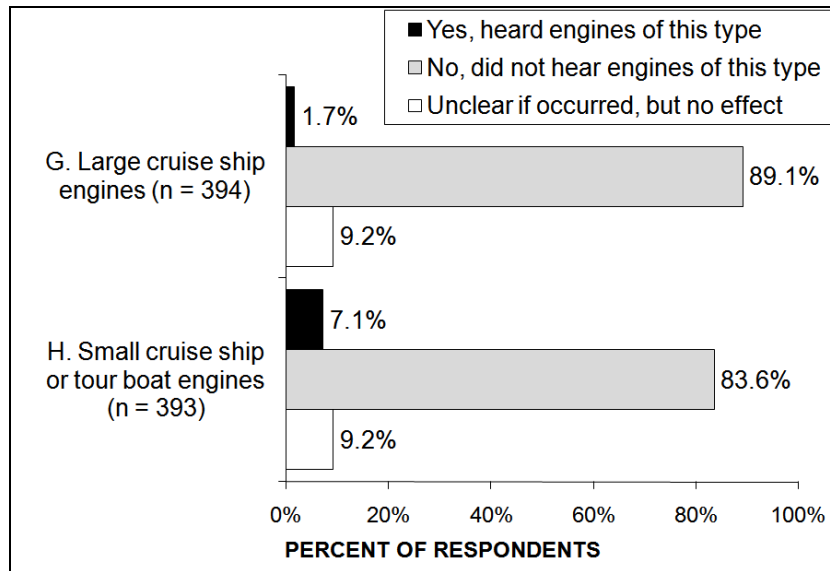


Figure C- 42. Experiences with engine sounds from watercraft

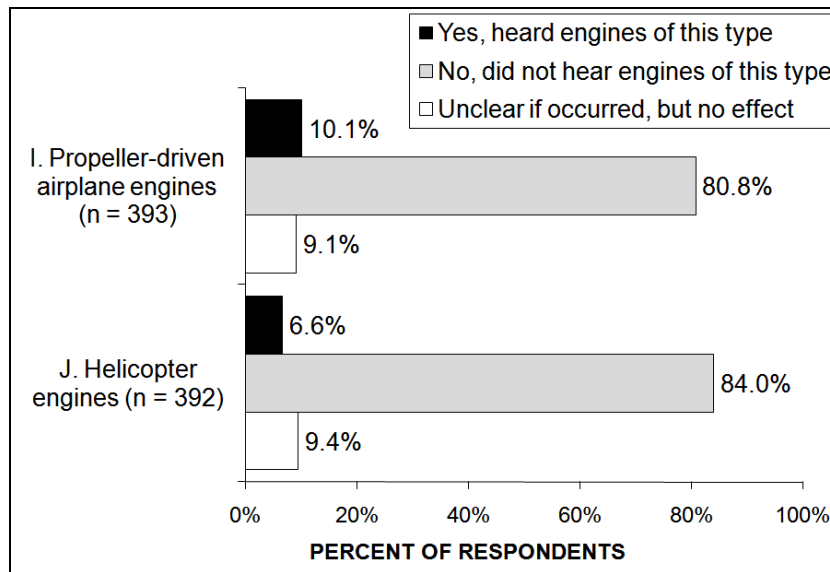


Figure C- 43. Experience with engine sounds from aircraft

Of the six cruise ship passengers who reported hearing engines of other large cruise ships, 4 reported that the sound had no effect on them and 2 reported they detracted somewhat from their trip enjoyment.

Cruise Ship Passenger Survey

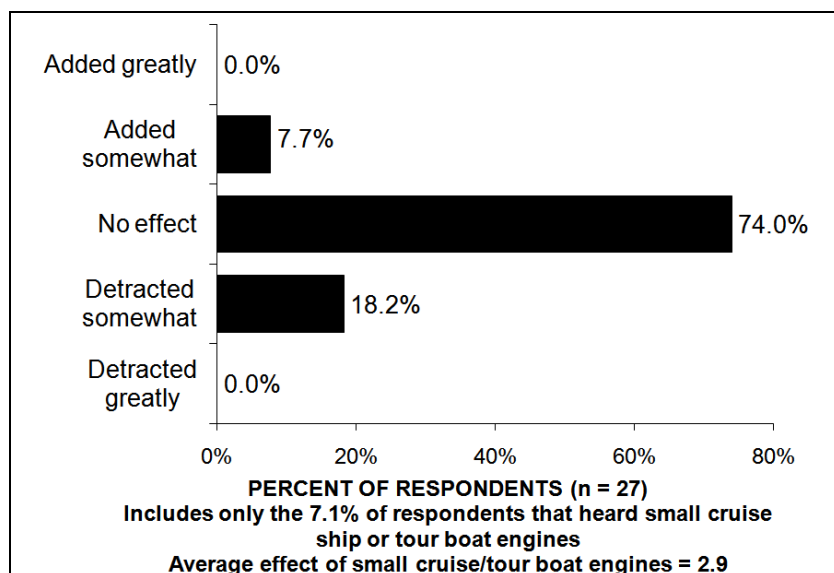


Figure C- 44. Effect of hearing small cruise ships or tour boat engines on trip enjoyment

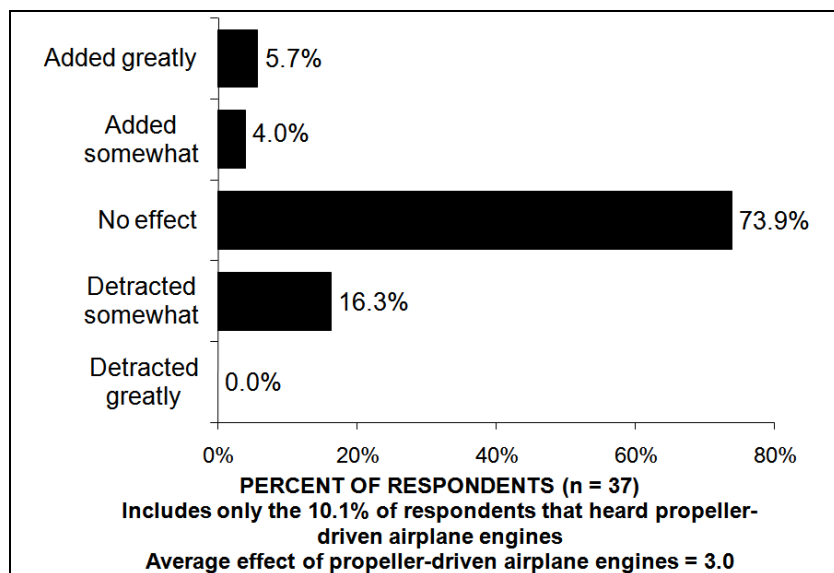


Figure C- 45. Effect of hearing propeller-driven airplane engines on trip enjoyment

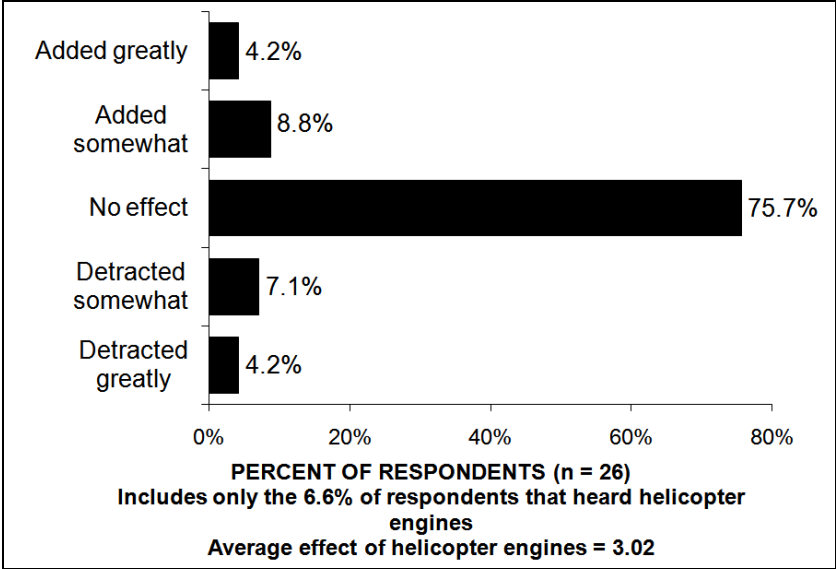


Figure C- 46. Effect of helicopter engines on trip enjoyment

VII. EFFECTS OF ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS

Cruise ship passengers were asked whether they encountered cruise ships and other motorized craft when they were visiting Margerie and Grand Pacific glaciers. Respondents were also asked how these encounters affected their enjoyment of the Margerie and Grand Pacific glaciers. This section reports the results of these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 9).

Highlights

- Of the different types of craft seen by cruise ship passengers at Margerie and Grand Pacific glaciers, motorized craft other than large cruise ships were the most likely to detract from visitors' enjoyment of the Margerie and Grand Pacific glaciers (6.1%). Large cruise ships were a close second (5.0%).
- A small percent (4.7%) of cruise ship passengers indicated that large cruise ships added to their enjoyment of the glaciers and 25.4% reported they had no effect on their enjoyment of Margerie and Grand Pacific glaciers.
- Other motorized craft were the most likely to add (14.7%) to cruise ship passengers' enjoyment of the Margerie and Grand Pacific glaciers.
- Helicopters detracted from less than 1% of cruise ship passengers' experiences of the glaciers. These low overall detraction rates were due to few cruise ship passengers hearing or seeing helicopters (<3%) and not because people who saw them were not affected (32% of cruise ship passengers who saw/heard helicopters reported they detracted from their trip experience). Thus, increases in air traffic would increase the negative effects of these craft at a relatively rapid rate.

Presence of different types of craft affected enjoyment of Margerie and Grand Pacific glaciers

Mail survey

11c. How did the presence of each type of craft affect your enjoyment of the Margerie/Grand Pacific tidewater glaciers?

	How did the presence of each type of craft affect your enjoyment of Margerie/Grand Pacific glaciers?					
	↓	↓	↓	↓	↓	↓
A. LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
B. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
C. KAYAKS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
D. PROPELLER-DRIVEN AIRPLANES	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
E. HELICOPTERS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly

Question 11c was completed by cruise ship passengers who visited Margerie and Grand Pacific glaciers *and* reported seeing craft at the glaciers. Thus, the “Did not see” response to Q11c does not include cruise passengers who did not see craft of any kind when visiting the Margerie and Grand Pacific glaciers. To provide more meaningful results, those respondents who visited the glacier and did not see or did not remember seeing any craft at the glaciers were included in the “Did not see/Don’t know” response option. Thus, responses include all cruise ship respondents who visited the Margerie and Grand Pacific glaciers.

The data for Question 11c are presented in two ways: Table C-9 presents the effect ratings as a percent of all respondents who visited the Margerie and Grand Pacific glaciers and Table C-10 presents the effect ratings as a percent of those who saw that type of craft. As can be seen in Table C-9, motorized craft other than large cruise ships had the highest overall detraction rates (2.5%) with large cruise ships a close second (2.0%).

Looking at Table C-10, for those who saw each different type of craft, helicopters and cruise ships were most likely to detract from cruise ship passengers’ experiences of the glaciers (31.5% and 14.3%, respectively). Motorized craft other than large cruise ships were third. Although cruise ship passengers reported that cruise ships detracted more than other motorized craft, because fewer cruise ship passengers heard or saw cruise ships, the overall detraction rates for cruise ships were lower.

Helicopters detracted from less than 1% of cruise ship passengers’ experiences of the glaciers. Table C-10 suggests that these low overall detraction rates were due to fewer cruise ship passengers hearing or seeing

Cruise Ship Passenger Survey

helicopters. Thus, increases in air traffic would increase the negative effects of these craft at a relatively rapid rate.

Table C-9. Effects of different types of craft for cruise ship passenger survey respondents who visited Margerie and Grand Pacific glaciers

Type of craft	Percent of all respondents who visited the glaciers					
	Did not see/ Don't know	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
Large cruise ships (n = 265)	85.7%	0.0%	2.0%	10.3%	1.1%	0.8%
Motorized craft other than large cruise ships (n = 264)	71.1%	0.0%	2.5%	20.5%	5.1%	0.8%
Kayaks (n = 264)	91.5%	0.0%	0.4%	4.1%	3.3%	0.7%
Propeller-driven airplanes (n = 263)	97.7%	0.0%	0.0%	1.5%	0.0%	0.8%
Helicopters (n = 263)	97.8%	0.4%	0.3%	0.3%	1.2%	0.0%

Note: Includes only the 66.7% of respondents that visited Margerie and Grand Pacific glaciers.

Table C-10. Effects of different types of craft for cruise ship passenger survey respondents who saw/heard craft at Margerie and Grand Pacific glaciers

Type of craft	Saw craft at glaciers	Percent of respondents who saw/heard type of craft at Margerie/Grand Pacific glaciers						
		n	Average effect rating	1 = Detracted greatly	Detracted somewhat	No effect	Added somewhat	5 = Added greatly
Large cruise ships	14.3%	37	3.0	0.0%	14.3%	72.2%	7.7%	5.7%
Motorized craft other than large cruise ships	28.9%	77	3.1	0.0%	8.5%	70.9%	17.8%	2.8%
Kayaks	8.5%	22	3.5	0.0%	4.8%	48.6%	38.4%	8.2%
Propeller-driven airplanes	2.3%	6	3.7	0.0%	0.0%	64.9%	0.0%	35.1%
Helicopters	2.2%	6	3.1	18.5%	13.0%	13.0%	55.5%	0.0%

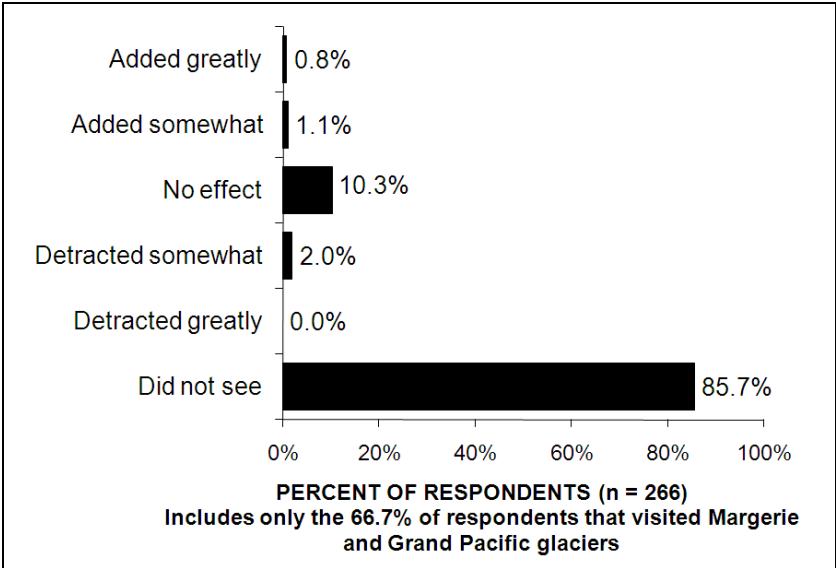


Figure C- 47. Effect of seeing large cruise ships at Margerie and Grand Pacific glaciers

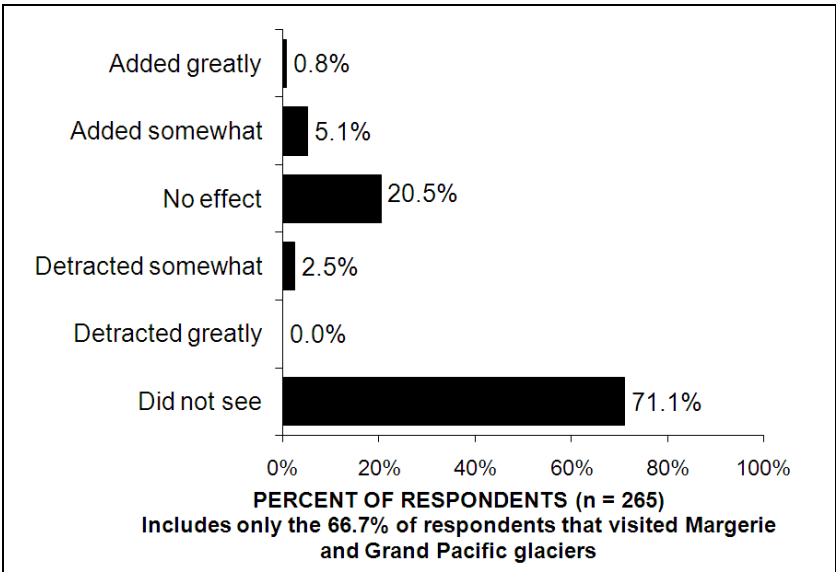


Figure C- 48. Effect of seeing motorized water craft other than large cruise ships at Margerie and Grand Pacific glaciers

Cruise Ship Passenger Survey

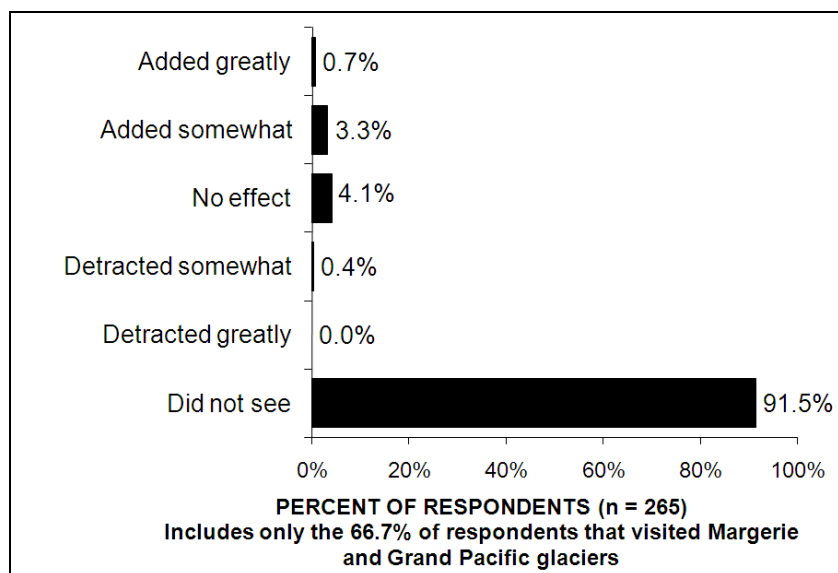


Figure C- 49. Effect of seeing kayaks at Margerie and Grand Pacific glaciers

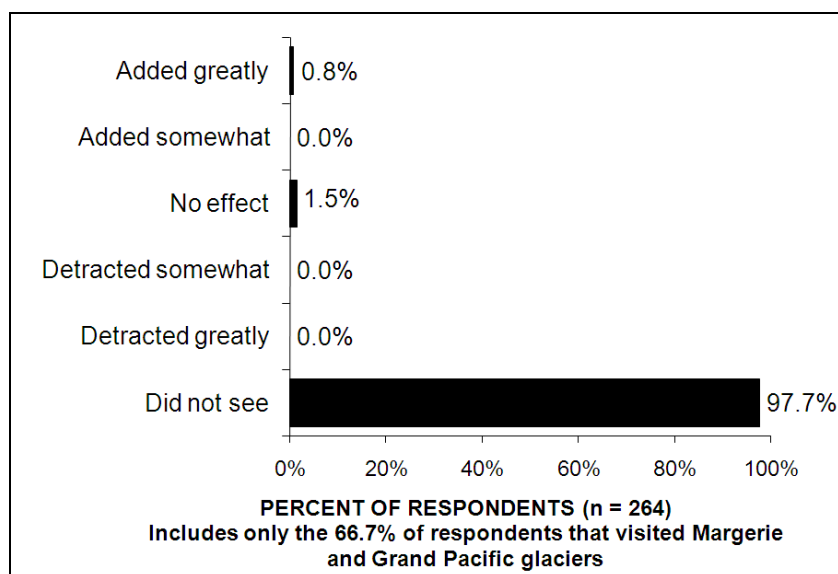


Figure C- 50. Effect of seeing propeller-driven airplanes at Margerie and Grand Pacific glaciers

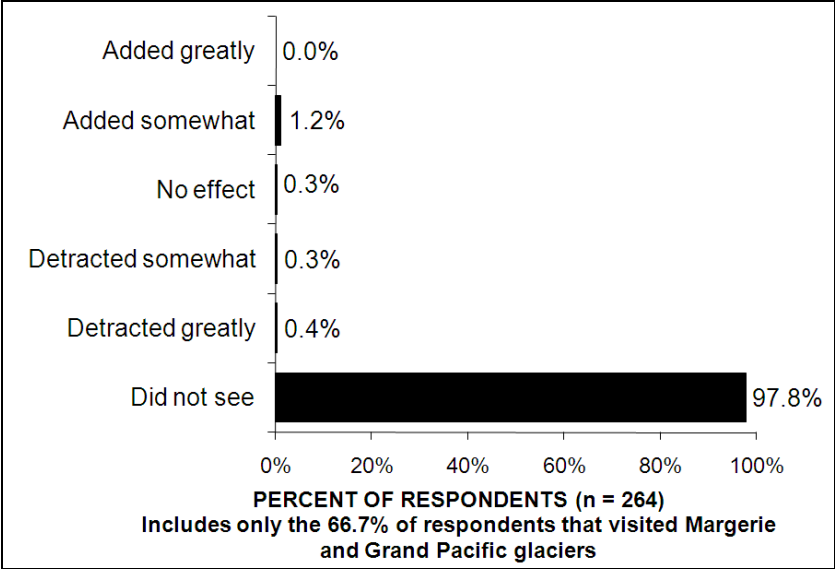


Figure C- 51. Effect of seeing helicopters at Margerie and Grand Pacific glaciers

VIII. EFFECTS OF ENCOUNTERS: ENTIRE TRIP

Cruise ship passengers were asked about encounters with cruise ships and other motorized craft during their entire visit to Glacier Bay proper. Respondents were asked about the effects of these encounters on 1) enjoyment of Glacier Bay, 2) specific aspects of trip experience, and 3) on future recommendations. This section reports the findings for these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 9).

Highlights

- Large cruise ships had the highest overall detraction rates (5.3%) with motorized craft other than large cruise ships a close second (4.8%). However, fewer cruise ship passengers reported seeing another large cruise ship than reported seeing motorized craft other than large cruise ships.
- For cruise ship passengers who saw each different type of craft, large cruise ships and propeller-driven airplanes were most likely to detract from cruise ship passengers' experiences (14% and 16%, respectively). Motorized craft other than large cruise ships was the least likely to detract from cruise ship passengers' experiences (8%).
- The trip experiences most affected by seeing or hearing a large cruise ship were: 1) Solitude and 2) Pristine environment. Review of all items suggests that the presence of large cruise ships affected the ratings on the items that most strongly represent wilderness experience as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). Furthermore, for each of the 8 trip experiences, the majority of scale scores indicated "No effect." A few cruise ship passengers indicated for each trip experience that large cruise ships "Added somewhat" and "Added greatly" for any trip experience. Averaging the effect ratings of cruise ship passenger respondents resulted in means that were below 3, the "No effect" point on the scale.
- Of 8 possible trip experiences that cruise ship passengers may have in Glacier Bay proper, other large cruise ships detracted from those most directly related to the presence of human beings. Specifically, trip experiences most affected by seeing or hearing other large cruise ships were Solitude and Pristine environment.
- There was a slight relationship between the importance of a trip experience and the effect of large cruise ships upon it. This relationship however was such that items that were more important were less affected by cruise ships. The two dimensions that were most affected, "Solitude" and "Pristine Environment," were the least important and the third most important, respectively. The most important dimensions of "Scenic beauty" and "Wonder of nature" were the least and fourth least affected dimensions.
- Less than 2% of cruise ship passengers indicated that large cruise ships inhibited their ability to see land animals and/or to see marine animals. Most (84% and 86%, respectively) respondents indicated large cruise ships had no effect on their viewing of land or marine animals.

- Most (87%) cruise ship passengers reported being very likely to recommend visiting Glacier Bay on the cruise ship. Less than 2% of cruise ship passengers said they would be somewhat or very unlikely to recommend visiting Glacier Bay on a cruise ship.
- Experience with different craft during the trip had small effects (positive or negative) on cruise ship passengers' future recommendation. Most cruise ship passengers reported no effect (76% to 84%) of different craft on future recommendations. Compared to water craft, the two types of aircraft were slightly more likely to decrease the likelihood of recommending that others visit Glacier Bay on a cruise ship (approximately 7% for watercraft vs. 10% for aircraft).
- Overall ratings of the time spent boating/cruising in Glacier Bay proper indicated that 59% of cruise ship visitors' time was "extremely good" and 32% of cruise ship visitors' time was "very good." Less than 2% of cruise ship visitors rated their time spent boating/cruising in Glacier Bay proper as poor, very poor, or extremely poor.

Effect of encounters of different types of craft on enjoyment of Glacier Bay proper

Mail Survey

10. During the trip in which you were contacted, how did seeing or hearing (other than your own transport) each type of motorized craft affect your enjoyment of Glacier Bay proper?

		How did seeing or hearing the following vehicles affect your enjoyment of Glacier Bay proper?					
		↓	↓	↓	↓	↓	
A.	LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
B.	MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
C.	PROPELLER-DRIVEN AIRPLANES	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
D.	HELICOPTERS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly

The data for Question 10 are presented in two ways: Table C-11 presents the effect ratings as a percent of all respondents and Table C-12 presents the effect ratings as a percent of those who saw the craft. As can be seen in Table C-11, large cruise ships had the highest overall detraction rates (5.3%) with motorized craft other than large cruise ships a close second (4.8%). However, fewer cruise ship passengers reported seeing other large cruise ships than reported seeing motorized craft other than large cruise ships.

Cruise Ship Passenger Survey

Looking at Table C-12, for those who saw each different type of craft, large cruise ships and propeller-driven airplanes were most likely to detract from cruise ship passengers' experiences. Motorized craft other than large cruise ships were the least likely to detract from cruise ship passengers' experiences.

Propeller-driven airplanes and helicopters detracted from less than 2% of all cruise ship passengers' trip experiences. Table C-11 suggests that these low overall detraction rates were due in part to low encounter rates. Thus, increases in air traffic would increase the negative effects of these craft at a relatively rapid rate.

Table C-11. Effect of different craft on enjoyment of Glacier Bay proper: Percent of all respondents

Type of craft	Percent of all respondents					
	Did not see/ Don't know	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
Large cruise ships (n = 398)	62.6%	0.5%	4.9%	29.6%	1.3%	1.1%
Motorized craft other than large cruise ships (n = 390)	43.6%	0.0%	4.8%	41.0%	8.9%	1.8%
Propeller-driven airplanes (n = 390)	86.4%	0.6%	1.6%	9.2%	1.0%	1.3%
Helicopters (n = 391)	90.1%	0.3%	0.7%	7.8%	0.8%	0.3%

Table C-12. Effect of different craft on enjoyment of Glacier Bay proper: Percent who saw craft

Type of craft	Saw craft	N	Average effect rating	Percent of respondents who saw craft				
				1 = Detracted greatly	Detracted somewhat	No effect	Added somewhat	5 = Added greatly
Large cruise ships	37.4%	141	2.9	1.2%	13.2%	79.2%	3.4%	2.9%
Motorized craft other than large cruise ships	56.4%	221	3.1	0.0%	8.4%	72.7%	15.7%	3.2%
Propeller-driven airplanes	13.6%	53	3.1	4.1%	11.6%	67.2%	7.5%	9.6%
Helicopters	9.9%	38	3.0	2.8%	7.5%	78.6%	8.3%	2.8%

Effect of encounters with large cruise ships on different trip experiences

The qualitative interviews conducted during Summer 2007 revealed seven dimensions of visitor experience that were affected by cruise ships. These identified dimensions of visitor experience had significant overlap with dimensions of visitor experience measured by the list of Recreational Experience Preference (REP) items. To have two items for each dimension, 9 REP items were selected and 5 new items were constructed using the REP format (see general Introduction for more detail). Respondents were asked the importance of each of these experiences during their visit to Glacier Bay (see p. 25). Additionally respondents were asked how hearing or seeing a large cruise ship affected each possible trip experience.

Mail survey

8. How did hearing or seeing a large cruise ship affect each of the following aspects of your experience in Glacier Bay proper? *(Circle one response for each aspect of your experience.)*

		How did hearing or seeing a large cruise ship affect each of the following aspects of your experience?				
		↓	↓	↓	↓	↓
A.	EXPERIENCE THE SCENIC BEAUTY	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
B.	EXPERIENCE TRANQUILITY	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
C.	BE AMAZED BY NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
D.	EXPERIENCE A PRISTINE SETTING	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
E.	ENJOY THE SOUNDS OF NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
F.	EXPERIENCE SOLITUDE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
G.	EXPERIENCE NATURE UNTOUCHED BY HUMANS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
H.	HAVE PERSONAL EXPERIENCES WITH NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
I.	VIEW WILDLIFE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
J.	EXPERIENCE NATURE'S WONDERS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
K.	BE CLOSE TO NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
L.	FEEL ALONE WITH NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
M.	EXPERIENCE PEACE AND CALM	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
N.	EXPERIENCE THE NATURAL SOUNDS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly

Cruise Ship Passenger Survey

Cronbach's alpha was calculated for each of the seven dimensions to assess the internal consistency of the two scale items selected to measure the effect of cruise ships on each dimension. George and Mallery (2003) provide the following rules of thumb: “ $\alpha > .9$ – Excellent, $\alpha > .8$ – Good, $\alpha > .7$ – Acceptable, $\alpha > .6$ – Questionable, $\alpha > .5$ – Poor, and $\alpha < .5$ – Unacceptable” (p. 231). As can be seen in Table C-13, Cronbach's alpha was over 0.8 for 6 of the 7 scales indicating good reliability of those scales. The Cronbach's alpha for the scale for “Seeing nature” was 0.564 indicating poor reliability. Because it was unlikely that the same latent variable underlies these two items for cruise ship passengers, these two items were treated as two separate scales measuring different dimensions. Thus, a total of 8 scales representing 8 dimensions were used in subsequent analyses. It should be noted that this pattern of findings is analogous to that found for the 14 items measuring importance of these visitor experience dimensions.

Table C-13. Internal consistency measure (Cronbach's alpha) for each dimension

Scale	Items	Cronbach's alpha
Seeing nature		0.564
	View wildlife	
	Experience the scenic beauty	
Experiencing the wonder of nature		0.908
	Be amazed by nature	
	Experience nature's wonders	
Intimate experience with nature		0.866
	Have personal experiences with nature	
	Be close to nature	
Hear the sounds of nature		0.871
	Enjoy the sounds of nature	
	Experience the natural sounds	
Tranquility		0.896
	Experience tranquility	
	Experience peace and calm	
Solitude		0.880
	Experience solitude	
	Feel alone with nature	
Pristine environment		0.842
	Experience a pristine setting	
	Experience nature untouched by humans	

Table C-14 reveals that the trip experiences most affected by seeing or hearing a large cruise ship were: 1) Solitude and 2) Pristine environment. Review of all items suggests that the presence of large cruise ships affected the ratings on the items that most strongly represent wilderness experience as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). Furthermore, for each of the 8 trip experiences, the majority of scale scores indicated “No effect.” A few cruise ship passengers indicated for each trip experience that large cruise ships “Added somewhat” and “Added greatly” for any trip experience. Averaging the effect ratings of cruise ship passenger respondents resulted in means that were below 3, the “No effect” point on the scale.

Table C-14. Effects of large cruise ships on cruise ship passengers' trip experiences

Trip Experiences	N	Mean	Percent of people rating effect of seeing/hearing large cruise ship during this trip to Glacier Bay proper on experiences ¹								
			1	1.5	2	2.5	3	3.5	4	4.5	5
Solitude	153	2.80	2.2	2.1	9.2	9.7	75.4	0.7	0.0	0.0	0.7
Pristine environment	152	2.84	1.2	1.4	9.2	8.8	77.9	0.0	0.7	0.0	0.7
Tranquility	154	2.93	0.5	2.1	5.4	5.4	83.1	0.7	0.7	0.7	1.4
Intimate experience with nature	153	2.93	0.5	1.9	2.1	4.9	89.8	0.0	0.0	0.0	0.7
Experiencing the wonder of nature	153	2.94	1.2	0.7	4.9	3.3	85.6	2.8	0.0	0.0	1.4
Hear the sounds of nature	153	2.94	0.0	0.4	4.7	4.9	88.4	0.0	0.7	0.0	0.7
View wildlife	154	2.95	0.5	0.0	6.8	0.0	91.3	0.0	0.0	0.0	1.4
Experience the scenic beauty	154	2.98	1.2	0.0	11.0	0.0	79.1	0.0	5.9	0.0	2.8

¹The rating scale included for each item was: 1 = Detracted greatly, 2 = Detracted somewhat, 3 = No effect, 4 = Added somewhat, 5 = Added greatly. Scale values that fall between the 5 points on the rating scale are due to averaging the ratings for the two scale items for a dimension.

Cruise ship passengers were asked about the importance of each of these 8 trip experiences as well (see p. 25). To see whether the important trip experiences were more (or less) likely to be affected by large cruise ships, the average importance ratings were plotted against the average detraction ratings. As shown in Figure C- 52, points of greatest concern would be those that fell in the lower right-hand quadrant of the plot. This area corresponds to important trip experiences from which cruise ships detracted. The area denoted by the dotted line corresponds to the area presented in Figure C- 53 showing the average importance ratings by average detraction ratings for cruise ship passengers.

As can be seen in Figure C- 53 for cruise ship passengers there was a slight relationship between the importance of a trip experience and the effect of large cruise ships upon it. This relationship however was such that items that were more important were less affected by cruise ships. The two dimensions that were most affected, "Solitude" and "Pristine Environment," were the least important and the third most important, respectively. The most important dimensions of "Scenic beauty" and "Wonder of nature" were the least and fourth least affected dimensions.

Cruise Ship Passenger Survey

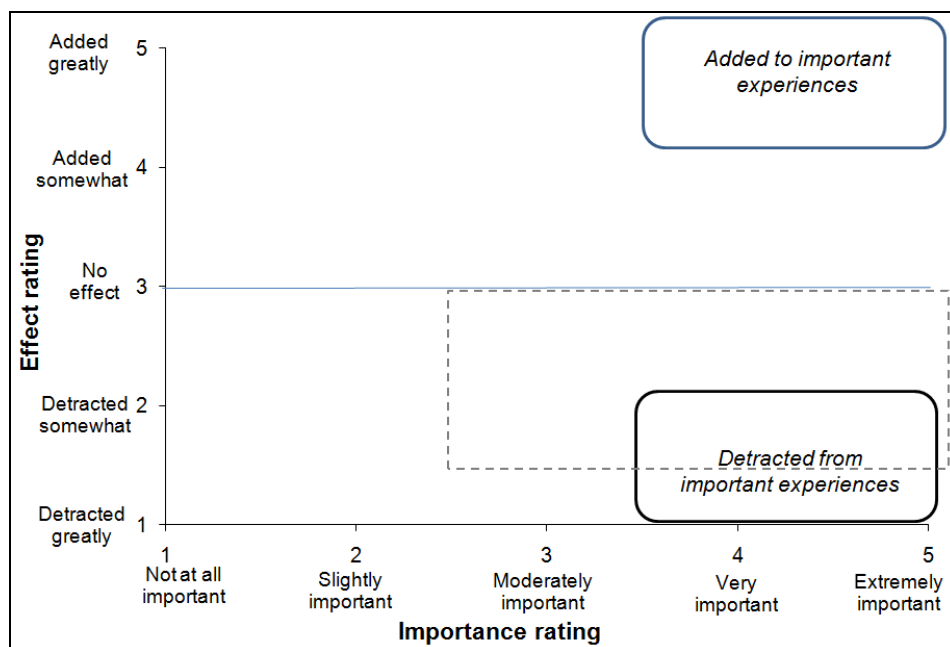


Figure C- 52. Average importance ratings by average effect ratings for each type of trip experience

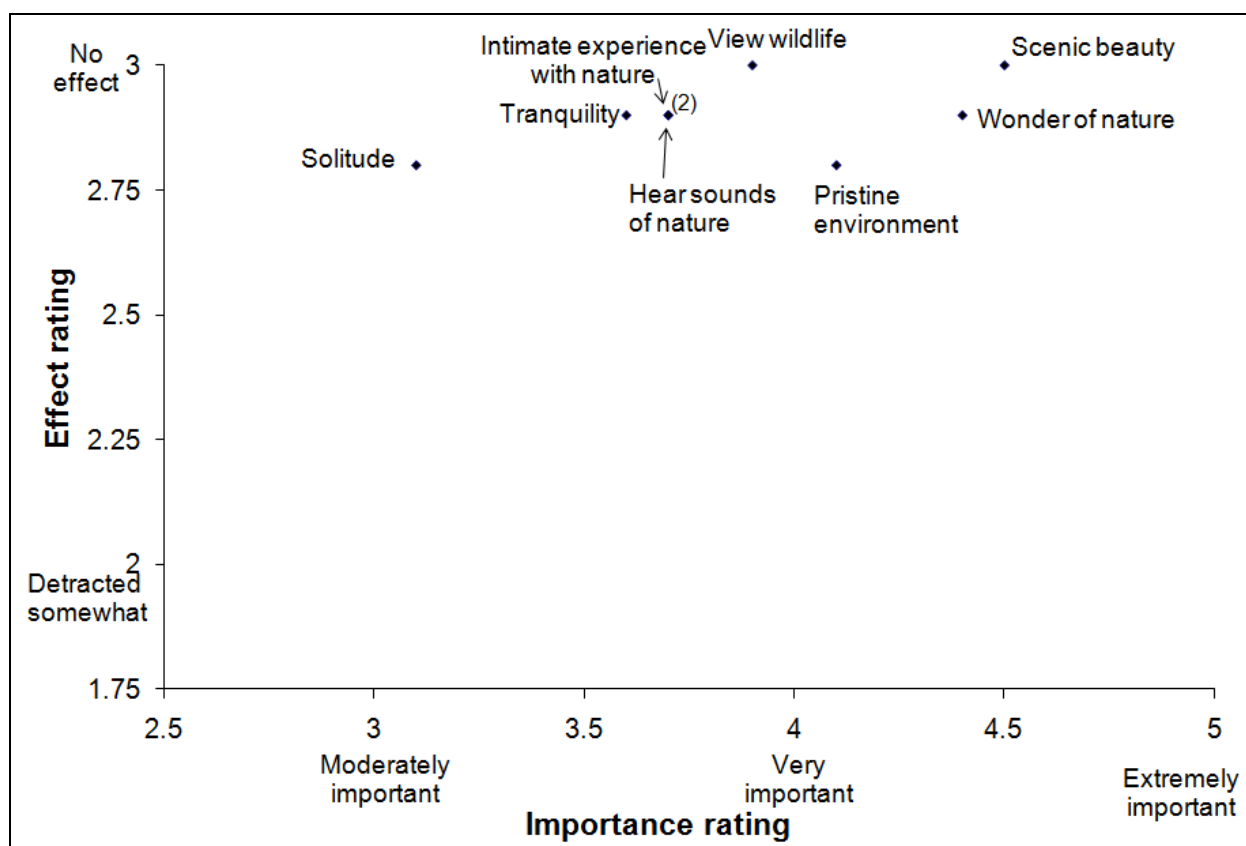


Figure C- 53. Average importance ratings by average effect ratings for each trip experience dimension

Effect of encounters with large cruise ships on viewing land animals

Mail Survey

13. During your trip to Glacier Bay proper, how did large cruise ships (other than the one you were on) affect your viewing of **land animals** (e.g., bear, moose, etc.)? (*Check all that apply.*)

- ☐ Other large cruise ships blocked my view of land animals.
- ☐ Other large cruise ships made land animals move to where I could easily see them.
- ☐ Other large cruise ships made land animals move to where I could not easily see them.
- ☐ Other large cruise ships had no effect.
- ☐ Don't know/Don't remember

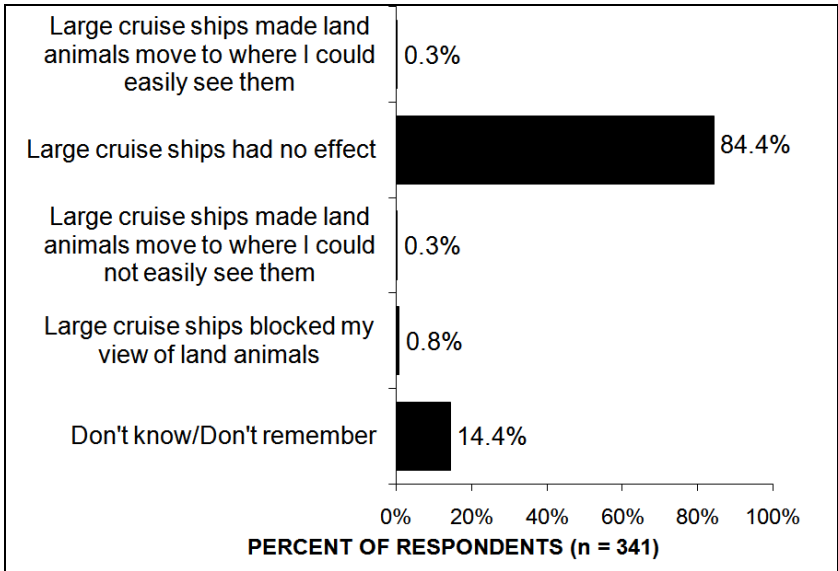


Figure C- 54. Effect of encounters with large cruise ships on viewing of land animals

Effect of encounters with large cruise ships on viewing marine animals

Mail Survey

14. During your trip to Glacier Bay proper, how did large cruise ships (other than the one you were on) affect your viewing of **marine animals** (e.g., whales, sea lions, etc.)? *(Check all that apply.)*

- ☐ Other large cruise ships blocked my view of marine animals.
- ☐ Other large cruise ships made marine animals move to where I could easily see them.
- ☐ Other large cruise ships made marine animals move to where I could not easily see them.
- ☐ Other large cruise ships had no effect.
- ☐ Don't know/Don't remember

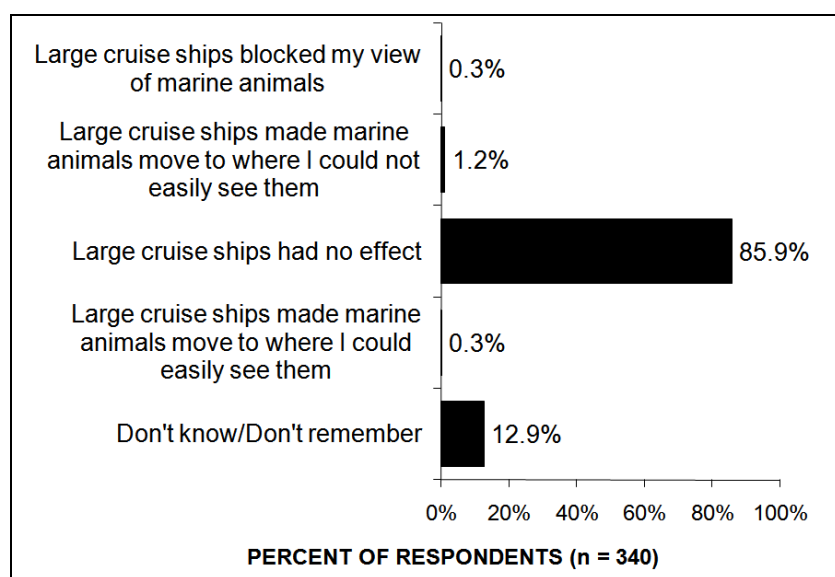


Figure C- 55. Effect of encounters with large cruise ships on viewing of marine animals

Future recommendations to visit Glacier Bay

Given their trip experience, cruise ship passenger survey respondents were asked how likely they would be to recommend that a friend or family member visit Glacier Bay on a cruise ship (Q-17). A follow-up question asked how their experience with different kinds of craft affected their likelihood of recommending a similar visit (Q-18).

Mail Survey

17. Based on your trip experience boating/cruising in Glacier Bay, how likely would you be to recommend that a friend or family member visit Glacier Bay on the same kind of vessel you used (e.g., charter, small cruise, private vessel, etc.)?

- ☐ Very likely to recommend visiting Glacier Bay.
- ☐ Somewhat likely to recommend visiting Glacier Bay.
- ☐ No opinion
- ☐ Somewhat unlikely to recommend visiting Glacier Bay.

- ☐ Very unlikely to recommend visiting Glacier Bay.

18. How did your experience (or lack of it) with each of the following types of craft affect whether you would recommend that a friend or family member visit Glacier Bay proper on the same kind of vessel you used (e.g., charter, small cruise, private vessel, etc.)?

	How did your experience (or lack of) with each craft affect whether you recommend others to visit Glacier Bay on the same kind of vessel you used?				
	↓	↓	↓	↓	↓
A. LARGE CRUISE SHIPS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
B. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
C. PROPELLER-DRIVEN AIRPLANES	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
D. HELICOPTERS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely

As can be seen in Figure C- 56, 86.6% of cruise ship passengers reported being very likely to recommend that others visit Glacier Bay on a cruise ship. Less than 2% of cruise ship passengers said they would be somewhat or very unlikely to recommend visiting Glacier Bay on a cruise ship.

Experience with different craft during the trip had small effects (positive or negative) on cruise ship passengers' future recommendations. Compared to water craft, the two types of aircraft were slightly more likely to decrease the likelihood of recommending that others visit Glacier Bay on a cruise ship.

Further review of the data revealed that of the five people who were unlikely (somewhat or very) to recommend visiting Glacier Bay, four reported that their experiences with other large cruise ships made it less likely (a lot or somewhat) that they would recommend visiting Glacier Bay on a cruise ship. In contrast, one on these five indicated that experiences with motorized watercraft other than large cruise ships would decrease the likelihood that they would make future recommendations to visit Glacier Bay on a cruise ship and two of these five indicated that experiences with the different types of aircraft would decrease the likelihood that they would make future recommendations to visit Glacier Bay on a cruise ship.

Cruise Ship Passenger Survey

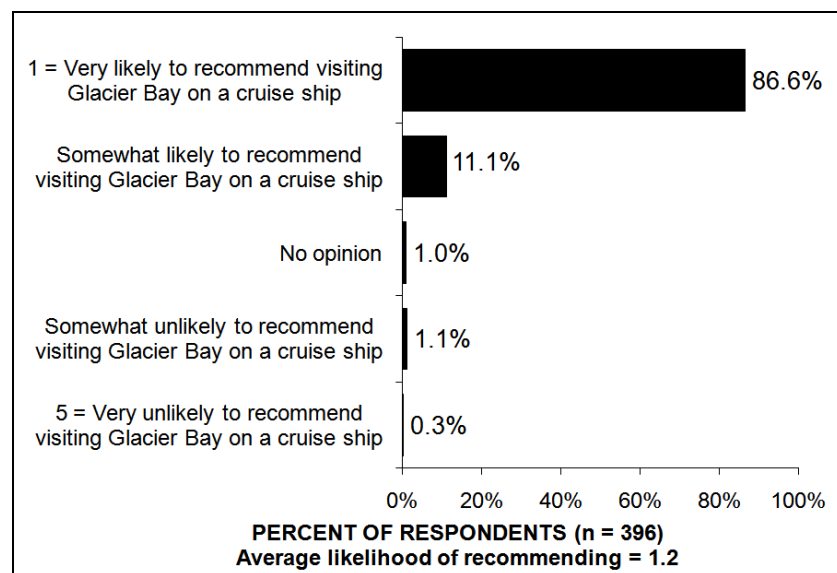


Figure C- 56. Likelihood of recommending a friend or family member visit Glacier Bay on the cruise ship

Table C-15. Effect of experience with different craft on cruise ship passengers' future recommendations

Type of craft	Percent of all respondents				
	A lot less likely	Somewhat less likely	No effect	Somewhat more likely	A lot more likely
Large cruise ships (n = 380)	2.9%	4.1%	76.8%	5.8%	10.4%
Motorized craft other than large cruise ships (n = 380)	3.7%	3.0%	83.7%	5.1%	4.4%
Propeller-driven airplanes (n = 374)	5.8%	3.4%	83.3%	3.7%	3.8%
Helicopters (n = 373)	7.0%	3.0%	82.7%	3.1%	4.2%

Overall rating of time spent boating/cruising in Glacier Bay proper

Cruise ship passengers were asked to give an overall rating for the time they spent boating/cruising in Glacier Bay proper. This question served as a global measure of the effect of cruise ships on visitor experience. As can be seen in Figure C- 57, 58.7% of cruise ship passengers rated their time boating or cruising in Glacier Bay proper as "Extremely good" and 31.9% rated the time as "Very good".

Mail Survey

19. Overall, how would you rate the time you spent boating/cruising in Glacier Bay proper during your trip?
(Check one box.)
- ☐ Extremely poor
 - ☐ Very poor
 - ☐ Poor
 - ☐ Good
 - ☐ Very good
 - ☐ Extremely good

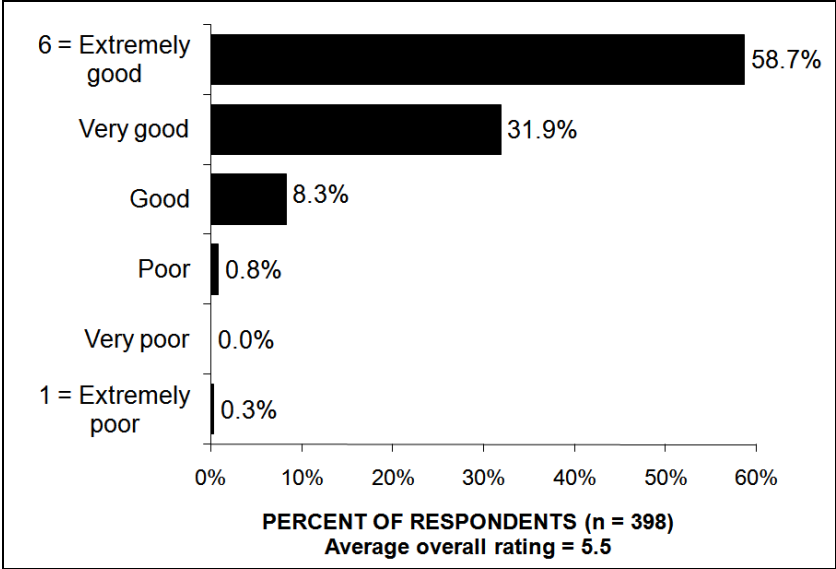


Figure C- 57. Overall rating of time spent boating/cruising in Glacier Bay proper

IX. OPINIONS REGARDING CRUISE SHIPS IN GLACIER BAY PROPER

Cruise ship passengers were asked the extent to which they agreed with four statements regarding the presence of cruise ships in Glacier Bay proper (see Q-15 below). This section reports the results obtained from these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 9).

Mail survey

15. Please indicate the extent to which you agree or disagree with each of the following statements.						
		Do you agree or disagree with this statement?				
		↓	↓	↓	↓	↓
A.	LARGE CRUISE SHIPS IN GLACIER BAY PROPER ARE MAJESTIC.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
B.	LARGE CRUISE SHIPS PROVIDED A SENSE OF SCALE WHEN VIEWING SCENERY IN GLACIER BAY	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
C.	LARGE CRUISE SHIPS ARE A GOOD WAY FOR A LARGE NUMBER OF PEOPLE TO VISIT GLACIER BAY PROPER	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
D.	IT IS INAPPROPRIATE FOR LARGE CRUISE SHIPS TO BE IN GLACIER BAY PROPER	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Highlights

- Of the four statements, cruise ship passengers were most likely to agree with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper” (92%) and “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay” (60%).
- Three-fourths (76%) of cruise ship passengers disagreed that “It is inappropriate for large cruise ships to be in Glacier Bay proper.”
- Half (50%) of cruise ship passengers were neutral that large cruise ships in Glacier Bay proper are majestic. The remaining half of respondents was split in their agreement that large cruise ships in Glacier Bay proper are majestic with 28.5% in agreement and 21.9% in disagreement.

- Responses to these four statement were correlated (r 's ranged from .23 to .53). The pattern of correlations indicated that people either 1) generally agreed with the favorable statements and disagreed with the unfavorable statement regarding cruise ships, or 2) the reverse (generally disagreed with the favorable statements and agreed with the unfavorable statement).

Agreement with “Large cruise ships in Glacier Bay proper are majestic.”

As seen in Figure C- 58, the distribution of agreement with the statement, “Large cruise ships in Glacier Bay are majestic” is bell-shaped around the neutral point, with 49.7% of respondents indicating they were neutral toward the statement.

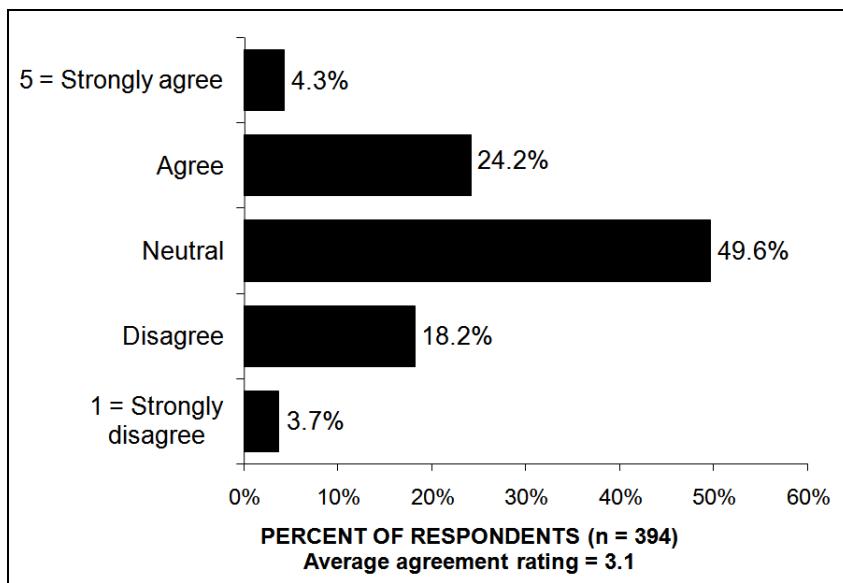


Figure C- 58. Agreement with “Large cruise ships in Glacier Bay proper are majestic”

Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay.”

Figure C- 59 shows that over half (61.2%) of cruise ship passengers agreed or strongly agreed that “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay.”

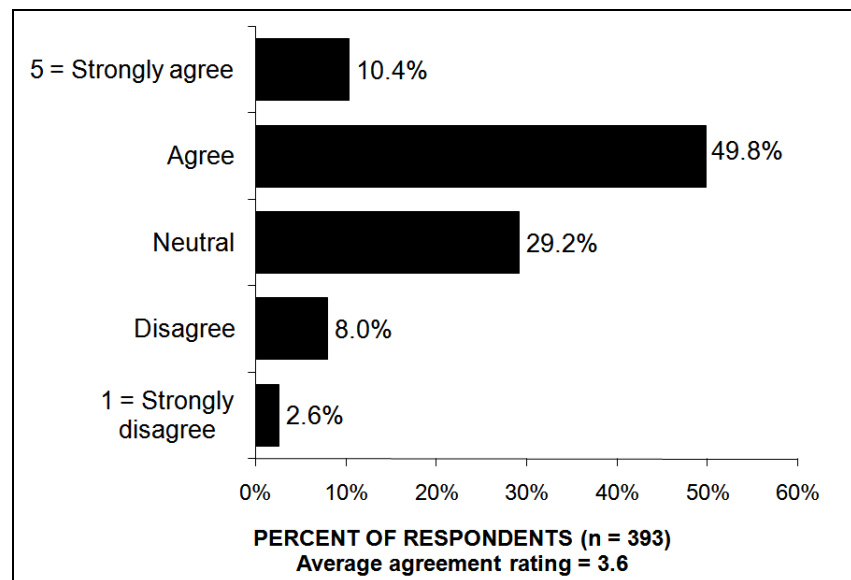


Figure C- 59. Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay”

Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.”

Less than 10% of cruise ship passengers did not “agree” or “strongly agree” that “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.” About 2% of cruise ship passengers disagreed or strongly disagreed with this statement.

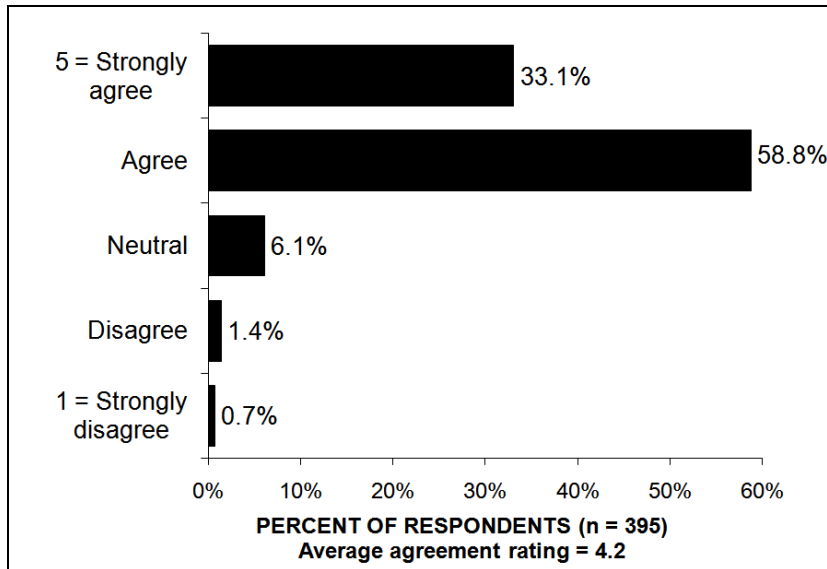


Figure C- 60. Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper”

Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper.”

Three-fourths (75.9%) of cruise ship passengers disagreed or strongly disagreed with the statement, “It is inappropriate for large cruise ships to be in Glacier Bay proper.” A small percentage (6.9%) of cruise ship passengers agreed or strongly agreed with the statement.

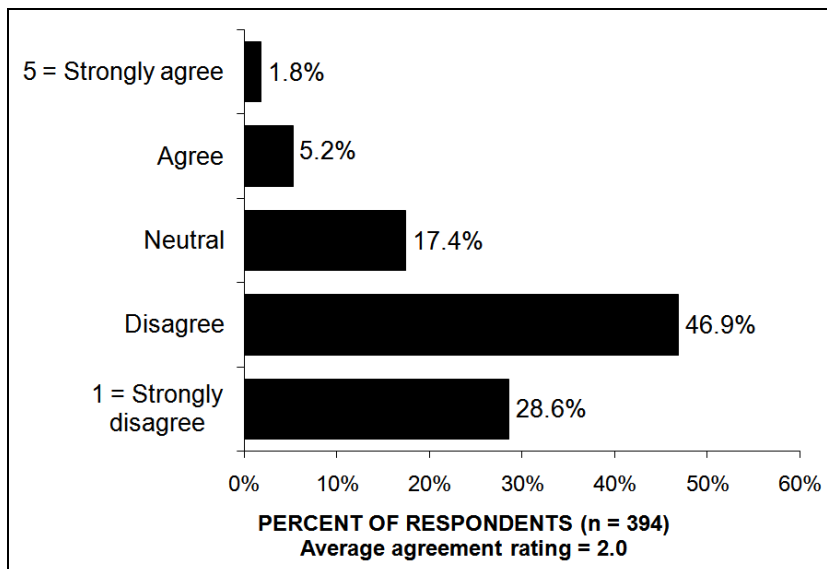


Figure C- 61. Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper.”

Table C-16. Correlations among agreement with opinion statements

Variable		A	B	C	D
A	Large cruise ships in Glacier Bay proper are majestic	--			
B	Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay	.44	--		

Cruise Ship Passenger Survey

C	Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.	.28	.35	--	
D	It is inappropriate for large cruise ships to be in Glacier Bay proper	-.23	-.30	-.53	--

Note: *n*'s range from 392 to 394, and all correlations have *p*-values < .001

Opinion Scale

A scale measure that consists of multiple items (i.e., responses) with internal consistency is a more reliable measure than any of the individual items. Cronbach's alpha was calculated to assess the internal consistency of these four items as a measure of opinions about large cruise ships in Glacier Bay proper. George and Mallery (2003) provide the following rules of thumb: " $\alpha > .9$ – Excellent, $\alpha > .8$ – Good, $\alpha > .7$ – Acceptable, $\alpha > .6$ – Questionable, $\alpha > .5$ – Poor, and $< .5$ – Unacceptable" (p. 231). The Cronbach's alpha for cruise ship passengers was .683 indicating a scale that was at the high end of questionable reliability whereas Cronbach's alpha for these four items for all the other user groups (e.g., backcountry visitors, day-boat passengers) ranged from .727 to .826 indicating acceptable to good reliability. Because it is useful to be able to compare across the user groups and because the reliability for these four items was just below the acceptable range, it was decided to compute a single opinion scale for these four items for all user groups. The opinion scale score was computed by averaging the responses to the four individual opinion items. Because of the increased reliability, the opinion scale was used in subsequent analyses rather than the individual items.

Figure C- 62 shows the distribution of opinion scale scores for cruise ship passengers. The mean for all cruise ship passengers on the opinion scale was 3.71 indicating that on average cruise ship passengers somewhat agreed with large cruise ships being in Glacier Bay proper.

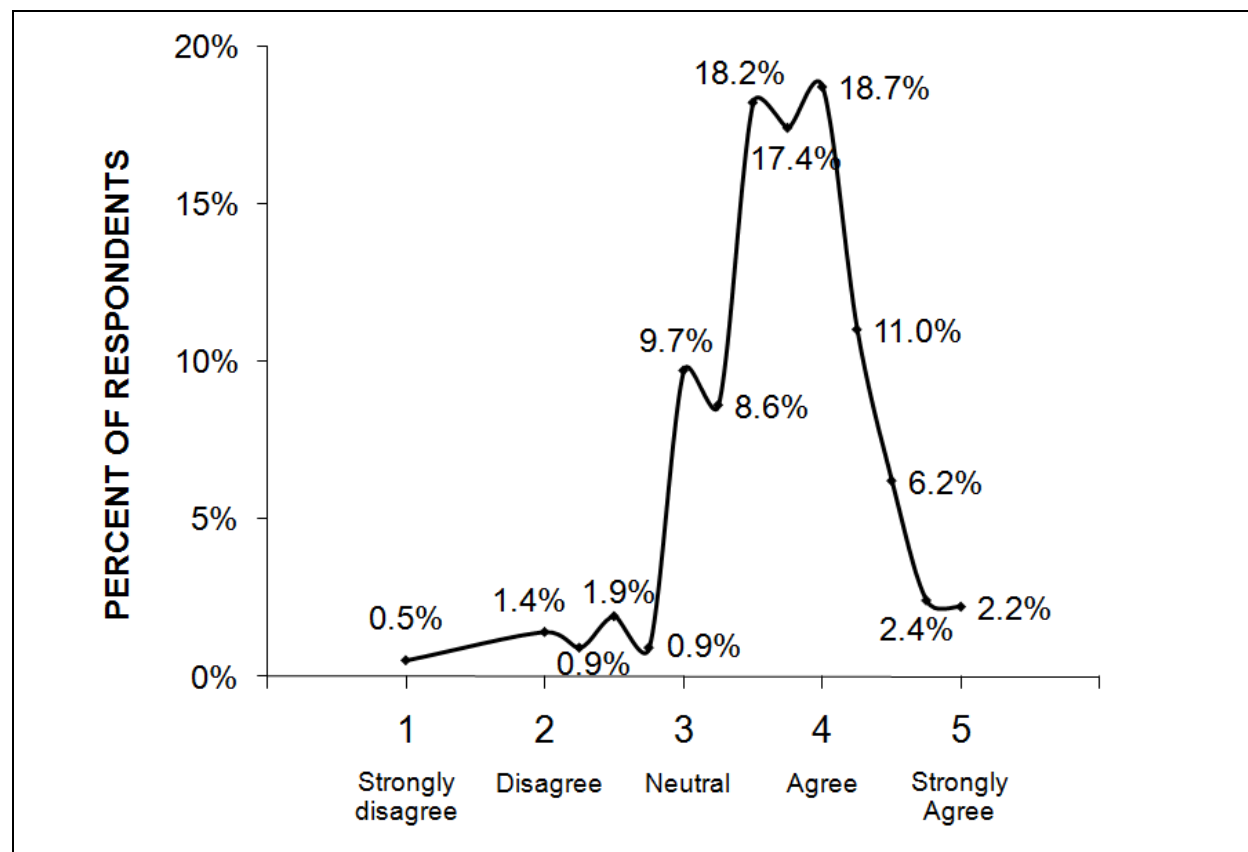


Figure C- 62, Distribution of opinion scale scores

X. LENGTH OF EXPOSURE EFFECTS ON VISITOR EXPERIENCE

Cruise ship passengers were asked to report the number of hours they saw or heard large cruise ships during their stay in Glacier Bay proper. Although a more subjective measure of exposure than number of cruise ships in the bay per day and one that park managers have considerably less control over, this measure provided more detailed information about exposure to cruise ships. As was the case for cruise ship passengers that saw or heard cruise ships, the number of hours cruise ships were heard or seen did not differ by the number of cruise ships in the bay. However, it may be that the effect of cruise ships heard or seen depended on the length of time that cruise ship passengers heard or saw cruise ships regardless of the number of cruise ships in the bay the day they visited. These analyses are described and reported in this section.

Length of exposure was the number of hours that cruise ship passengers reported seeing cruise ships during their stay in Glacier Bay proper. Along with individuals who did not see or hear cruise ships, individuals who did not know or remember the hours they saw or heard cruise ships were excluded from these analyses. The effect of length of exposure to cruise ships was examined for the following measures of effects of cruise ships on visitor experience: 1) cruise ship detraction ratings for each of the eight visitor experience dimensions, 2) likelihood of future recommendations and the effect of seeing large cruise ships on the likelihood of future recommendations, 3) overall enjoyment ratings, 4) effect of cruise ships on trip enjoyment, 5) effect of cruise ships on enjoyment of Margerie and Grand Pacific glaciers), and 6) the opinion scale.

Of the 14 measures examined, number of hours heard or saw cruise ships was significantly related to one measure. The more hours cruise ships were heard or seen the greater the detraction ratings on the experience pristine environment scale were, $r(n = 124) = -.186, p = .039$. Although significant, it should be noted that this observed relationship was relatively weak and explained 3.4% of the variance. Thus, for individuals who saw or heard cruise ships, the number of hours cruise ships were seen or heard was not strongly predictive of reported effects of cruise ships on visitor experience or on opinions related to cruise ships in Glacier Bay proper.

XI. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS

This section examines whether there were particular features of cruise ships (e.g., haze, public address system, etc.) that were associated with effects of cruise ships on cruise ship passengers. Knowing whether certain characteristics of cruise ships are more predictive of effects on cruise ship passengers can provide insights into possible mitigation strategies, if needed.

A total of 143 (37.4%) cruise ship passengers reported hearing or seeing cruise ships during their visit to Glacier Bay proper. The data from these individuals were used in the following analyses and thus, the results reflect only those individuals who had experience with cruise ships during the trip in which they were contacted to participate in the survey.

Characteristics of encounters with cruise ships measured

As part of the mail survey, cruise ship passengers were asked to report about different characteristics of their encounters with large cruise ships. These characteristics were captured by the nine variables listed in Table C-17.

Table C-17. Characteristics of cruise ships used as predictors in regression analyses

Number of cruise ships in the bay (1 vs. 2)
Number of cruise ships in the bay (1 vs. 2 staggered entries vs. 2 concurrent entries)
Total length of time saw or heard large cruise ships
Haze from large cruise ship exhaust affected my views in some manner.
Heard sound from large cruise ship public address system.
Heard large cruise ship engines.
Number of large cruise ships seen at Margerie and Grand Pacific glaciers
Other large cruise ships had no effect on viewing land animals
Other large cruise ships had no effect on viewing marine animals

Measures of effect of cruise ships on visitor experience

A number of measures of effects of cruise ships on visitor experience were included in the survey: 1) effects of cruise ships on different dimensions of visitor experience, 2) effect of cruise ships on trip enjoyment, 3) likelihood of future recommendations, 4) overall ratings of trip enjoyment. To determine if there were common factors underlying responses on these measures, an exploratory factor analysis was done.³ The results of the factor analysis revealed a single factor underlying responses to these measures and explained 69.4% of the variance. The measures of cruise ships effects on 8 dimensions of trip experience and the measure of effect of cruise ships on trip enjoyment had factor loadings ranging from .671 to .919 while likelihood of future recommendations and overall ratings of trip enjoyment had loadings below .3 and thus, were excluded. A factor scale score was computed by averaging the scores on each measure which had a factor loading over 0.3.⁴ This computed factor score will be referred to as the cruise ship effect

³ In the exploratory factor analysis, the factors were extracted using maximum likelihood and oblimin rotation. The scree test was used to determine the appropriate number of factors to retain by selecting and interpreting the number of factors above the bend in the curve. This approach to exploratory factor analysis is consistent with “best practices” outlined in Costello and Osborne (2005).

⁴ The factor scale score based on the average of the items loading on the factor was compared to the factor score derived based on the factor score coefficients. The two scores were correlated at 0.99. The factor scale score based on

Cruise Ship Passenger Survey

score and it is a continuous measure of effects of cruise ships ranging from 1 = “detracted greatly” to 5 = “added greatly.” Analyses that use this continuous measure as the dependent variable will show which variables predict different levels of effects of cruise ships ranging from detracted greatly to added greatly.

It may also be useful for park managers to understand how changes in significant predictors can affect the likelihood that visitors report cruise ships detract from their enjoyment. To obtain this information, a dichotomous variable, cruise ships detracted, was created from the continuous cruise ship effect factor score. Individuals who had a cruise ship effect factor score ranging from 1.0 to 2.9 were classified as “cruise ships detracted from experience” whereas individuals who had cruise ship effect factor scores of 3 were classified as “no effect.” Individuals with cruise ship effect factor scores above 3.0 were excluded from the analyses as these individuals reported that cruise ships added to their trip enjoyment. Three individuals (2.3%) had cruise ship effect factor scores over 3.0 and thus, were excluded from analyses using the cruise ships detracted score. Analyses that use this dichotomous measure as the dependent variable will show which variables predict changes in the likelihood that cruise ships detract from visitors’ enjoyment.

Individual relationships between characteristics of cruise ship encounters and the effect of cruise ships

Analyses were conducted to determine whether any of the measured characteristics of cruise ship encounters were related to the effect of cruise ships on visitors experience as measured by the cruise ship effect factor score (the continuous dependent measure). For characteristics of cruise ship encounters that were continuous in nature, correlations were calculated. For characteristics of cruise ship encounters that were nominal in nature, t-tests or one-way ANOVAs were calculated.

Analyses indicated that three of the eight measured characteristics of cruise ship encounters were significant predictors of the effect of cruise ships as measured by the cruise ship effect score. Table C-18 summarizes the characteristics of cruise ships that were found to be significant predictors of the effect of cruise ships as measured by the cruise ship effect score. The findings below indicate that cruise ships detracted more (lower scores on the detract factor) from cruise ship passengers’ trip experience:

1. if cruise ship passengers reported that haze from large another cruise ship exhaust affected their views in some manner,
2. if cruise ship passengers heard another large cruise ships’ public address systems,
3. if cruise ship passengers heard another large cruise ship engines,

Table C-18. Characteristics of cruise ships that were significant predictors of effects of cruise ships

Predictor variable	<i>r</i>	<i>p</i> -value
Haze from large cruise ship exhaust affected my views in some manner.	-0.22	.016
Heard sound from large cruise ship public address system.	-.201	.028
Heard large cruise ship engines.	-.215	.018

NOTE: Higher scores of the cruise ship effect score reflect more positive effects of cruise ships.

To understand the unique relationship of each of the predictor variables with the effects of cruise ships on cruise ship passengers’ visitor experience, a regression was performed that included the three significant variables as predictor variables. A stepwise procedure was adopted to determine the best fitting model. The

the average of the items was used for the following reasons: 1) the scale for the factor score was the same as the original items, 2) analyses indicated that the cruise ship effect score for the other user groups could be computed using the average and still achieve high correlations, thus allowing a way to compare across user groups if desired.

final model included one of the three variables (see Table C-19). The omnibus test of the model was significant, $F(1, 116) = 7.56$, $p = .007$, and the R^2 indicated that 6.1% of the variance in cruise ship effect score was explained by the model.

Table C-19. Summary of model for effects of cruise ships measured by cruise ship effect score for cruise ship passengers

Predictor Variable	B	S.E.	<i>t</i>	<i>p</i> -value
Haze from large cruise ship exhaust affected my views in some manner.	-.605	.220	-2.75	.007
Constant	2.91	.030	97.85	<.001

The regression equation associated with the above model is below.

Cruise ship effect score = $2.91 + (-0.605 * \text{Haze from another large cruise ship's exhaust affected my views in some manner})$

Because the haze variable was dichotomous (0 = no effect, 1 = effect), this equation can be used to predict cruise ship effect scores for those two conditions. Cruise ship passengers who did not report haze from another large cruise ship affected their views are predicted to have cruise ship effect scores of 2.91 if they did not experience haze from another cruise ship and to have cruise ship effect scores of 2.31 if they did experience haze from another large cruise ship. Thus, having haze from another large cruise ship affect cruise ship passengers views in some manner resulted in cruise ship effect scores that went from almost no effect (3 on the cruise ship effect scale) to closer to detracted somewhat (2 on the cruise ship effect scale). It should be noted that less than 1% of cruise ship passengers reported haze from another large cruise ship affecting their views in some manner.

At first it may seem surprising that many characteristics of cruise ship encounters that were measured did not predict the effects of cruise ships on visitors' experiences, particularly given that the characteristics measured were those identified through qualitative interviews with park visitors. However, review of the distribution of responses for the characteristics and cruise ship effect score indicated that most respondents who encountered cruise ships had similar experiences and similar evaluations of those experiences resulting in a restricted range for testing the relationships between the characteristics of the encounters and the effect on visitor experience. Thus, it would be premature to interpret the lack of significant findings obtained in this study as indicating that the characteristics of cruise ship encounters have no effect on cruise ship passengers' visitor experiences.

Individual relationships between characteristics of cruise ship encounters and the likelihood that cruise ships detract from trip enjoyment

Analyses were conducted to determine whether any of the measured characteristics of cruise ship encounters were related to the likelihood cruise ships detract from visitors experience as measured by the cruise ship detracted score (the dichotomous dependent measure). Logistic regression analysis was used to determine whether any of the measured characteristics of cruise ship encounters (see Table C-17) predicted who was negatively affected by cruise ships. Logistic regression is a form of linear regression used when the dependent variable is dichotomous (e.g., cruise ships detracted: yes or no)⁵. In logistic regression,

⁵Discriminant function analysis may also be used to predict membership in two or more groups. Given that there were only two groups, logistic regression was selected over discriminant function analysis because it requires fewer assumptions in theory, is more statistically robust in practice and easier to use and understand.

predictor variables may be either categorical (e.g., heard cruise ship engines: yes or no) or continuous (e.g., total length of time heard or saw large cruise ships).

In logistic regression there are multiple ways to evaluate whether the generated model is good fit to the data. The first is the omnibus chi-square test of the model coefficients. A significant chi-square indicates that the coefficients in the model as a whole significantly predict the dependent variable. When a model has only one predictor variable, a significant model chi-square indicates that the predictor variable significantly predicted the dependent variable. Second, the Hosmer and Lemeshow Goodness of Fit test statistic⁶ can be computed when the predictor variables are continuous. The Hosmer and Lemeshow Goodness of Fit test statistic is a measure of the difference between the data predicted by the model and the observed data. A significant Hosmer and Lemeshow Goodness of Fit test statistic indicates that the data predicted by the model differ significantly from the observed data and thus, the model is not a good fit. Third, examining the percent of cases correctly classified by the model provides information on the goodness of fit of the model. Higher percentages correctly classified indicate a better fitting model.

Predicting for whom cruise ships detracted from trip enjoyment

A separate logistic regression was run for each predictor variable listed in Table C-17 with cruise ships detracted (detracted vs. not effected) as the dependent variable. The maximum number of observations for these analyses was 126, as three respondents indicated that cruise ships added to their enjoyment and were thus, excluded from these analyses. Of the nine variables, none resulted in models with significant model chi-squares indicating they were significant predictors of cruise ships detracting from trip enjoyment. This pattern of no significant predictors was found for the continuous dependent measure as well. Please see the Summary below for more discussion of these findings.

Summary

Three characteristics of cruise ships were found to significantly predict effects of cruise ships on visitors' experiences (the continuous dependent measure), however a stepwise regression found only experiences with haze from another large cruise ship to be significant. This model explained only 6.1% of the variance and thus has very limited practical significance. No cruise ship characteristics predicted the likelihood of cruise ships detracting (the dichotomous measure).

Review of cruise ship passengers' responses suggested that most respondents who encountered cruise ships had similar experiences and similar evaluation of those experiences. This restricted range of experience in the sample limits the ability to detect relationships that may be observed if a wider range of experience occurred. Thus, it would be premature to interpret the lack of significant findings obtained in this study as indicating that the characteristics of cruise ship encounters have no effect on the likelihood of cruise ships to detract from cruise ship passengers' visitor experiences.

It should be noted that findings from stepwise procedures are exploratory in nature. The results of stepwise procedures can be affected by meaningless patterns unique to a particular sample. Thus, the findings can be used to develop theory that would then be tested directly in future research.

⁶ The Hosmer and Lemeshow Goodness of Fit test examines the null hypothesis that the data were generated by the model fitted by the researcher. The test divides subjects in to deciles based on predicted probabilities, and then computes a chi-square from observed and expected frequencies. If the computed test statistic has a probability of .05 or less, the null hypothesis that there is no difference between the observed and model-predicted values of the dependent variable is rejected. Well-fitting models generate data that do not differ from what was observed and their Hosmer and Lemeshow Goodness of Fit Test statistic is not significant.

XII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM VISITOR CHARACTERISTICS

The experience cruise ship passengers have with cruise ships may also be affected by some characteristic(s) associated with them. For example, visitors for which it was important to experience a pristine environment may react more negatively to their encounters with cruise ships than visitors for which experiencing a pristine environment was not as important. Knowing whether certain characteristics of cruise ship passengers are more predictive of effects of cruise ships on cruise ship passengers can provide insights to park managers. For some visitor characteristics (e.g., gender, age) that may be significant predictors, park managers have few options for mitigating their impacts. For others (e.g., importance of different trip dimensions, attitudes toward cruise ships), park managers may be able to design mitigation efforts such as managing expectations to match the most likely visitor experience.

A total of 143 (37.4%) cruise ship passengers reported hearing or seeing cruise ships during their visit to Glacier Bay proper. The data from these individuals were used in the following analyses and thus, the results reflect only those individuals who had experience with cruise ships during the trip in which they were contacted to participate in the survey.

Characteristics of cruise ship passengers measured

As part of the mail survey, respondents were asked to report about different characteristics of themselves. These characteristics were captured by the 18 variables listed in Table C-20.

Table C-20. Visitor characteristics used as predictors in regression analyses

Gender	Hispanic (yes or no)
Age	First trip to GLBA
Education level (years of schooling)	Type of party
Residence	Party size
Caucasian (White: yes or no)	
Importance of experiencing the wonder of nature	Importance of experiencing solitude
Importance of intimate experience with nature	Importance of experiencing pristine environment
Importance of hearing the sounds of nature	Importance of experiencing the scenic beauty
Importance of experiencing tranquility	Importance of viewing wildlife
Opinion scale re: large cruise ships in Glacier Bay proper	

Measures of effect of cruise ships on visitor experience

A number of measures of effects of cruise ships on visitor experience were included in the survey: 1) effects of cruise ships on different dimensions of visitor experience, 2) effect of cruise ships on trip enjoyment, 3) likelihood of future recommendations, and 4) overall ratings of trip enjoyment. As described in the previous section, two composite measures were calculated. The first was a continuous measure of the effects of cruise ships on visitor experience based on the results of a factor analysis (see above for complete description). The range of the cruise ship effect factor score was from 1 “detracted greatly” to 5 “added greatly.” The second was a dichotomous measure of whether cruise ships detracted from trip experience (detracted versus no effect) based on the continuous measure cruise ships effects factor score (see section above for complete description).

Individual relationships between characteristics of cruise ship passengers and the effect of cruise ships

Analyses were conducted to determine whether any of the measured characteristics of cruise ship passengers were related to the effect of cruise ships on their experience as measured by the cruise ship effect score. For characteristics of visitors that were continuous in nature, correlations were calculated. For characteristics of visitors that were nominal in nature, *t*-tests or one-way ANOVAs were calculated.

Table C-21 summarizes the characteristics of cruise ship passengers that were found to be significant predictors of the effect of cruise ships as measured by the cruise ship effect score. The older respondents were the more positive effects cruise ships had on their experience while the more years of schooling respondents had the more negative effects cruise ships had on their experience. More favorable opinions about large cruise ships being in Glacier Bay proper were associated with more positive effects of cruise ships on cruise ship passengers' experience. Because the opinion measures were asked in the mail back questionnaire, it is possible that the opinion scale reflects cruise ship passengers' experiences with cruise ships (other than the one they were on) during their trips. Thus, while the opinion scale and effects of cruise ships were related, there was no way from the current data to determine 1) whether visitor opinions shaped the perception of the experience, 2) whether the experience shaped visitors' opinions, or 3) whether some other more complex relationship underlies the observed correlation.

Table C-21. Cruise ship passenger characteristics that were significant predictors of effects of cruise ships

Predictor variable	<i>r</i>	<i>p</i> -value
Age	.204	.016
Education	-.197	.019
Opinion scale: large cruise ships in Glacier Bay proper	.439	<.001

NOTE: Higher scores of the detraction scale reflect more positive effects of cruise ships and higher scores on the attitude toward large cruise ships in Glacier Bay proper reflect more positive attitudes toward cruise ships.

To understand the unique relationship of each of the predictor variables with the effects of cruise ships on cruise ship passengers' visitor experience, a regression was performed that included all three variables as predictor variables. A backward stepwise procedure was adopted to determine the best fitting model. The final model included two of the three variables (see Table C-22). The omnibus test of the model was significant, $F(2, 137) = 23.65$, $p < .001$, and the R^2 indicated that 25.6% of the variance in cruise ship effect scores was explained by the model.

Table C-22. Summary of model for effects of cruise ships measured by cruise ship effect score for cruise ship passengers

Predictor Variable	B	S.E.	<i>t</i>	<i>p</i>
Highest level of formal schooling	-.024	.008	-3.01	.003
Opinion scale: large cruise ships in Glacier Bay proper	.303	.048	6.32	<.001
Constant	2.17	.218	9.97	<.001

The regression equation associated with the above model is below.

$$\text{Cruise ship effect score} = 2.17 + (-.024 * \text{Education}) + (.303 * \text{Opinion Scale})$$

The regression coefficients (B) show the change in one variable given that all else is constant. For example, for a particular number of years of education (e.g., the mean of 16.4), a one-point increase in the opinion scale score (e.g., going from 2 to 3 or 3 to 4) will increase the cruise ship effect score by .303 points. Likewise, increasing the number of years of education by one will decrease the cruise ship effect score by

0.024 assuming the value for the opinion scale score remains the same. Figure C- 63 shows the plane described by the above regression equation. As can be seen in Figure C- 63, the greatest cruise ship effect scores are predicted for those individuals with the most education who strongly disagree with large cruise ships being in Glacier Bay proper whereas individuals with less education who are more supportive of large cruise ships in Glacier Bay have more positive cruise ship effect scores.

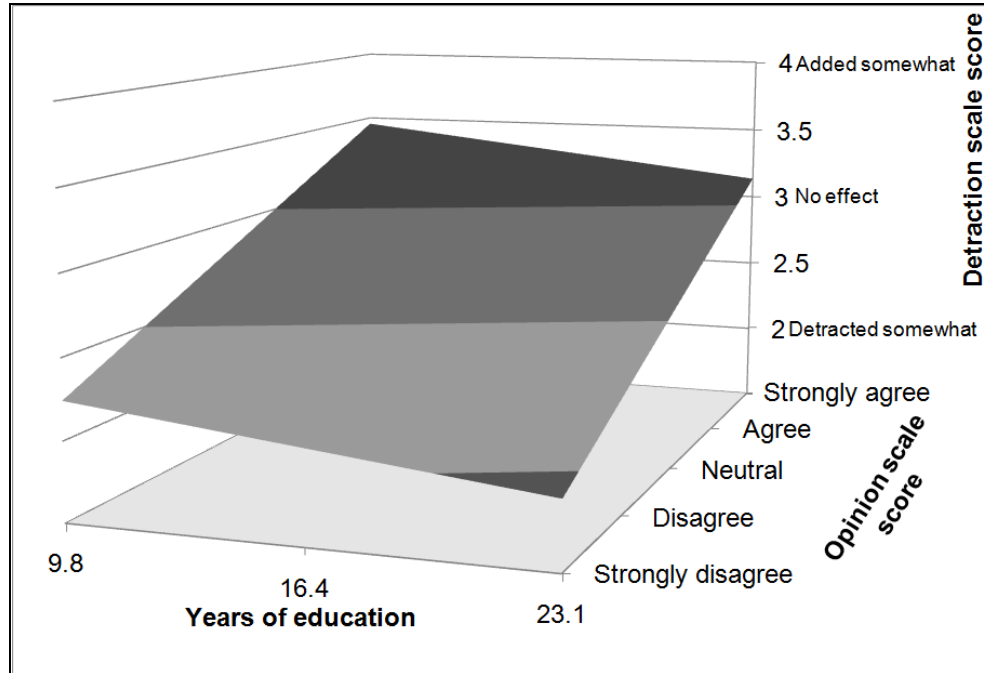


Figure C- 63. Detraction scale score for different education levels and opinion scores

Individual relationships between characteristics of cruise ship passengers and the likelihood that cruise ships detract from trip enjoyment

Analyses were conducted to determine whether any of the measured characteristics of cruise ship passengers were related to the likelihood cruise ships detract from visitors experience as measured by the cruise ship detracted score (the dichotomous dependent measure). Logistic regression analysis was used to determine whether any of the measured characteristics of cruise ship passengers (see Table C-20) predicted who was negatively affected by cruise ships. Logistic regression is a form of linear regression used when the dependent variable is dichotomous (e.g., cruise ships detracted: yes or no)⁷. In logistic regression, predictor variables may be either categorical (e.g., gender: male or female) or continuous (e.g., age).

In logistic regression there are multiple ways to evaluate whether the generated model is good fit to the data. The first is the omnibus chi-square test of the model coefficients. A significant chi-square indicates that the coefficients in the model as a whole significantly predict the dependent variable. When a model has only one predictor variable, a significant model chi-square indicates that the predictor variable significantly predicted the dependent variable. Second, the Hosmer and Lemeshow Goodness of Fit test

⁷Discriminant function analysis may also be used to predict membership in two or more groups. Given that there were only two groups, logistic regression was selected over discriminant function analysis because it requires fewer assumptions in theory, is more statistically robust in practice and easier to use and understand.

statistic⁸ can be computed when the predictor variables are continuous. The Hosmer and Lemeshow Goodness of Fit test statistic is a measure of the difference between the data predicted by the model and the observed data. A significant Hosmer and Lemeshow Goodness of Fit test statistic indicates that the data predicted by the model differ significantly from the observed data and thus, the model is not a good fit. Third, examining the percent of cases correctly classified by the model provides information on the goodness of fit of the model. Higher percentages correctly classified indicate a better fitting model. If a model meets all of the prior criteria but does not improve upon the ability to classify cases above what would be expected by selecting the most frequent group, the model will not be considered a good fit.

Predicting for whom cruise ships detracted from trip enjoyment

A separate logistic regression was run for each predictor variable listed in Table C-20 with cruise ships detracted (detracted vs. not effected) as the dependent variable. The maximum number of observations for these analyses was 119. Of the 18 variables, two resulted in models with significant model chi-squares indicating they were significant predictors of cruise ships detracting from trip enjoyment: 1) gender, and 2) opinions toward large cruise ships in Glacier Bay proper. Both of these had non-significant Hosmer and Lemeshow's Goodness of Fit test statistics indicating that these models did not predict values significantly different from what they ought to be (i.e. from the observed values), and therefore, indicated good fits. Although gender was a statistically significant predictor, it was not sufficiently strong to improve upon prediction based on selecting the most common condition of "no effect." Thus, the model for gender will not be considered a good fit because it is not a strong predictor. Table C-23 contains the results of these two logistic regressions.

Table C-23. Model summaries for predicting likelihood that cruise ships detracted from trip enjoyment

Predictor Variable	Constant	B ¹	Chi-Sq <i>p</i> -value	Hosmer & Lemeshow	% classified
Gender	-1.71	0.98	.023	nc	75.9% ²
Opinion re: large cruise ships in Glacier Bay proper	2.56	-1.02	.008	.576	77.1%

¹In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

²The percent classified correctly did not exceed that based on selecting the most common condition of "no effect, and thus, the model will not be considered a good fit as the variable is not a strong predictor.

Because only one individual characteristic was found to be a good predictor of effects of cruise ships on visitors experience, no additional procedures were performed to determine "the best fitting model" Table C-24 summarizes the parameters of the model containing opinions toward large cruise ships in Glacier Bay proper. The logistic coefficient (i.e., B) provides information about how changes in one of the predictor variables (e.g., attitudes) affects the likelihood that cruise ships will detract from respondents' trip enjoyment when the other predictor variables (if there were any) are held constant.

Table C-24. Summary of model with one predictor variable

Predictor Variable	B*	S.E.	Wald	df	<i>p</i>	exp(B)

⁸ The Hosmer and Lemeshow Goodness of Fit test examines the null hypothesis that the data were generated by the model fitted by the researcher. The test divides subjects in to deciles based on predicted probabilities, and then computes a chi-square from observed and expected frequencies. If the computed test statistic has a probability of .05 or less, the null hypothesis that there is no difference between the observed and model-predicted values of the dependent variable is rejected. Well-fitting models generate data that do not differ from what was observed and their Hosmer and Lemeshow Goodness of Fit Test statistic is not significant.

Opinion re: large cruise ships in Glacier Bay proper	-1.02	.41	6.31	1	.012	.359
Constant	2.56	1.49	2.96	1	.085	12.914

*In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

The generic form of a model with one predictor variable is given below:

$$\ln \left(\frac{p}{1-p} \right) = \text{constant} + B_1 * (\text{predictor variable 1})$$

Where: p is the probability that cruise ships detracted and B_1 is the logistic coefficient for the first predictor variable and B_2 is the logistic coefficient for the second predictor variable.

A logistic curve can be drawn by computing the probability that cruise ships detracted from trip enjoyment for each level of one predictor variable. Figure C- 64 contains the logistic curve for opinion re: large cruise ships in Glacier Bay proper. The curve shows that the more strongly people disagreed with statements supportive of cruise ships in Glacier Bay proper the greater likelihood there was of cruise ships detracting from trip enjoyment. If on average cruise ship passengers were neutral in the opinions of cruise ships in Glacier Bay proper, there would be a 0.37 likelihood that cruise ships would detract from passengers' trip experiences. Current data indicated that cruise ship passengers on average had somewhat positive opinions regarding cruise ships in Glacier Bay proper ($M = 3.7$) just below "Agree" and 24.1% reported cruise ships detracted from their trip experiences.

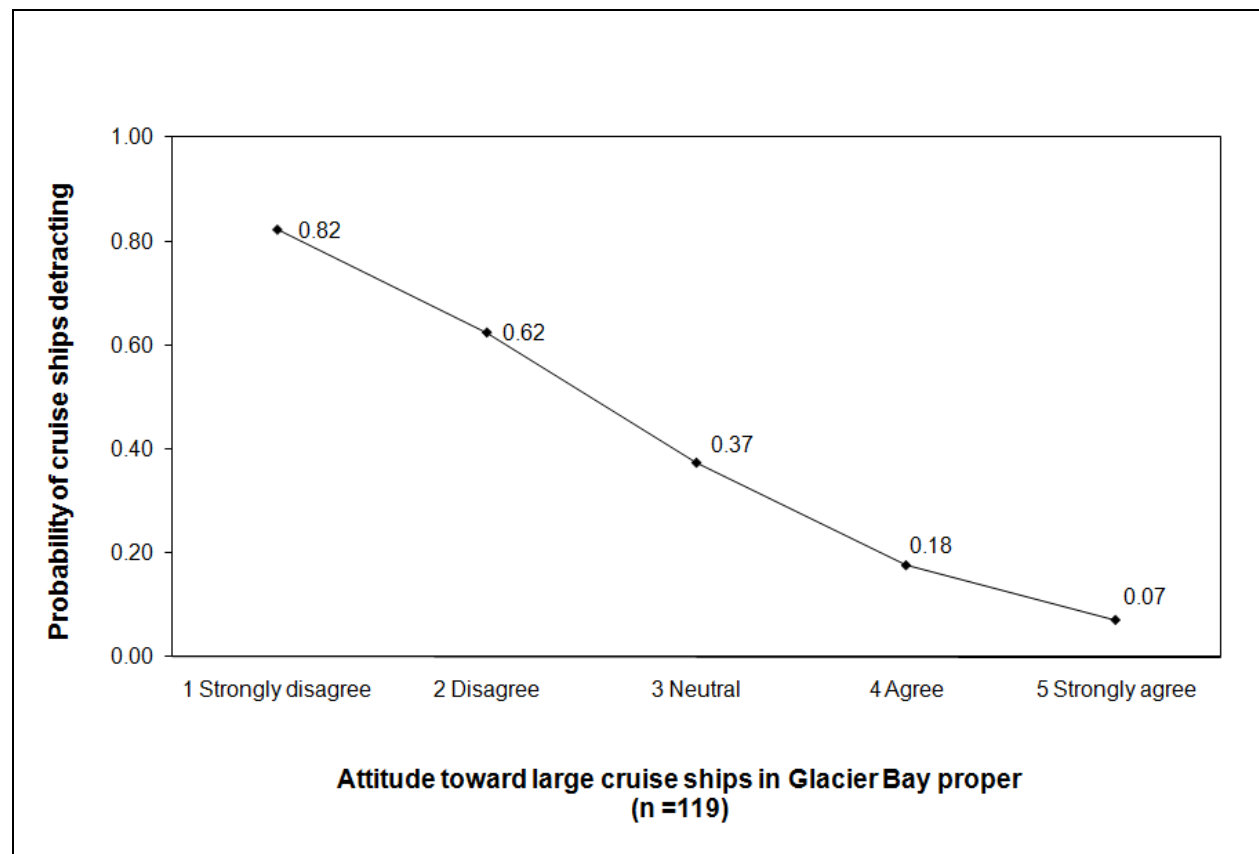


Figure C- 64. Likelihood of cruise ships detracting for different agreement levels with cruise ships being in Glacier Bay proper

Summary

For both dependent measures of cruise ships detraction from trip enjoyment, visitors' opinion regarding large cruise ships in Glacier Bay proper was a significant predictor of who would report more negative effects of cruise ships on trip enjoyment. Visitors' opinions were measured after their experience with cruise ships making interpretation of this relationship unclear. While the opinion scale and effects of cruise ships were related, there was no way from the current data to determine 1) whether visitor opinions shaped the perception of the experience, 2) whether the experience shaped visitors' opinions, or 3) whether some other more complex relationship underlies the observed relationship. Future research could address this issue by asking visitors' their opinions prior to the trip.

Education level was also included in the final model for the continuous dependent measure. Together with visitors' opinions regarding cruise ships in Glacier Bay proper, the model explained 25% of the variance in cruise ship effects scores. Comparing it to the percent of variance explained by the model using cruise ship characteristics to predict the continuous dependent measure (6%) suggests that for the variables measured and the cruise ship experiences encountered during the survey period that characteristics of individuals may be stronger predictors.

It should be noted that findings from stepwise procedures are exploratory in nature. The results of stepwise procedures can be affected by meaningless patterns unique to a particular sample. Thus, the findings can be used to develop theory that would then be tested directly in future research.

XIII. EXPERIENCES WITH DIFFERENT FORMS OF TRANSPORT

When cruise-ship passengers are visiting Glacier Bay, evidence of human presence is generally limited to the other visitors in the bay, and the forms of transport used by those visitors.⁹ Although this report focuses on the effects of other cruise ships on cruise-ship passenger experiences, survey questions also asked about encounters with other forms of transport. There were two primary reasons for considering the effects of other forms of transport: 1) to set the effect of cruise ships in a context relative to the effects of those other forms, and 2) to determine whether visitors' experiences with multiple forms of transport affect the degree to which those encounters (including encounters with cruise ships) detract from their experiences.

Effects of cruise ships relative to other forms of transport

Table C-9 to C-12 in chapters VII and VIII above summarized the detraction ratings for different forms of transport encountered at Margerie/Grand Pacific glaciers and during the entire Glacier Bay trip. Table C-25 shows that detraction rates were low in both contexts, and that cruise ships detracted from approximately as many cruise-ship passenger experiences as any other single form of visitor transport.

Table C-25. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip

Type of craft	Percent who said craft detracted (somewhat or greatly) from enjoyment of Margerie/Grand Pacific glaciers ¹	Percent who said craft detracted (somewhat or greatly) from enjoyment of Glacier Bay proper ²
Large cruise ships	2.0%	5.4%
Motorized craft other than large cruise ships	2.5%	4.8%
Propeller-driven aircraft	0.4%	2.2%
Helicopters	0.0%	1.0%

¹ These summary data were derived from those presented in Table C-9.

² These summary data were derived from those presented in Table C-11.

Aircraft detracted from the Glacier Bay experiences of relatively few cruise-ship passengers because they were so rarely encountered. Most cruise-ship passengers who encountered aircraft said that those aircraft (prop-driven or helicopters) detracted from their experiences (see Table C-26).

The total number of cruise-ship passengers who reported detraction due to cruise ships and other types of motorized vessels was similar because cruise ships were seen less often – among visitors who encountered each type of watercraft, cruise ships detracted from a higher percentage of experiences (both at Margerie/Grand Pacific glaciers and Glacier Bay in general; see Table C-26). However, encounters with cruise ships and/or other motorized vessels detracted from the experiences of a minority of cruise ship passengers who saw them (less than 15%).

⁹ Exceptions would be NPS staff or scientific researchers and commercial jetliners at high altitudes.

Table C-26. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip

Type of craft	Percent of respondents who encountered each form of transport that said craft detracted (somewhat or greatly)	
	Detracted from enjoyment of Margerie/Grand Pacific glaciers ¹	Detracted from enjoyment of Glacier Bay proper ²
Large cruise ships	14.3%	14.5%
Motorized craft other than large cruise ships	8.5%	8.4%
Propeller-driven aircraft	0.0% ³	15.7%
Helicopters	31.5% ³	10.3%

¹ These summary data were derived from those presented in Table C-10.

² These summary data were derived from those presented in Table C-12.

³ These percentages are not statistically reliable because they are based on only 6 respondents who saw each type of aircraft.

In sum, few cruise-ship passengers reported detracting effects due to any of the motorized craft. Cruise ships and other motorized vessels had approximately equal detracting effects, while aircraft detracted from very few cruise-ship passengers experiences because they were very seldom encountered.

Does the number of cruise ships affect encounters with other forms of transport and ratings of their detraction?

One indirect way in which cruise ships could affect visitor experiences is by altering the number of encounters visitors have with other forms of transport. For example, if captains of smaller vessels planned their trips to the tidewater glaciers for days when only one cruise ship visits Glacier Bay, then encounters with those motorized vessels would be higher on 1-cruise ship days. Analyses of the survey data found no evidence of such indirect effect. Encounters with all types of craft other than cruise ships were no different for days with 1 versus 2 cruise ships, and none of the detraction measures differed for 1 and 2-cruise ship days.

The survey results showed that encounters with other forms of mechanized transport (and their effects on visitor experiences) were not altered by the number of ships in Glacier Bay, and thus, these results should not substantially alter managers' decisions regarding cruise ship policy. The next section discusses evidence (consistent with Johnson, 1990) that encounters with multiple forms of transport were not cleanly separated in visitors' detraction ratings.

Do encounters with one type of craft affect experiences with other types of craft?

In addition to shifting actual encounters with different types of craft, cruise ships may also affect how those experiences with different craft are perceived. More broadly, experiences with one type of craft may affect how visitors perceive their experiences with other types of craft. Johnson (1990) discussed evidence for such effects in a 1989 study of Glacier Bay visitors. Understanding the inter-related reactions to different types of craft can help managers more effectively measure and mitigate the impacts of changes in vessel management policy.

The current research program focused on assessing the effects of cruise ships on visitor experiences. Some limited additional questions asking about other types of craft were included to provide context for understanding the effects of cruise ships. However, the nature of these questions was only sufficient to support exploratory analyses regarding the possible relationships between encounters with and effects of

the different type of craft. These exploratory analyses are discussed below to help managers appreciate the complexity of visitor experiences and to provide researchers with information that may be useful in the development of future surveys.

Relationships between encounters with various forms of transport and ratings of their detraction were assessed by correlation and logistic regression analyses examining the variables shown in Table C-27. Measures of encounters with each form of transport (i.e., cruise ships, other motorized vessels, propeller-driven aircraft, and helicopters) were included, as well as measures of the detracting effects of those encounters.

Table C-27. Measures used in analysis of relationships between encounters with various forms of transport and ratings of their detraction

Type of craft	Encounter Measures						Detraction Measures		
	Saw/heard Y/N	Number saw/heard	Hours saw/heard	Heard engine	Heard P.A.	Saw haze	Detract Y/N	Degree detract	Detract scale*
Large cruise ships	X		X	X	X	X	X		X
Motorized craft other than large cruise ships	X	X	X	X	X	X	X	X	
Propeller-driven aircraft	X	X	X	X			X	X	
Helicopters	X	X	X	X			X	X	

*Average of cruise ship detraction scales for each REP item and the rated detraction of cruise ships in Glacier Bay proper.

The results of the correlation and logistic regression analyses showed that the detracting effects of encounters were intertwined Table C-28 includes all 12 significant relationships found by the analyses (i.e., relationships between encounters with one type of craft and detraction measures for a different type of craft). For example, the first correlation shows that detraction due to cruise ships was related to whether cruise ship passengers heard engine sounds from other motorized craft.

Table C-28. Significant relationships between encounters with one type of craft and detraction measures for a different type of craft: Results of correlation and logistic regression analyses.

Correlation analyses				Logistic regression analyses			
Encounter measure	Detraction measure	<i>r</i>	<i>p</i> -value	Encounter measure	Detraction measure	B*	Chi-Sq <i>p</i> -value
Heard watercraft other than cruise ship engines	Cruise ship detraction scale	.182	.046	Saw helicopters	Cruise ship detracted Y/N	-1.63	.049
Saw prop-driven aircraft	Cruise ship detraction scale	-.323	< .001	Heard cruise ship P.A.	Watercraft other than cruise ship detracted Y/N	2.30	.033
Saw helicopters	Cruise ship detraction scale	-.260	.003	Heard cruise ship engines	Watercraft other than cruise ship detracted Y/N	.632	.042
Heard cruise ship P.A.	Watercraft other than cruise ship detraction	.163	.022	Saw helicopters	Prop-driven aircraft detracted Y/N	.352	.029
Heard cruise ship engines	Watercraft other than cruise ship detraction	.153	.031	Heard cruise ship P.A.	Helicopter detracted Y/N	3.39	.016
Heard prop-driven aircraft	Watercraft other than cruise ship detraction	.172	.015	Heard cruise ship engines	Helicopter detracted Y/N	23.13	.042
Saw cruise ship haze	Helicopter detraction	.452	.020				
Heard cruise ship P.A.	Helicopter detraction	.623	.001				
Heard cruise ship engines	Helicopter detraction	.705	<.001				

*In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

A variety of hypotheses may account for such intertwined relationships. Some visitors may be both more observant of all types of craft and more likely to say that craft detracted from their experiences, or a disturbing encounter with one type of craft may sensitize them to the presence of other forms of transport. Alternately, visitors might respond to all the detraction measures based on a generalized feeling of how much they were “bothered” by the presence of other visitors, and be either unwilling or unable to clearly separate the effects of different vessels or craft. Future research could be designed to test these different explanations. Because a complete investigation of these relationships was not a focus of the current research, little can be said about the specific ways in which encounters with the various forms of transport affect visitor ratings of detraction. However, the correlations provide strong evidence that those encounters do not have independent effects on the rated detraction due to each type of craft.

Although the exploratory analyses discussed in this section do not clearly define the relationships between encounters with and effects of the different type of craft, they can help managers decide whether information designed to mitigate the detracting effects of cruise ships should focus entirely on cruise ships or should also address the effects of other forms of transport. Specifically, if the detracting effects of each form of transport were unrelated to each other, then each effect could be treated independently. However,

because the effects are related, mitigation efforts focused on all forms of transport are likely to be more effective.

Because of the limited understanding of the factors that determine cruise ship passenger ratings of the detracting effect of other cruise ships, some might argue that the measure should not be used in formulating vessel management policy. A complete understanding of the visitor experience would be ideal. However, it is important to remember that no matter what factors actually led some visitors to report that cruise ships detracted from their experiences, there is every reason to believe that those visitors felt that cruise ships did detract from their experiences. Measuring the prevalence of such detraction is a necessary first step in determining whether it is an issue that merits further study or management action.

XIV. SOCIAL VALUE CONFLICT

Reviewers of an earlier draft of this report suggested that the concept of recreational conflict might shed light on the ways cruise ships affect visitor experiences. Because the current research was not conceptualized from this perspective, the measures collected in this study do not map directly onto key variables or concepts used in the conflict approach. However, as described below, several measures that approximate the concepts were available. The findings and discussion below are based on these approximate measures, and thus, are exploratory in nature. Their primary value is to guide the planning of future research that might seek to understand how and why cruise ships affect visitors' experiences (rather than if they do).

Recreational conflict overview

When diverse groups use a common recreation area, conflict between those groups is likely. Interpersonal (or goal interference) conflict arises when a physical encounter with (i.e., hearing and/or seeing) an individual or group interferes with the goals of another individual or group (Jacob & Schreyer 1980). For example, in Glacier Bay proper, individuals who wish to experience nature untouched by humans may experience interpersonal/goal interference conflict when seeing a cruise ship in the otherwise pristine environment of the bay. Recreationists may also experience a second type of conflict – social value conflict occurs between groups who do not share the same norms and/or values, and does not require a physical encounter between the conflicting groups (Ruddell & Gramann 1994). For example, individuals who feel that cruise ships in Glacier Bay are inappropriate may perceive conflict with cruise ships even if they never see a cruise ship during their visits to Glacier Bay proper.

Research examining conflict among recreationists has found that social value conflict occurs not only for individuals who do not encounter a potentially conflicting other group, but can also occur in individuals who encountered the other group. A study by Vaske, Needham, and Cline, Jr. (2007) asked snowmobilers and skiers whether they agreed with the statement “just knowing that skiers (snowmobilers) are in the area bothers me.” Agreement with this statement was used as a measure of social value conflict in individuals who also experienced interpersonal conflict. Findings indicated that a sub-group of individuals who were classified as experiencing interpersonal conflict also experienced social value conflict.¹⁰ In sum, individuals who have encounters with another potentially conflicting group can experience interpersonal conflict and/or social value conflict whereas individuals who do not have physical encounters with another potentially conflicting group can only experience social value conflict.

Understanding the source of conflict can be useful when setting policy intended to reduce such conflict. For example, interpersonal conflicts, those that arise solely from physical encounters, can be addressed by separating user groups through restricted use or zoning (i.e., limiting opportunities for physical encounters). However, these strategies will not reduce social value conflict, which is independent of actual encounters. Education has been suggested as a more effective means to reduce social value conflicts (Vaske et al. 2007). Thus, managers may be better able to mitigate the detracting effects of cruise ships on park visitors if they know the nature of the conflict (or conflicts) that underlies reported detraction.

¹⁰ Although their methods did not allow this determination, it should be noted that it was possible that some of the people reported as experiencing both interpersonal conflict and social value conflict may have experienced only social value conflict.

Applying the conflict framework to current research

The current research was designed to inform park management of potential changes in the effects of cruise ships associated with the shift from the 1:2 mix of one- versus two-cruise ships in the bay days to every day being a two-cruise ships in the bay day. Accordingly, it provided cruise ship detraction rates only for those cruise ship respondents who saw another cruise ship, and was not designed to distinguish whether these detraction effects were due to interpersonal conflict or social value conflict. It was presumed that only the detraction arising from actual interaction with cruise ships (either hearing or seeing) would be affected by the change in policy. Therefore, the primary objective was to determine whether changes in the number of cruise ships in the bay would produce significant changes in: a) the likelihood of encountering cruise ships and b) the likelihood that cruise ships would detract from visitor experiences.

The conflict framework has traditionally looked at reactions of one user group toward another user group. Therefore, examining social value conflict (with cruise ships being in the bay) among cruise ship passengers is not the typical approach. It was anticipated that most cruise ship passengers would not experience social value conflict due to cruise ships being in Glacier Bay proper. However, cruise ships enable people to visit the park who have limited funds (i.e. the most cost-effective way), limited mobility, or are travelling with others who do not have social value conflict with cruise ships being in the bay. Thus, there may be some individuals who visited by cruise ship although they think cruise ships are inappropriate in the bay. In sum, a small number of cruise ship passengers were expected to exhibit social value conflict due to cruise ships being in the bay. If a large number were found to exhibit social value conflict, it would suggest that the operationalization of social value conflict in this research was questionable, not only for cruise ship passengers but the other user groups as well.

Applying the conflict framework to cruise ship passengers or any other visitors suggests that for some of them, conflict may arise that is not due to physical encounters with cruise ships. As noted above, the current research was not conceptualized using the conflict framework and thus does not have all the necessary data to assess rates of interpersonal conflict and social value conflict among all cruise ship passengers. However, for some visitors, data were collected that approximated some of the key concepts from the conflict approach, and those data were used in these exploratory analyses. Specifically, among visitors who saw cruise ships, data were available that could serve as reasonable operationalizations for: 1) problems/conflicts and 2) social value conflict. For those who did not see cruise ships, only a measure assessing social value conflict was available.

Measure of problem/conflict

Recreational conflict research typically considers a problem or conflict to exist if a person reports a problem with specific behaviors engaged in by another user group. The current research was interested in the effects of cruise ships rather than the behavior of those aboard them. Thus, for analyses of conflict, if a cruise ship passenger indicated that another cruise ship detracted from their trip experience, a problem or conflict was assumed to be inherent in that detraction. If another cruise ship did not detract, then no problem or conflict was considered present.

A dichotomous measure of cruise ship detraction based on an aggregated measure of cruise ship effects was developed for other analyses (see Measures of Effect of Cruise Ships on Visitors Experience for description of this measure). Individuals whose scores on the aggregated measure indicated a negative effect of another cruise ship on their trip enjoyment were coded as “cruise ships detracting” whereas individuals who reported no effects of another cruise ship were coded as “cruise ships did not detract”. The small number of individuals with aggregate scores indicating another cruise ship added to their trip enjoyment were excluded. Because only cruise ship passengers who saw or heard another cruise ship were asked cruise ship effect questions, there were no problem/conflict data for people who did not see cruise ships.

Cruise Ship Passenger Survey

As seen in Table C-29, 31% of cruise ship passenger respondents saw or heard another cruise ship and of those, 24% reported the cruise ship detracted from their trip experience.

Table C-29. Summary of variables related to social value conflict

% of all cruise ship passengers who saw/heard another cruise ship	31%
% for whom cruise ships detracted of those who saw/heard them	24%
% of all cruise ship passengers who agreed it is inappropriate for large cruise ships to be in Glacier Bay proper (social value conflict)	7%

Measure of social value conflict

Social value conflict is defined as arising when the values a person holds are in conflict with the values of another individual or group. These value conflicts can exist and result in perceived problems even if the two user groups have no physical contact. Review of the questionnaire suggested that one of the included opinion items could serve as a reasonable measure of social value conflict between cruise ship passengers and other cruise ships in Glacier Bay proper. This item asked respondents' agreement with the statement, "It is inappropriate for large cruise ships to be in Glacier Bay proper." Individuals who indicated that they strongly agreed or agreed with the statement were classified as having a social value conflict with cruise ships in Glacier Bay proper. Individuals who indicated that they were neutral, disagreed, or strongly disagreed were classified as having no social value conflict. Because all respondents completed the opinion measures, social value conflict data were available for all cruise ship passenger respondents.

As can be seen in Table C-29, 7% of all cruise ship passenger respondents agreed that it is inappropriate for large cruise ships to be in Glacier Bay proper suggesting a small percentage of cruise ship passenger respondents experience social value conflict with cruise ships in Glacier Bay proper. Not surprisingly, most cruise ship passengers did not express social value conflict with cruise ships being in Glacier Bay. The small number of respondents who expressed social value conflict may have taken a cruise ship to the bay because other values may have weighed more in their decision such as spending time with family or because it was the only way they could see the park either do to cost or mobility issues.

Analyses

Within the framework of user conflict, it is possible that cruise ships detracted from the experiences of some cruise ship passengers who did not see cruise ships based exclusively on their social value conflict with cruise ships being in Glacier Bay proper. In addition, for cruise ship passengers who saw another cruise ship and reported that the ship detracted from trip experience, understanding whether that detraction arose from interpersonal conflict, social value conflict, or a mix of the two can help park managers assess whether limiting encounters with cruise ships is likely to reduce conflict and associated detraction. Thus, further analysis of these variables has the potential to: 1) provide an estimate of negative effects of cruise ships due to social value conflict among cruise ship passengers who did not see cruise ships and 2) provide insight into the possible sources of conflict underlying the reported detraction for those who did see cruise ships.

Source of conflict for those who saw/heard cruise ships

A total of 24% of the cruise ship passengers who saw/heard another cruise ship indicated that cruise ships detracted from their trip enjoyment. When these individuals are separated by their agreement with "It is inappropriate for large cruise ships to be in Glacier Bay proper", 21% of those who saw/heard another cruise ship experienced only interpersonal conflict (see Table C-30).

The methods used in prior social value conflict research allowed the separation of individuals who experienced problems due to their encounters with another user group into those who had social value conflict and those who did not. However, these methods did not provide a means to distinguish if those who experienced problems from encountering another group did so for both interpersonal and social value

conflict or for social value conflict only. Thus, per the conflict literature, the remaining 3% would be considered to have experienced a mix of social value conflict and interpersonal conflict. However, it is possible that the detraction effects experienced by these individuals could have been entirely due to social value conflict or interpersonal conflict.

For those who saw/heard cruise ships but reported no conflict, a small percentage were classified as having social value conflict. However, because these individuals did not report detraction, it is possible that: 1) the level of conflict was insufficient to result in detraction, 2) our opinion item was a less than ideal measure of social value conflict, or 3) there was inconsistency within individuals. Prior research examining social conflict used methods that examined or distinguished the rate of social value conflict among only those users who both encountered another user group and reported effects of the encountered group (Vaske et al. 2007). If they had looked at rates of social value conflict in other groups, it is possible that they would have seen similar patterns to those reported in Table C-30.

Table C-30. Source of conflict for other tour-boat respondents

	Did not see/hear cruise ships		Saw/heard cruise ships	
Cruise ships did not detract	100%		76%	
No conflict		94%		72%
Social value conflict only		6%		4%
Cruise ships detracted	0%		24%	
Interpersonal conflict only				21%
Both types of conflict*				3%
Total	100%	100%	100%	100%

Estimating additional detraction effects due to social value conflict.

In the current survey, visitors who did not see or hear cruise ships were not asked whether cruise ships in Glacier Bay affected their trip enjoyment. However, the social value conflict literature suggests that some individuals who do not see another user group may still experience negative effects of that group because of differing social values. Using the information in Table C-29 and Table C-30, we can estimate the percentage of cruise ship passenger respondents who did not see cruise ships but would be expected to have negative reactions due to social value conflict.

Our proxy measure for social value conflict indicated that 6% of cruise ship passenger respondents who did not see cruise ships agreed that it was inappropriate for large cruise ships to be in Glacier Bay proper (see Table C-30). As 69% of cruise ship passengers did not encounter cruise ships (100% - 31% per Table C-29), it would be expected that up to 4% ($69\% \times 6\%$) of cruise ship passengers who did not see cruise ships in Glacier Bay proper would report negative effects of cruise ships on their trip experience from simply knowing that the ships are in the bay (i.e., because of social value conflict).

Discussion

The survey focused primarily on effects of cruise ships on those visitors who encountered ships and did not include measures traditionally used to measure the different sources of user conflict. Thus, analyses examining social value conflict among cruise ship passengers were exploratory and are presented for park managers' consideration in light of current and future visitor research.

As expected a small percentage of cruise ship passengers (7%) expressed social value conflict due to cruise ships being in Glacier Bay proper. Cruise ship passengers had the lowest rates of social value conflict of any user group. Together these findings were consistent with a reasonable operationalization of social value conflict.

Cruise Ship Passenger Survey

The fact that some cruise ship passengers believe it is inappropriate for large cruise ships to be in Glacier Bay may be surprising to park management. Perhaps, more surprising is the idea that this belief can result in cruise ships detracting from park visitors' experiences even when they do not encounter cruise ships during the trip.

The concept of social value conflict also suggests that people who never go to Glacier Bay proper can experience negative effects of cruise ships because they hold values incongruent with cruise ships being in the bay. If managers make use of social value conflict when considering the impacts of cruise ships, a question naturally arises concerning the population in which such conflicts should be considered. Is the relevant population park visitors? Park visitors and AK residents? All U.S. residents? All North Americans? The world? In light of such complex decisions, managers might reasonably elect to focus on the experiences of park visitors, recognizing that those experiences may be influenced by a variety of factors including social value conflict.

Managers can still benefit from the insight that there are people whose experiences are negatively affected by cruise ships independent of whether they physically encounter one. This insight suggests that vessel limits or zoning efforts that reduce encounters will not have a directly proportional effect on detraction rates (because some visitors' experiences will be negatively affected as long as any cruise ships are allowed in Glacier Bay, whether or not they encounter one). Research to better understand the specific value conflicts for these visitors may help managers to determine whether other mitigation efforts, such as educational programs, would mitigate the negative effects of cruise ships on their experiences. For example, if people believe that large cruise ships are inappropriate in Glacier Bay proper because they pollute the environment, then providing information about the air and water standards/monitoring for cruise ships that are much more rigorous than most Alaskan coastal villages may help to reduce the conflict. However, if individuals believe that large cruise ships are simply incongruent with the park aesthetic, then educational programs are unlikely to be effective. Qualitative information from interviews with visitors found evidence of both beliefs, but their prevalence in visitors who reported detraction due to cruise ships is unknown.

XV. SUMMARY AND IMPLICATIONS

The Cruise Ship Passenger Mail Survey was designed to address the following three research objectives:

1. How do cruise ships affect, if at all, cruise ship passengers' experiences in Glacier Bay proper?
 - a. Which dimensions of cruise ship passenger experiences in Glacier Bay proper, if any, do cruise ships affect?
 - b. If cruise ships affect cruise ship passengers experiences in Glacier Bay proper, which features of cruise ships have effects?
2. What are estimated effects for cruise ship passengers under the Record of Decision maximum use level of 2 cruise ships per day, every day?
3. How do the effects of cruise ships on visitor experiences in Glacier Bay proper compare to the effects of other forms of mechanized transport?

This section addresses each of these objectives. However, the third objective will not be discussed independently. Rather, when the effects of cruise ships on visitor experiences (either current effects or estimated effects under the maximum use level) are discussed, the analogous effects of other forms of mechanized transport will be compared and contrasted.

Objective 1: How do cruise ships affect, if at all, cruise ship passengers' experiences in Glacier Bay proper?

Recalled encounters with cruise ships

It is difficult to imagine how cruise ships could have a direct effect on visitor experiences if visitors did not remember seeing them.¹¹ Accordingly, the maximum possible extent of such direct effects is indicated by the proportion of visitors who report seeing cruise ships. In this survey, 37.8% of cruise ship passengers reported seeing or hearing large cruise ships. In comparison, a considerably higher proportion (56.6%) saw motorized watercraft other than large cruise ships. (For more detail regarding encounters on the entire trip see Chapter V.)

Qualitative interviews conducted in 2007 suggested that cruise ships might have particularly strong effects on experiences at focal attractions in Glacier Bay. Perhaps the foremost attraction for most visitors is the terminus of Tarr Inlet where the Margerie and Grand Pacific glaciers are visible. In this survey, 9.5% of all cruise ship passengers (14.3% of those who said they visited Margerie/Grand Pacific glaciers) reported seeing or hearing large cruise ships at that location. Twice as many cruise ship passengers (19.0% of all and 28.6% of those who said they visited Margerie/Grand Pacific glaciers) reported seeing motorized watercraft other than large cruise ships. (For more detail regarding encounters at Margerie and Grand Pacific glaciers see Chapter IV.)

These results suggested that even if every encounter with another cruise ship had a strong negative effect on cruise ship passengers (which it did not), a maximum of 37.8% of cruise ship passengers would

¹¹ Chapter XIV discusses how cruise ships could detract from some visitors' experiences even when they did not encounter cruise ships. The mechanism for this indirect effect is social values conflict.

experience such negative effects at some point during their trip, and 9.5% would be negatively affected by encounters at Margerie/Grand Pacific glacier. The actual effects of encounters with other cruise ships reported by cruise ship passengers are discussed in the following section.

General and specific effects of cruise ships

The survey was designed to measure a wide range of effects that encounters with cruise ships might have on visitors' experiences. Some of these effects were very general whereas others were much more specific. For example, the question asking visitors how seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper was an extremely general measure. More specific measures asked about effects of encounters on visitor enjoyment of Margerie/Grand Pacific glaciers, effects of encounters on particular trip experiences, and effects of particular aspects of encounters (e.g., engine sounds, public address system sound, and haze) with cruise ships.

The more specific measures were included for two different reasons. First, past studies found that general measures tend to be less sensitive to trip experiences (e.g., seeing or hearing cruise ships) than more specific measures. And second, more specific information about the aspects of encounters that have the greatest effects on trip experiences (e.g., location, engine sounds, public address system sound, and haze) has the potential to help managers set policy that mitigates negative effects.

Throughout earlier sections of this report, percentages were often calculated and reported for various sub-populations of cruise ship passengers. For example, the percentage of cruise ship passengers reporting that cruise ships detracted from their general enjoyment of Glacier Bay was calculated based on the sub-population of visitors who saw or heard cruise ships. In this section, results are generally reported as percentages of all cruise ship passengers. This approach allows direct comparison between the results of different questions, thus enabling readers to better judge the magnitude of the various effects of cruise ships and effects of other motorized craft.

Detraction from general enjoyment and from particular trip experiences

Figure C-65 shows the percentage of cruise ship passengers who reported that encounters with large cruise ships detracted from their experiences in any of a number of ways. The largest percentages of cruise ship passengers (between 6.6% and 7.4%) reported detraction from particular trip experiences that were related to wilderness experience as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). If we consider encounter rates, then up to 20% of cruise ship passengers who saw or heard another cruise ship felt that the cruise ship detracted from particular trip experiences or from their general enjoyment.

These quantitative findings were consistent with the findings of the qualitative interviews with Glacier Bay visitors conducted in both 2007 and 2008. For example, the most common effects of cruise ships mentioned by interviewed visitors were disruptions of “the wilderness experience” or a “sense of solitude.” At the same time, many cruise-ship passengers reported no detraction due to cruise ships. Many of them may have felt similar to the tour boat passenger interviewed in 2008 who succinctly described an encounter with a cruise ship, “...I guess it didn't have too big of an impact other than interrupting the pristine aspect.”

Although the qualitative report concluded that nearly all participants felt that other vessels (including cruise ships) had no significant effects on their experiences, the mail survey found that about 45% of charter boat passengers reported that encounters with cruise ships detracted from their general enjoyment of Glacier Bay. Further examination of the mail survey data, reported below under “Measures of overall trip satisfaction”, suggests that the results of the two surveys are not as discrepant as this reported incidence of detraction would indicate.

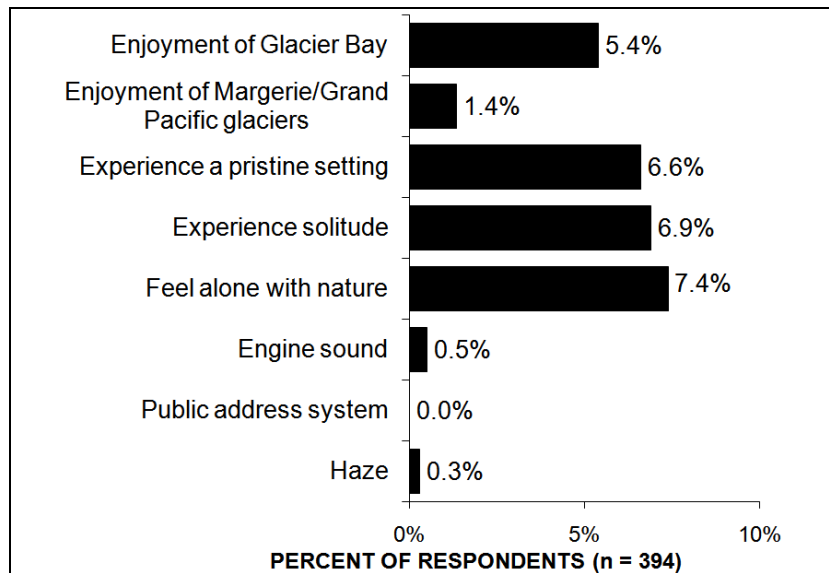


Figure C-65. Percent of all cruise ship respondents who reported detraction effects due to large cruise ships

Figure C-66 shows that 4.8% of cruise ship passengers reported that seeing or hearing motorized craft other than cruise ships detracted from their general enjoyment of Glacier Bay. This percentage was roughly comparable to the 5.4% who reported detraction due to seeing or hearing cruise ships. Although the overall percentages of cruise ship passengers reporting detraction were similar, two findings suggested that encounters with cruise ships were perceived more negatively. First, for those cruise ship passengers who encountered each of the different types of craft, detraction rates were higher for cruise ships than for motorized craft other than cruise ships (14.4% vs. 8.4%, respectively). The overall percentages of cruise ship passengers reporting detraction was roughly comparable because cruise ship passengers were half as likely to encounter cruise ships as they were to encounter motorized craft other than cruise ships (9.5% vs. 19.5%). Second, of cruise ship passengers seeing or hearing the craft, 18.9% reported that seeing or hearing motorized craft other than cruise ships *added to* their general enjoyment of Glacier Bay, and only 6.3% reported similar positive effects for encounters with cruise ships.

Figure C-67 reports the findings for helicopters and propeller-driven aircraft. The overall percentages of cruise ship passengers reporting detraction due to each type of aircraft were lower than the percentages for cruise ships or motorized watercraft other than cruise ships. These overall percentages were low because encounters with aircraft were relatively rare. Detraction rates for cruise ship passengers who saw aircraft were comparable to large cruise ships (for propeller-driven airplanes) and motorized watercraft other than large cruise ships (for helicopters).

Cruise Ship Passenger Survey

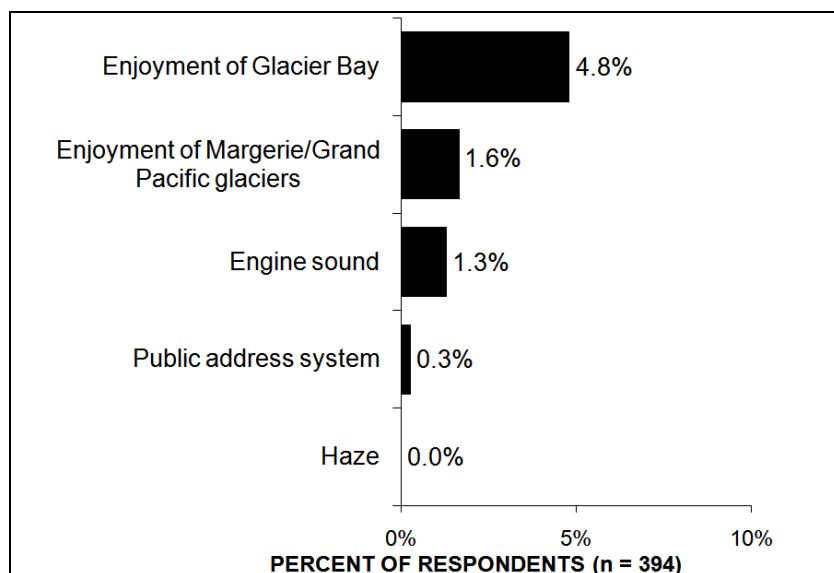


Figure C-66. Percent of all cruise ship respondents who reported detraction effects due to motorized watercraft other than large cruise ships

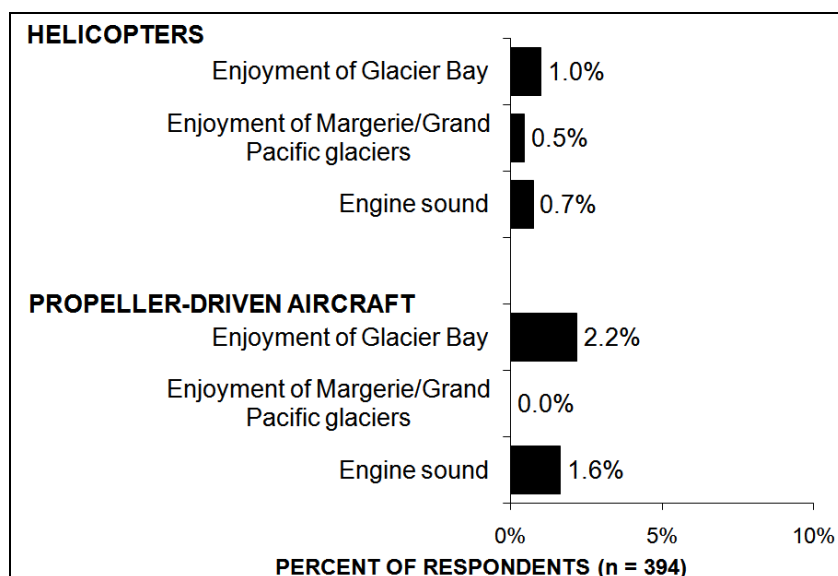


Figure C-67. Percent of all cruise ship respondents who reported detraction effects due to aircraft

Detraction at particular sites

A considerably smaller percentage of cruise ship passengers reported that other cruise ships detracted from their experiences at Margerie and Grand Pacific glaciers (1.4%; see Figure C-65) than reported detraction from their general enjoyment of Glacier Bay (5.4%; see Figure C-65). However, fewer cruise ship passengers encountered large cruise ships at Margerie and Grand Pacific glaciers than during the course of their entire trip (9.5% vs. 37.8%, respectively). Comparing the detraction rate for passengers who encountered cruise ships at Margerie and Grand Pacific glaciers with that for passengers who encountered cruise ships anywhere in Glacier Bay proper reveals comparable detraction rates (14.3% vs. 14.4%, respectively). In other words, when cruise ship passengers did encounter cruise ships at Margerie and Grand Pacific glaciers, those encounters produced no more (or less) detraction from their experiences than encounters at other places in Glacier Bay.

Seeing or hearing large cruise ships at Margerie and Grand Pacific glaciers detracted from nearly the same proportion of cruise ship passengers' trips as seeing or hearing motorized craft other than cruise ships (1.4% vs. 1.6%). Although these percentages are similar, two findings suggest that encounters with cruise ships were perceived more negatively. First, for those cruise ship passengers who encountered each of the different types of craft, detraction rates were higher for cruise ships than for motorized craft other than cruise ships (14.3% vs. 8.3%, respectively). The overall percentages of cruise ship passengers reporting detraction was roughly comparable because cruise ship passengers were half as likely to encounter cruise ships at the glaciers as they were to encounter motorized craft other than cruise ships at the glaciers (9.5% vs. 19.5%). Second, of cruise ship passengers seeing or hearing the craft at the glaciers, 20.6% (5.9% of all respondents) reported that seeing or hearing motorized craft other than cruise ships *added* to their enjoyment of Margerie and Grand Pacific glaciers whereas 13.4% (1.9% of all respondents) reported similar positive effects for encounters with cruise ships at the glaciers.

Figure C-67 reports the findings for helicopters and propeller-driven aircraft at Margerie and Grand Pacific glaciers. Detraction effects for both types of aircraft at the glaciers were lower than cruise ships or motorized watercraft other than cruise ships. Although no one who saw propeller-driven airplanes reported that they detracted from their enjoyment, 31.5% of cruise ship respondents who saw helicopters reported the helicopters detracted from their enjoyment of Margerie and Grand Pacific glaciers. Interestingly, a moderate number of cruise ship passengers who saw propeller-driven airplanes and helicopters said that the aircraft added to their enjoyment of the glaciers (35.1% and 55.5%, respectively). However, the reliability of these values is low given that only six cruise ship passengers reported seeing or hearing propeller-driven airplanes or helicopters.

Detraction due to specific aspects of encounters

Very few cruise ship passengers (0.5% or less) reported that engine sounds, public address systems, or haze from cruise ships detracted from their general enjoyment of Glacier Bay (see Figure C- 40 to Figure C- 43). This finding was consistent with the findings of the qualitative interviews with Glacier Bay visitors. Interviewed visitors generally concluded that other vessels (including cruise ships) had no significant effects on their experiences, and the feature of cruise ships that elicited the most comments was their vast size, not the sounds and haze asked about in the mail survey.

Figure C-65 to Figure C-67 show that detraction ratings for engine sounds from cruise ships were lower than those from motorized craft other than cruise ships or for both types of aircraft. Compared to cruise ships, public address systems of motorized craft other than cruise ships were more likely to detract whereas haze from these vessels was less likely to detract. A closer look at the data reported in Chapter VI suggested that the differences arise because cruise ship captains generally maintain enough distance between ships that their engine and public address system sounds are very rarely audible to passengers on other cruise ships. Thus, the difference in reported detraction between cruise ships and motorized craft other than cruise ships was more likely to arise from differences in exposure rather than differences in the detracting effect of sounds from different types of vessels.

Measures of overall trip satisfaction

In the mail survey of cruise ship passengers, the most general measures that could have been affected by seeing or hearing other cruise ships were two questions assessing passengers' overall ratings of their trip experiences (see Chapter VIII). On the simplest of these measures, over 90% of passengers rated their time in Glacier Bay as "Extremely good" or "Very good". Only three (out of 398) respondents rated their time as "Poor" and one respondent gave a rating of "Extremely poor". The second question showed that 86.6% of cruise ship passengers said they were very likely to recommend that others visit Glacier Bay on a cruise ship. Less than 2% of cruise ship passengers said they would be somewhat or very unlikely to recommend visiting Glacier Bay on a cruise ship.

Cruise Ship Passenger Survey

Neither of these general measures of cruise ship passengers' experience quality was affected by the number of cruise ships in the bay on the day when respondents visited. Of the five people who were unlikely (somewhat or very) to recommend visiting Glacier Bay, four reported that their experiences with other large cruise ships made it less likely (a lot or somewhat) that they would recommend visiting Glacier Bay on a cruise ship. Because only a small number of respondents were unlikely to recommend visiting the park on a cruise ship, caution should be exercised in concluding that are other cruise ships were responsible.

Encounters with motorized craft other than cruise ships and the two types of aircraft were also unrelated to the two general measures of respondents' experience quality.

Rated detraction due to cruise ships and encounters with other craft

Prior research in Glacier Bay (Johnson, 1990) suggested that the rated effects of cruise ships on visitor experiences were affected by encounters with other forms of transport. The exploratory analyses conducted on the mail survey of cruise-ship passengers were consistent with this prior research, showing that in a variety of cases, the detracting effects of encounters with different kinds of craft were intertwined. For example, detraction due to cruise ships was related to whether cruise ship passengers heard engine sounds from other motorized craft. Clearly, encounters with each type of craft do not have effects only on the rated detraction due to that specific type of craft.

Because a complete investigation of these relationships was not a focus of the current research, little can be said about the specific ways in which encounters with the various forms of transport affect visitor ratings of detraction. Based on this limited understanding, some might argue that visitor ratings of the detracting effect of cruise ships should not be used in formulating vessel management policy. A complete understanding of the visitor experience would be ideal. However, it is important to remember that no matter what factors actually led some visitors to report that cruise ships detracted from their experiences, there is every reason to believe that those visitors felt that cruise ships did detract from their experiences. Measuring the prevalence of such detraction is a necessary first step in determining whether it is an issue that merits further study or management action.

Implications

The present mail survey found that for both general and specific measures, fewer than 10% of cruise-ship passengers reported that other cruise ships detracted from their trips. Questions of policy cannot be settled by simply asking whether most cruise ship passengers were generally satisfied with their trips. However, the measures designed to determine whether the more specific effects of cruise ship encounters were acceptable also found little evidence of cruise ship detraction. In order to decide whether current experiences are acceptable, managers must have a clear understanding of the type of experience(s) that they wish to (and are in some cases required to) provide. While researchers can provide data and visitors can provide opinions, it is up to managers to decide whether or not the effects of cruise ships described in this report are appropriate and acceptable.

Objective 2: What are estimated effects for cruise ship passengers under the Record of Decision maximum use level of 2 cruise ships per day, every day?

Analyses were conducted that examined whether cruise ship passengers' experiences differed by the number of cruise ships in the bay (i.e., 1 or 2) on the day they visited. To address objective 2, responses that differed significantly for 1 vs. 2-cruise ships in the bay were examined to generate estimates for current and maximum allowed conditions. When significant differences were found for a variable, the findings for 2-cruise ships in the bay were the best estimate for that variable under the maximum use level of 2-cruise ships in the bay every day. The best estimate for current conditions was the aggregate of all respondents. It should be noted that the observed difference between 1- and 2-cruise ships in the bay days is larger than the difference between the estimates for current and maximum-allowed conditions. The reason for this is that under current conditions 2/3 of the days are already 2-cruise ships in the bay days. All results presented

below represent the differences expected by moving from current conditions to the maximum allowed condition. The largest expected effect is:

- Cruise ship passengers who recall seeing and/or hearing other cruise ships in Glacier Bay are estimated to rise from 37.8% to 44.0%

There were two sets of questions assessing the positive and negative effects of cruise ships that were asked only of passengers who saw cruise ships. No significant differences between 1- and 2-cruise ships in the bay days were found for the responses to these questions. Nonetheless, because a move to the maximum allowed condition is expected to increase the percentage of all cruise ship passengers who saw other cruise ships both the percent of all cruise ship passengers responding to these questions and the percentage of all passengers thereby reporting positive and negative effects of cruise ships are also expected to increase. Specifically, the expected effects include:

- The percentage of all cruise ship passengers reporting that other cruise ships detracted from their overall experiences in Glacier Bay is estimated to rise from 5.4% to 6.4%. This increase in detraction however is offset by an increase in the percentage of all cruise ship passengers reporting that other cruise ships added to their overall experiences in Glacier Bay which is estimated to rise from 2.4% to 2.8%.
- The percentage of all cruise ship passengers reporting that other cruise ships had positive and negative effects on the 8 different trip experiences is expected to increase. Table C-31 includes the four trip experiences that had the highest rates of detraction and shows the expected increase in the percentage of all cruise ship passengers reporting that cruise ships detracted from (greatly or somewhat) their trip experiences. Review of Table C-31 indicates an increase up to 1.5 percentage points in the percent of all cruise ship passengers reporting that large cruise ships detracted from these specific trip experiences.

Table C-31, Estimated increase in detraction rates for all cruise ship passengers for four trip experiences with highest detraction rates under current conditions

Trip experience	Percent of all cruise ship passengers	
	Current conditions	Maximum allowed
Solitude	8.7%	10.2%
Pristine environment	7.7%	9.1%
Tranquility	5.1%	5.9%
Experience scenic beauty	4.6%	5.4%

In terms of the percentage of all cruise ship passengers affected, the magnitude of effects expected from a shift to the maximum allowed condition range from 0.4 to 6.2 percentage points. The largest increase was related to increased encounters with cruise ships during the stay in Glacier Bay proper. However, because only some cruise ship passengers reported that cruise ships detracted from trip experience, increases in detraction rates were approximately 1.5% or less.

Implications

In sum, the results of this survey suggest that increasing cruise ship use to two ships per day every day would 1) produce relatively few changes in the experiences of cruise ship passengers, and 2) the proportion of all cruise ship passengers who report negative effects of cruise ships would increase by approximately 1.5 percentage points. The largest expected increase in detraction due to cruise ships was 1.5 percentage points for the experience of Solitude. Although Solitude had the lowest average importance rating of the trip experiences, it was rated as “moderately important” by cruise ship passengers. The final decision as to

Cruise Ship Passenger Survey

whether such changes are important alterations of the experiences park managers wish to provide cruise ship passengers is left to those managers.

Report 2
A Survey of Day-Boat Visitors

Jane E. Swanson
Mark E. Vande Kamp

VOLUME GUIDE

Volume 1

Executive Summary

General Introduction

A Survey of Cruise Ship Passengers

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Volume 2

A Survey of Private Vessel Visitors

A Survey of Charter-Boat Visitors

Qualitative Interviews with Park Visitors: Summer 2008

Qualitative Interviews with Experience Gatekeepers

Appendices (includes questionnaires and general comments)

TABLE OF CONTENTS

LIST OF FIGURES.....	IV
LIST OF TABLES.....	VII
I. INTRODUCTION AND METHOD.....	1
GOALS OF THE DAY-BOAT PASSENGER MAIL SURVEY	1
SURVEY DESIGN AND QUESTIONNAIRE DEVELOPMENT.....	1
SAMPLING AND VISITOR CONTACT PROCEDURES.....	2
ADMINISTRATION OF MAILINGS	2
STATISTICAL CONSIDERATIONS.....	3
LIMITATIONS.....	3
<i>Non-response</i>	3
ACCURACY OF THE SAMPLE	5
ESTIMATES FOR CURRENT AND MAXIMUM ALLOWED SEASONAL USE DAYS	6
CONVENTIONS FOLLOWED IN THIS REPORT	6
II. VISITOR PROFILE	8
HIGHLIGHTS.....	8
GENDER AND AGE	9
EDUCATION	10
RESIDENCE	10
ETHNICITY AND RACE	12
NUMBER OF TRIPS TO GLACIER BAY NATIONAL PARK IN LAST 10 YEARS.....	13
III. TRIP CHARACTERISTICS.....	14
HIGHLIGHTS.....	14
PARTY SIZE	15
PARTY TYPE	15
NUMBER OF NIGHTS PLAN TO STAY IN GLACIER BAY PROPER.....	16
LENGTH OF STAY	17
ACTIVITIES ENGAGED IN ON TRIP TO GLACIER BAY NATIONAL PARK	20
PLANNED TRIP TO MINIMIZE SEEING OR HEARING OTHER VESSELS.....	21
IMPORTANCE OF DIFFERENT TRIP EXPERIENCES	22
VISITED MARGERIE AND GRAND PACIFIC GLACIERS	26
OTHER TIDEWATER GLACIERS VISITED.....	26
WEATHER	28
IV. ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS.....	30
HIGHLIGHTS.....	30
VISITED MARGERIE AND GRAND PACIFIC GLACIERS	32
SAW OTHER CRAFT AT MARGERIE AND GRAND PACIFIC GLACIERS	32
NUMBER OF DIFFERENT TYPES OF CRAFT SEEN AT MARGERIE AND GRAND PACIFIC GLACIERS	33
V. ENCOUNTERS: ENTIRE TRIP	36
HIGHLIGHTS.....	36
SAW OR HEARD LARGE CRUISE SHIPS	39
NUMBER OF DAYS SAW OR HEARD LARGE CRUISE SHIPS	39
TOTAL LENGTH OF TIME SAW OR HEARD LARGE CRUISE SHIPS	39
LENGTH OF TIME SAW OR HEARD LARGE CRUISE SHIPS ON DAY SAW OR HEARD MOST CRUISE SHIPS	41
COMPARISON OF LARGE CRUISE SHIP AND OTHER MOTORIZED CRAFT ENCOUNTERS	44
MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS: LENGTH OF TIME AND NUMBER HEARD OR SEEN	45
PROPELLER-DRIVEN AIRPLANES: LENGTH OF TIME AND NUMBER HEARD OR SEEN	46

Day-Boat Visitor Survey

HELICOPTERS: LENGTH OF TIME AND NUMBER HEARD OR SEEN.....	47
VI. EXPERIENCES WITH HAZE, PUBLIC ADDRESS SYSTEMS, AND ENGINE SOUNDS	49
HIGHLIGHTS.....	49
EXPERIENCES WITH HAZE	52
EXPERIENCES WITH PUBLIC ADDRESS SYSTEMS	53
EXPERIENCES WITH ENGINE SOUNDS.....	54
VII. EFFECTS OF ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS.....	58
HIGHLIGHTS.....	58
PRESENCE OF DIFFERENT TYPES OF CRAFT AFFECTED ENJOYMENT OF MARGERIE AND GRAND PACIFIC GLACIERS ..	59
VIII. EFFECTS OF ENCOUNTERS: ENTIRE TRIP	64
HIGHLIGHTS.....	64
EFFECT OF ENCOUNTERS OF DIFFERENT TYPES OF CRAFT ON ENJOYMENT OF GLACIER BAY PROPER.....	65
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON DIFFERENT TRIP EXPERIENCES	66
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON VIEWING LAND ANIMALS.....	71
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON VIEWING MARINE ANIMALS	71
FUTURE RECOMMENDATIONS TO VISIT GLACIER BAY.....	72
OVERALL RATING OF TIME SPENT BOATING/CRUISING IN GLACIER BAY PROPER	75
IX. OPINIONS REGARDING CRUISE SHIPS IN GLACIER BAY PROPER.....	76
HIGHLIGHTS.....	76
AGREEMENT WITH “LARGE CRUISE SHIPS IN GLACIER BAY PROPER ARE MAJESTIC.”	77
AGREEMENT WITH “LARGE CRUISE SHIPS PROVIDED A SENSE OF SCALE WHEN VIEWING SCENERY IN GLACIER BAY.”	77
AGREEMENT WITH “LARGE CRUISE SHIPS ARE A GOOD WAY FOR A LARGE NUMBER OF PEOPLE TO VISIT GLACIER BAY PROPER.	78
AGREEMENT WITH “IT IS INAPPROPRIATE FOR LARGE CRUISE SHIPS TO BE IN GLACIER BAY PROPER.”	78
OPINION SCALE.....	79
X. LENGTH OF EXPOSURE EFFECTS ON VISITOR EXPERIENCE	80
XI. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS	81
CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS MEASURED.....	81
MEASURES OF EFFECT OF CRUISE SHIPS ON VISITOR EXPERIENCE	81
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF CRUISE SHIP ENCOUNTERS AND THE EFFECT OF CRUISE SHIPS.....	82
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF CRUISE SHIP ENCOUNTERS AND THE LIKELIHOOD THAT CRUISE SHIPS DETRACT FROM TRIP ENJOYMENT	85
<i>Predicting for whom cruise ships detracted from trip enjoyment.....</i>	<i>86</i>
SUMMARY.....	87
XII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM VISITOR CHARATERISTICS	88
CHARACTERISTICS OF DAY-BOAT PASSENGERS MEASURED.....	88
MEASURES OF EFFECT OF CRUISE SHIPS ON VISITOR EXPERIENCE	88
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF DAY-BOAT PASSENGERS AND THE EFFECT OF CRUISE SHIPS.....	88
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF DAY-BOAT PASSENGERS AND THE LIKELIHOOD THAT CRUISE SHIPS DETRACT FROM TRIP ENJOYMENT	90
<i>Predicting for whom cruise ships detracted from trip enjoyment.....</i>	<i>90</i>
SUMMARY.....	91
XIII. EXPERIENCES WITH DIFFERENT FORMS OF TRANSPORT.....	92

EFFECTS OF CRUISE SHIPS RELATIVE TO OTHER FORMS OF TRANSPORT	92
DOES THE NUMBER OF CRUISE SHIPS AFFECT ENCOUNTERS WITH OTHER FORMS OF TRANSPORT AND RATINGS OF THEIR DETRACTION?	93
DO ENCOUNTERS WITH ONE TYPE OF CRAFT AFFECT EXPERIENCES WITH OTHER TYPES OF CRAFT?	93
XIV. SOCIAL VALUES CONFLICT	96
RECREATIONAL CONFLICT OVERVIEW.....	96
APPLYING THE CONFLICT FRAMEWORK TO CURRENT RESEARCH	97
<i>Measure of problem/conflict</i>	97
<i>Measure of social value conflict</i>	97
ANALYSES	98
<i>Source of conflict for those who saw/heard cruise ships</i>	98
<i>Estimating additional detraction effects due to social value conflict.</i>	99
DISCUSSION	99
XI. SUMMARY AND IMPLICATIONS.....	101
OBJECTIVE 1: HOW DO CRUISE SHIPS AFFECT, IF AT ALL, DAY-BOAT VISITORS' EXPERIENCES IN GLACIER BAY PROPER?.....	101
<i>Recalled encounters with cruise ships</i>	101
<i>General and specific effects of cruise ships</i>	102
<i>Measures of overall trip satisfaction</i>	106
<i>Rated detraction due to cruise ships and encounters with other craft</i>	106
<i>Implications</i>	107
OBJECTIVE 2: WHAT ARE ESTIMATED EFFECTS FOR PARK VISITORS UNDER THE RECORD OF DECISION MAXIMUM USE LEVEL OF 2 CRUISE SHIPS PER DAY, EVERY DAY?	107
<i>Implications</i>	108

List of Figures

Figure D-1. Respondent's Age	9
Figure D-2. Respondent's Gender	9
Figure D-3. Highest level of formal education completed by respondents	10
Figure D-4. Residence location	11
Figure D-5. Ethnicity and Race of Respondents	12
Figure D-6. Visit was first trip to GLBA	13
Figure D-7. Number of trips to GLBA in last 10 years	13
Figure D-8. Party size	15
Figure D-9. Type of party	16
Figure D-10. Number of nights plan to stay in Glacier Bay proper	16
Figure D-11. Stayed overnight within park boundaries	17
Figure D-12. Number of nights stayed overnight in the park	18
Figure D-13. Number of days visited by those who did not stay overnight	18
Figure D-14. Number of hours spent in park by those visiting only one day	19
Figure D-15. Number of hours spent in park by those who visited multiple days	19
Figure D-16. Activities engaged in on trip to Glacier Bay National Park	20
Figure D-17. Planned trip to minimize seeing or hearing other vessels	22
Figure D-18. Planned trip to minimize encounters with different types of vessels	22
Figure D-19. Percent of respondents who visited Margerie and Grand Pacific glaciers	26
Figure D-20. Other tidewater glaciers visited	27
Figure D-21. Other tidewater glaciers visited by number of cruise ships in the bay per day	27
Figure D-22. Percent of respondents who experienced each kind of weather	28
Figure D-23. Trip weather experience categories based on responses to each kind of weather experienced by a visitor	29
Figure D-24. Percent of respondents who visited Margerie and Grand Pacific glaciers	32
Figure D-25. Percent of respondents who saw other craft at Margerie and Grand Pacific glaciers	32

Figure D-26. Number of large cruise ships seen at Margerie and Grand Pacific glaciers.....	33
Figure D-27. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers.....	33
Figure D-28. Number of kayaks seen at Margerie and Grand Pacific glaciers	34
Figure D-29. Number of propeller-driven airplanes seen at Margerie and Grand Pacific glaciers	34
Figure D-30. Number of helicopters seen at Margerie and Grand Pacific glaciers.....	35
Figure D-31. Percent of respondents who saw or heard large cruise ships	39
Figure D-32. Number of days respondents saw cruise ships in Glacier Bay proper	39
Figure D-33. Total number of hours saw or heard large cruise ships in Glacier Bay proper	40
Figure D-34. Total number of hours saw or heard large cruise ships in Glacier Bay proper: Current vs. maximum allowed	41
Figure D-35. Number of hours saw or heard large cruise ships on day saw or heard most cruise ships.....	42
Figure D-36. Number of hours saw or heard large cruise ships on day saw or heard most cruise ships.....	43
Figure D-37. Number of hours motorized craft other than large cruise ships were heard or seen.....	45
Figure D-38. Number of motorized craft other than large cruise ships heard or seen.....	45
Figure D-39. Length of time propeller-driven airplanes were heard or seen	46
Figure D-40. Number of propeller-driven airplanes heard or seen	46
Figure D-41. Number of hours helicopters were heard or seen.....	47
Figure D-42. Number of helicopters heard or seen by number of cruise ships in the bay per day	47
Figure D-43. Number of helicopters heard or seen: Current conditions versus two-cruise ships in bay per day	48
Figure D-44. Percent of respondents who experienced haze from different types of vessels	52
Figure D-45. Effect of experience of haze from large cruise ships on trip enjoyment.....	52
Figure D-46. Percent of respondents who experiences public address systems from different types of vessels.....	53
Figure D-47. Effect of large cruise ship public address systems on trip enjoyment	53
Figure D-48. Effect of small cruise ship or tour boat public address systems on trip enjoyment	54
Figure D-49. Experiences with engine sounds from watercraft	54
Figure D-50. Experience with engine sounds from aircraft	55

Day-Boat Visitor Survey

Figure D-51. Effect of hearing large cruise ship engines on trip enjoyment.....	55
Figure D-52. Effect of hearing small cruise ship or tour boat engines on trip enjoyment	56
Figure D-53. Effect of hearing propeller-driven airplane engines on trip enjoyment	56
Figure D-54. Effect of helicopter engines on trip enjoyment.....	57
Figure D-55. Effect of seeing large cruise ships at Margerie and Grand Pacific glaciers.....	61
Figure D-56. Effect of seeing motorized water craft other than large cruise ships at Margerie and Grand Pacific glaciers	61
Figure D-57. Effect of seeing kayaks at Margerie and Grand Pacific glaciers: One vs. two cruise ships in bay	62
Figure D-58. Effect of seeing kayaks at Margerie and Grand Pacific glaciers: Current conditions vs. maximum allowed	62
Figure D-59. Effect of seeing propeller-driven airplanes at Margerie and Grand Pacific glaciers	63
Figure D-60. Effect of seeing helicopters at Margerie and Grand Pacific glaciers	63
Figure D-61. Average importance ratings by average effect ratings for each type of trip experience	70
Figure D-62. Average importance ratings by average effect ratings for each trip experience dimension ...	70
Figure D-63. Effect of large cruise ships on viewing land animals.....	71
Figure D-64. Effect of large cruise ships on viewing land animals.....	72
Figure D-65. Likelihood of recommending a friend or family member visit Glacier Bay on the day-boat.	74
Figure D-66. Overall rating of time spent boating/cruising in Glacier Bay proper.....	75
Figure D-67. Agreement with “Large cruise ships in Glacier Bay proper are majestic”	77
Figure D-68. Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay”	77
Figure D-69. Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper”	78
Figure D-70. Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper”	78
Figure D-71. Distribution of opinion scale scores.....	79
Figure D-72. Percent of all day-boat respondents who reported detraction effects due to large cruise ships	103
Figure D-73. Percent of all day-boat respondents who reported detraction effects due to motorized water craft other than large cruise ships	104
Figure D-74. Percent of all day-boat respondents who reported detraction effects due to aircraft	104

List of Tables

Table D-1. Percent of day-boat visitors entering Glacier Bay proper on one- and two-cruise ship days.....	2
Table D-2. Summary of non-response analyses for Day-Boat Passenger Mail Survey.	4
Table D-3. Weighted and unweighted findings of key variables.	5
Table D-4. Other activities engaged in by day-boat passengers.....	21
Table D-5. Internal consistency measure (Cronbach's alpha) for each importance dimension	24
Table D-6. Importance ratings for trip experience scales.....	25
Table D-7. Trip weather experience categories.....	29
Table D-8. Percent of respondents who encountered different kinds of craft.	44
Table D-9. Average number of hours different kinds of craft were heard or seen.....	44
Table D-10. Effect of different craft on enjoyment of Margerie/Grand Pacific glaciers	60
Table D-11. Effect of different craft on enjoyment of Margerie/Grand Pacific glaciers: Percent who saw type of craft at the glaciers	60
Table D-12. Effect of different craft on enjoyment of Glacier Bay proper: Percent of all respondents.....	66
Table D-13. Effect of different craft on enjoyment of Glacier Bay proper: Percent who saw craft.....	66
Table D-14. Internal consistency measure (Cronbach's alpha) for each dimension	68
Table D-15. Effects of large cruise ships on trip experiences	69
Table D-16. Effect of experience with different craft on future recommendations	74
Table D-17. Correlations among agreement with opinion statements	78
Table D-18. Significant correlations between total number of hours heard or saw cruise ships and different measures of effects of cruise ships	80
Table D-19. Characteristics of cruise ships used as predictors in regression analyses	81
Table D-20. Characteristics of cruise ships that were significant predictors of effects of cruise ships.....	83
Table D-21. Summary of model for effects of cruise ships measured by cruise ship effect score for day-boat passengers.....	83
Table D-22. Predicted detraction factor scores for the sixteen possible scenarios.....	85
Table D-23. Model summaries for predicting likelihood that cruise ships detracted from trip enjoyment.....	87

Day-Boat Visitor Survey

Table D-24. Visitor characteristics used as predictors in regression analyses	88
Table D-25. Day-boat passenger characteristics that were significant predictors of effects of cruise ships	89
Table D-26. Summary of model for effects of cruise ships measured by cruise ship effect score for day-boat passengers.....	89
Table D-27. Model summaries for predicting likelihood that cruise ships detracted from trip enjoyment based on day-boat visitor characteristics.....	91
Table D-28. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip	92
Table D-29. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip	92
Table D-30. Measures used in analysis of relationships between encounters with various forms of transport and ratings of their detraction.....	94
Table D-33. Correlation between measures of encounters with watercraft and craft-specific measures of detraction (significant correlations shown, those in bold have $p < .01$).....	94
Table D-30. Summary of variables related to social value conflict	97
Table D-31. Source of conflict for day-boat respondents	98

I. INTRODUCTION AND METHOD

Glacier Bay National Park and Preserve (GLBA) is a large park and most visitors experience the park in watercraft. The managers of GLBA are pursuing a research initiative arising from the vessel management planning process designed to assess whether cruise ships in Glacier Bay are affecting the environment or visitor experiences (See General Introduction for more background). This study is part of the research program that examined whether cruise ships affect visitor experiences.

The Glacier Bay Lodge operates a day tour boat (referred to as the day-boat) out of Bartlett Cove. The day-boat leaves from Bartlett Cove each morning and takes people up bay to the tidewater glaciers. Approximately 3,600 visitors take the day-boat each season. The timing of the day-boat is such that encounters with cruise ships are likely at some point during the trip. To determine the effects, if any, of other cruise ships in Glacier Bay on the quality of visitor experience, a mail survey of visitors who took the day-boat was conducted.

Goals of the day-boat passenger mail survey

The Day-Boat Passenger Mail Survey was designed to address the research questions identified for the research program as a whole.

1. How do cruise ships affect, if at all, day-boat visitors' experiences in Glacier Bay proper?
 - a. Which dimensions of day-boat visitors' experiences in Glacier Bay proper, if any, do cruise ships affect?
 - b. If cruise ships affect day-boat visitors' experiences in Glacier Bay proper, which features of cruise ships have effects?
2. What are estimated effects for day-boat visitors under the Record of Decision maximum use level of 2 cruise ships per day, every day?
3. How do the effects of cruise ships on day-boat visitors' experiences in Glacier Bay proper compare to the effects of other forms of mechanized transport?

Survey design and questionnaire development

The survey procedures and questionnaires were developed in conjunction with staff at GLBA. Survey questions were written based upon thorough discussions with NPS staff, review of related literature, and qualitative interviews with park visitors during the summer of 2007 (see General Introduction for details). To the extent possible, the questionnaires for each park user group included the same questions to allow comparison among the different groups.

The survey included an on-site questionnaire and a mail questionnaire (See Appendices D and H). The on-site questionnaire consisted of seven questions that asked about general demographics, travelling party characteristics, and how many nights they planned to spend in Glacier Bay proper. (Additionally, visitors were asked to provide their name and address to receive the mail questionnaire.) This descriptive information was used in determining whether the final sample of completed mail surveys was representative of passengers aboard the day-boat (i.e., whether non-response had biased the sample).

The mail questionnaire included questions about trip experiences, encounters with cruise ships and other motorized craft (in all areas of Glacier Bay, and specifically, at Margerie and Grand Pacific Glaciers), effects of cruise ships and other motorized craft on different aspects of the trip, attitudes about cruise ships in GLBA, and general demographics.

Day-Boat Visitor Survey

Drafts of these questionnaires were peer-reviewed and revised based on feedback. The revised questionnaires were reviewed and approved by the Office of Management and Budgeting under the full review process.

Sampling and visitor contact procedures

The results of the Day-Boat Passenger Mail Survey represent the population of all people who took the day-boat during their visit to Glacier Bay proper between June 27, 2008 and August 31, 2008 who are over the age of 17. The day-boat leaves each morning at 7:30 a.m. from the public dock at Bartlett Cove. People begin arriving to board the day-boat about 40 minutes before departure and people were contacted as they prepared to board the vessel. Logistical scoping during the summer of 2007 informed the visitor contact procedures.

Contacts were made on 51 selected days; 19 days were 1 cruise ship days and 32 were two cruise ship days. Although these sample days did not reflect the 1:2 ratio of one cruise ship and two cruise days (see Table D-1), the percentage of day-boat visitors contacted on one-cruise ship days was closer (35.0%) to the desired 33.3% as was the percentage of day-boat visitors returning a completed mail survey (34.7%). Because the percentage of day-boat visitors contacted and those returning a completed mail survey were so close to the desired 33.3%, the sample was considered to be representative of current conditions and thus, no weighting of the data was required.

Face-to-face contacts were made by project personnel to increase participation in the survey. In order to achieve the desired sample size, 12-14 contacts were made on each day. The survey worker approached passengers as they arrived at the dock to board the day-boat. The survey worker introduced the survey and asked the person to participate. When a passenger refused to participate, the survey worker logged the time, party size, and gender of the refusing individual – the next individual was then stopped and asked to participate. The on-site questionnaire took approximately 3 minutes to complete (see Appendix D). Respondents completed the on-site questionnaire and returned it to the survey worker. The survey worker thanked the person for his or her participation. Of the 612 day-boat visitors contacted, 559 (91.3%) agreed to participate in the mail survey.

Table D-1. Percent of day-boat visitors entering Glacier Bay proper on one- and two-cruise ship days

	Entered Glacier Bay on	
	1 cruise ship in bay day	2 cruise ships in bay day
Sampling days	37.3%	62.7%
Contacts (n = 612)	35.0%	65.0%
Participate (n = 559)	35.2%	64.8%
Mail survey (n = 405)	34.7%	65.3%

Administration of mailings

Mailings were administered by employees of the Protected Area Social Research Unit (PASRU) in Seattle, Washington. The names and addresses from the contact sheets were entered by the survey worker and sent electronically to the PASRU where they were compiled into a database. This database served as the basis for administering the mailings. All visitors who provided a name and address were mailed a questionnaire, a map of GLBA, and a cover letter from the PASRU. Respondents were instructed to complete the questionnaire and return it by mail in the postage-paid envelopes. As a follow-up, all respondents were sent a thank you/reminder letter about one week after they received the questionnaire. Non-respondents received a second reminder letter and an additional copy of the questionnaire about 14 days after the first reminder letter. For those who did not respond after the second reminder, a third reminder letter was sent about 14 days after the second reminder letter. This multi-phased approach is the recommended technique to

maximize response rates (Dillman 2000). Of the 559 questionnaires mailed, 19 were returned due to incorrect or out-of-date addresses. The final response rate was 83.3%, with 450 of 540 questionnaires completed and entered in the data file.

Statistical considerations

Consistent with convention, statistical significance was set at the **.05 level** for analyses included in this report. Statistical tests with p -values equal to or less than .05 are interpreted as indicating effects that are reliable or real (there is a probability of 5 percent or less that the observed effects are due to chance alone). Although the analyses highlight statistically significant effects, they do not reveal whether effects have important practical implications. Some effects that fall just short of the .05 significance level may have large practical implications while other effects with high statistical significance may have no practical implications. Thus, it is important to consider both the statistical significance and the practical implications of these data.

Limitations

The Day-Boat Passenger Mail Survey has several general limitations that should be kept in mind when interpreting the data. 1) In all surveys, it is assumed that respondents provide accurate and honest answers to the questions asked. 2) The data represent visitor attitudes, opinions, and evaluations of their experience at a particular point in time (i.e., the time of the survey) and people's attitudes, opinions, and experience evaluations are dynamic so changes can occur at any time. 3) Statistical inferences can only be made for the subset of GLBA visitors who were passengers on the day-boat. In addition, there are other limitations noted in the body of the report that are due to the manner in which individual questions were interpreted. Finally, there are limitations that revolve around the issue of non-response (i.e., possible bias in the sample due to differences between the visitors who completed the questionnaires and those who didn't). Potential limitations associated with non-response are discussed below.

Non-response

There were two points at which visitors could elect not to participate in the survey. The first point was when the fieldworker approached them, introduced the study, and asked them to participate. The second point was when visitors who received the mail survey chose whether to complete and return it. Because decisions whether to participate are unlikely to be random, the survey responses of visitors who agree to participate may differ from those who do not. In that case, the sample data will not accurately represent the population. Such inaccuracy is said to be the result of non-response bias.

Potential non-response bias is generally assessed by comparing respondents to non-respondents for all known characteristics. In this survey, visitors who completed the on-site questionnaire but failed to return the mail questionnaire were more fully described than visitors who refused to participate on-site (and provided no information beyond what the survey worker could observe). The rate of on-site refusals was lower than anticipated (8.7% vs. 10.0%) so the potential for non-response bias was minimal. Accordingly, only one set of non-response analyses were conducted, one to determine whether visitors who were sent the mail questionnaire and failed to return it differed from visitors who returned the questionnaire.

A variety of data from the on-site questionnaire provided an opportunity for the use of statistical tests to identify differences between respondents and non-respondents to the mail questionnaire. Specifically, possible differences were assessed using Chi-square tests for independence or t -tests that determined whether response rates were independent of a particular visitor characteristic (using a .05 significance level). The visitor characteristics that were used in assessing possible non-response bias were party size, type of personal group, how many nights they planned to stay in Glacier Bay proper, gender, age, location of residence, and whether they took the day-boat on a day when there was one versus two cruise ships in the bay.

Day-Boat Visitor Survey

Statistically significant differences in response rates were found for four of the seven characteristics listed above. These findings are reported in Table D-2.

Table D-2. Summary of non-response analyses for Day-Boat Passenger Mail Survey.

Characteristic	Statistical Result	Description of finding
Age	$t(541) = -3.34, p = .001$	Respondents who returned the mail questionnaire were older than respondents who did not return the mail questionnaire.
Type of party	$\chi^2(3, 554) = 11.11, p = .011$ (combined Family and friends with Other to eliminate frequency < 5)	Individuals were less likely to return the mail questionnaire whereas people in parties that were comprised of Family or parties comprised of Friends were more likely to return the mail survey.
Gender	$\chi^2(1, 556) = 6.48, p = .011$	Females were more likely than males to return the mail questionnaire.
Residence	$\chi^2(2, 558) = 16.86, p < .001$	Alaskan and non-U.S. residents were less likely to return the mail questionnaire than non-Alaskan U.S. residents.

Because it was possible that people's experiences of Glacier Bay proper differed based on these characteristics, key dependent measures of people's experiences with cruise ships were selected and a comparison of actual findings with those weighted to correct for the non-response were made. The key dependent measures were 1) whether they saw large cruise ships during their trip, 2) how seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper, 3) how the presence of large cruise ships affected their enjoyment of Margerie/Grand Pacific glaciers, and 4) Overall rating of time spent boating in Glacier Bay proper.

Table D-3 summarizes the unweighted and weighted findings for these variables. As can be seen, none of the weighted findings differ by even 1 percent (the largest difference was 0.8 percent). Given the small differences on these key variables, the difference in response rates observed were deemed unlikely to bias the findings and conclusions of the day-boat passenger survey.

Table D-3. Weighted and unweighted findings of key variables.

Variable/ Response option	Findings (not weighted)	Weighted for ...			
		Age	Type of Party	Gender	Residence
Saw large cruise ships					
No	10.7	10.1	11.1	11.0	10.6
Don't Know	0.4	0.5	0.4	0.4	0.4
Yes	88.8	89.4	88.5	88.5	89.0
How seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper					
Did not see	11.0	10.4	11.4	11.3	10.9
Detracted greatly	9.4	9.7	9.4	9.7	9.3
Detracted somewhat	36.2	36.3	36.0	35.9	36.0
No effect	40.8	40.9	40.7	40.5	41.3
Added somewhat	2.6	2.6	2.6	2.6	2.5
Added greatly	0.0	0.0	0.0	0.0	0.0
How the presence of large cruise ships affected their enjoyment of Margerie/Grand Pacific glaciers					
Did not see	23.1	23.4	23.7	23.6	23.3
Detracted greatly	14.9	15.1	14.7	15.3	14.9
Detracted somewhat	29.4	29.4	39.3	28.4	28.9
No effect	28.6	28.2	28.5	28.7	29.0
Added somewhat	3.9	4.0	3.9	4.0	3.9
Added greatly	0.0	0.0	0.0	0.0	0.0
Overall rating of time spent boating in Glacier Bay proper					
Extremely poor	0.2	0.3	0.2	0.3	0.2
Very poor	0.2	0.2	0.2	0.2	0.2
Poor	1.1	1.1	1.1	1.1	1.1
Good	7.5	7.5	7.7	7.5	7.5
Very good	35.4	36.0	35.6	35.2	36.1
Extremely good	55.6	54.9	55.1	55.7	54.8

Accuracy of the sample

Assuming a random sample and questions of the yes/no type in which the true occurrences of these values in the population are 50%/50%, the data from the larger sample from the contact sheet (i.e., 559 respondents) can be generalized to the population with a 95 percent assurance that the obtained or observed percentages to any item will vary no more than $\pm 3.8\%$. Assuming a random sample and questions of the yes/no type in which the true occurrences of these values in the population are 50%/50%, the data from the smaller sample from the mail survey (i.e., 450 respondents) can be generalized to the population of people

Day-Boat Visitor Survey

who took the day-boat with a 95 percent assurance that the obtained or observed percentages to any item will vary no more than $\pm 4.3\%$.

Subject to the limitations stated previously, the authors generally believe that the data are representative of persons over the age of 17 who visited Glacier Bay proper and were passengers on the day-boat during the time of the survey. This confidence is based on the large sample size, the fact that deviations from the sampling plan were relatively minor, and that corrections for differences in response rates were extremely small for key questions.

Estimates for current and maximum allowed seasonal use days

Cruise ship use level during the 2008 peak season was 153 seasonal use days (a.k.a. current conditions). This level of use corresponds to a 1:2 ratio of 1-cruise-ship in the bay days and 2-cruise-ships in the bay days. This ratio held true during the 2008 sampling period. As the day-boat sample was representative of visitors during the 2008 peak season, the best estimates for current conditions (153 seasonal use days) were observed effects for all respondents to the survey.

The maximum allowed under the Record of Decision is two cruise ships entering the bay every day. Day-boat visitors are typically single day visitors and thus, under the maximum-allowed conditions they should experience conditions comparable to current day-boat passengers who visit the bay on 2-cruise ships in the bay days. If analyses examining differences between day-boat passengers who entered on 1-cruise-ship days and those who entered on 2-cruise-ship in the bay days were statistically significant, then the best estimates of future effects of day-boat visitors are observed effects for day-boat passengers who enter Glacier Bay on 2-cruise ships in the bay days. However, if analyses showed no significant difference in day-boat visitors' responses due to 1- and 2-cruise ships in the bay days, then it was assumed that there would be no significant change when increasing cruise ship use levels to the maximum-allowed conditions of all 2-cruise ships in the bay days. The maximum allowed estimate in these cases was the observed effect for all respondents (i.e., same as current conditions).

Comparisons between current conditions and the maximum allowed were made on key variables. It should be noted that differences, if any, between current conditions (66% are 2-cruise ship days) and the maximum allowed (100% 2-cruise ship days) will be smaller than observed significant differences between 1- and 2-cruise ships in the bay days (0% and 100% 2-cruise ship days, respectively). Be that as it may, park managers will need to assess whether the observed differences in rates are 1) practically meaningful and 2) acceptable.

Conventions followed in this report

As mentioned previously, an on-site questionnaire and a mail questionnaire were used to collect the data presented in this report. These questionnaires are included in this report (see Appendices D and H), and it is recommended that they be reviewed before reading the body of this report.

In the body of this report, each question is presented as it appeared on the questionnaire, followed by corresponding graphs, tables, or analyses. The specific survey instrument and question used to collect the data reported in each chart are noted in the chart titles. The number of respondents (n) whose data are represented in each chart is also reported, generally at the bottom of the chart.

When a chart reports data for a subset of respondents (*c.f. Figure D-18. Planned trip to minimize encounters with different types of vessels*), a note describes the sub-sample included in the chart.

Missing data for up to 10 percent of respondents to a particular question are generally not considered likely to alter the interpretation of that question. Throughout this report, few questions had more than 10 percent missing data. Exceptions are noted in the text and charts.

It is neither possible nor desirable that this report describes all possible analyses of the data collected by the survey, or even all analyses that are potentially of interest to park managers. However, some analyses that may be of interest are briefly noted throughout this report and described as the potential focus of future work.

II. VISITOR PROFILE

Day-boat passengers were asked a variety of demographic questions that are used here to describe or provide a profile of such visitors. In this section, each question is presented along with the findings in chart format. Highlights of this section are below.

Highlights

- The majority of day-boat passengers were between age 45 and 69 (65.9%) and only 6.5% of day-boat passengers were under age 30. The average age of day-boat passengers was 52.3 years. Slightly more day-boat passengers were male (52.0%).
- Day-boat passengers were highly educated with 60.5% of passengers having graduate or professional training and the average highest number of years of education being 18 (equivalent to a master's degree).
- Most day-boat passengers were non-Alaskan U.S. residents (75.3%). Non-U.S. residents comprised 19.4% of day-boat passengers followed by Alaskan residents (5.4%).
- The vast majority of day-boat passengers reported being White (97.0%) followed by Asian (2.5%). Hispanic ethnicity was reported by 3.4% of day-boat passengers.
- For 89.1% of day-boat passengers, this trip was their first to Glacier Bay National Park. Only a small percentage of day-boat passengers (3.9%) reported visiting Glacier Bay National Park three or more times in the last 10 years.

Gender and age

Contact Sheet

4. What year were you born? 19 ____ 6. Are you: ☐ FEMALE ☐ MALE

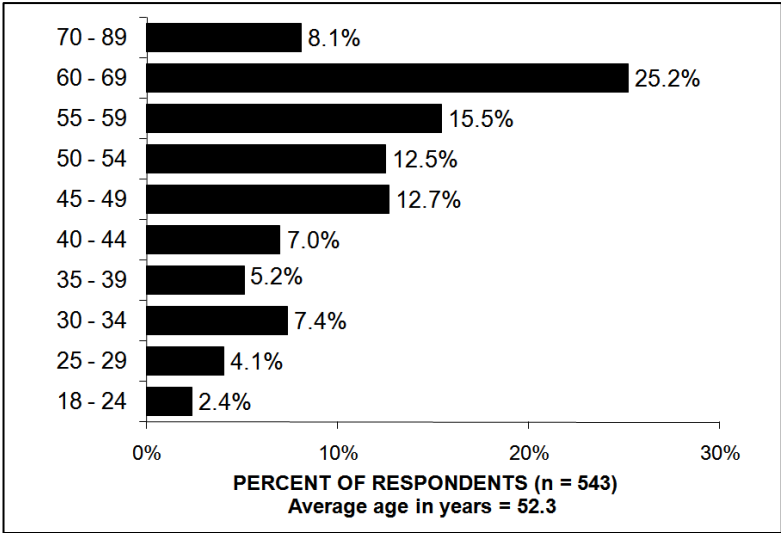


Figure D-1. Respondent’s Age

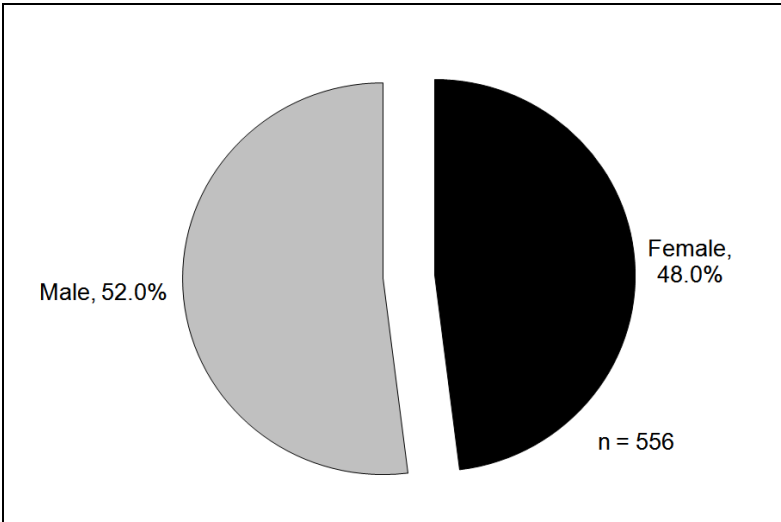


Figure D-2. Respondent’s Gender

Education

Mail survey

23. What is the highest level of formal schooling you have completed? *(Circle the appropriate number.)*

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24+
 (Elementary thru High School) (College/Vocational) (Graduate/Professional)

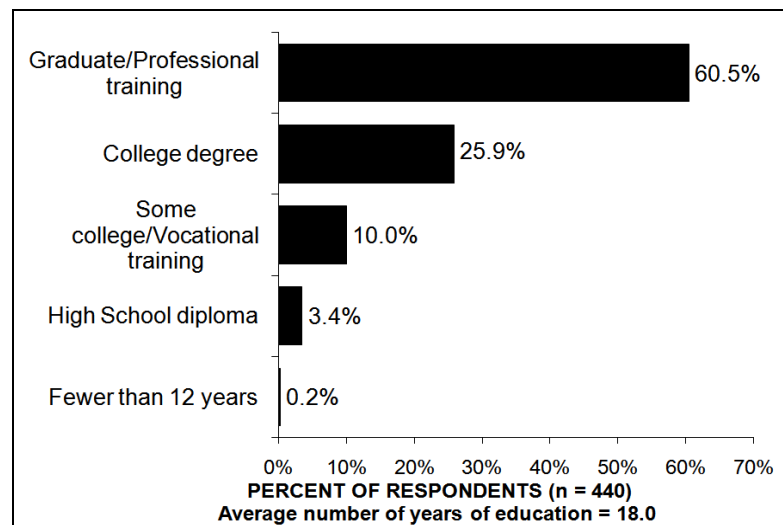


Figure D-3. Highest level of formal education completed by respondents

Residence

Contact Sheet

7. What is your home Zip or Postal Code? *(If you live outside of the United States, please write the name of your country.)*

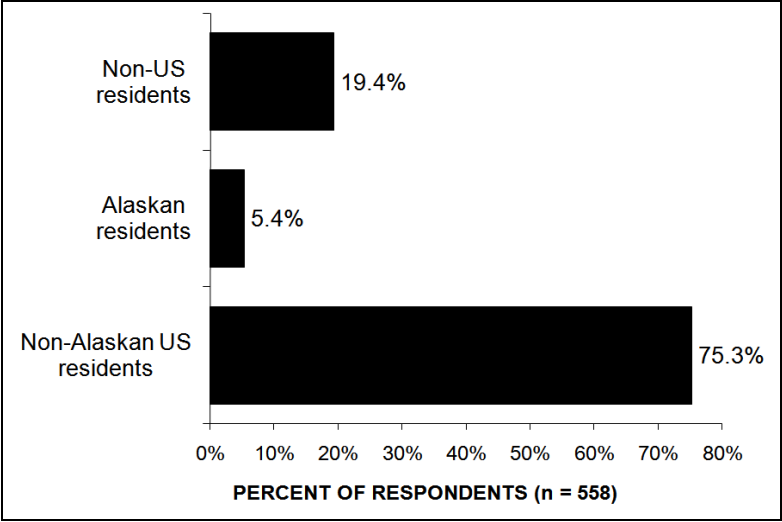


Figure D-4. Residence location

Ethnicity and race

Mail Survey

24. Are you Hispanic or Latino?

- ☐ YES – Hispanic or Latino
- ☐ NO – Not Hispanic or Latino

25. What is your race? (Check one or more races to indicate what you consider yourself to be)

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or other Pacific Islander
- ☐ White

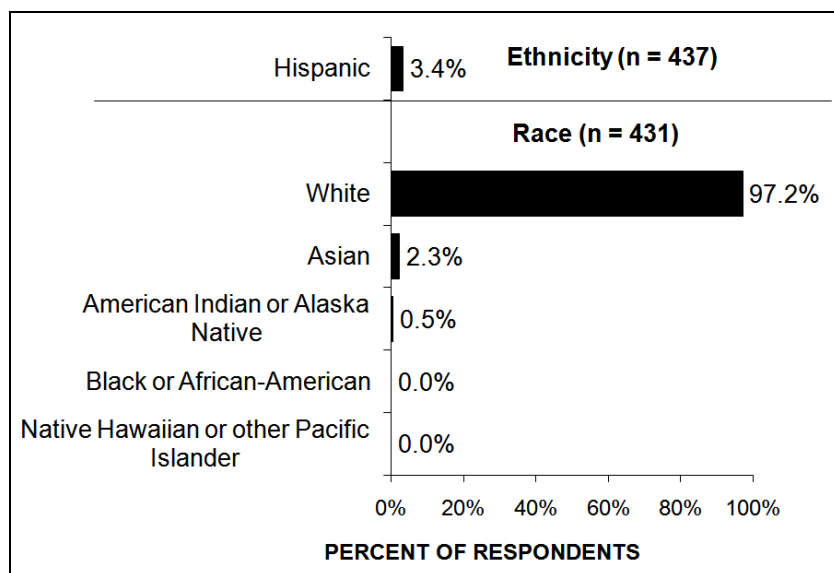


Figure D-5. Ethnicity and Race of Respondents

Number of trips to Glacier Bay National Park in last 10 years

Mail Survey

1. Was the trip during which you were contacted your first trip to Glacier Bay National Park and Preserve?
- ☐ Yes → GO TO QUESTION 2
- ☐ No → 1a. **Including the trip during which you were contacted**, how many times have you visited Glacier Bay National Park and Preserve in the last 10 years?

_____ NUMBER OF VISITS TO GLACIER BAY NPP IN LAST 10 YEARS

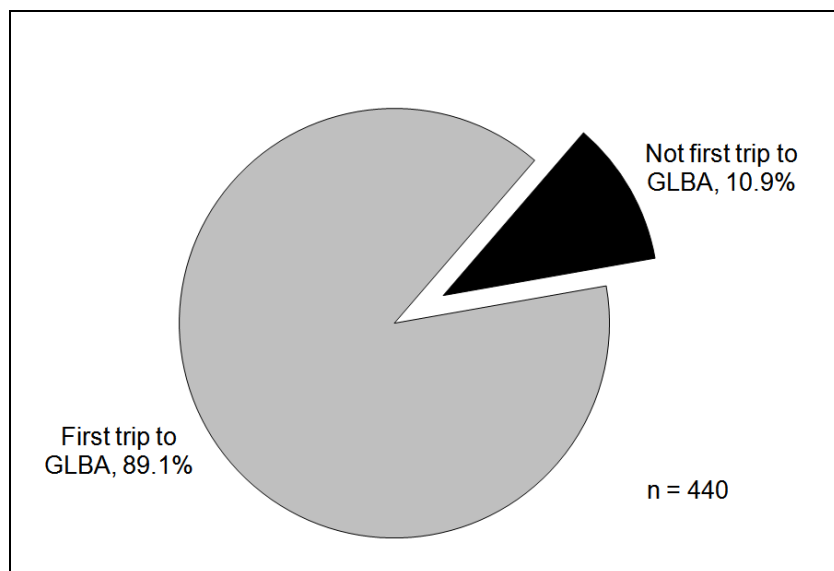


Figure D-6. Visit was first trip to GLBA

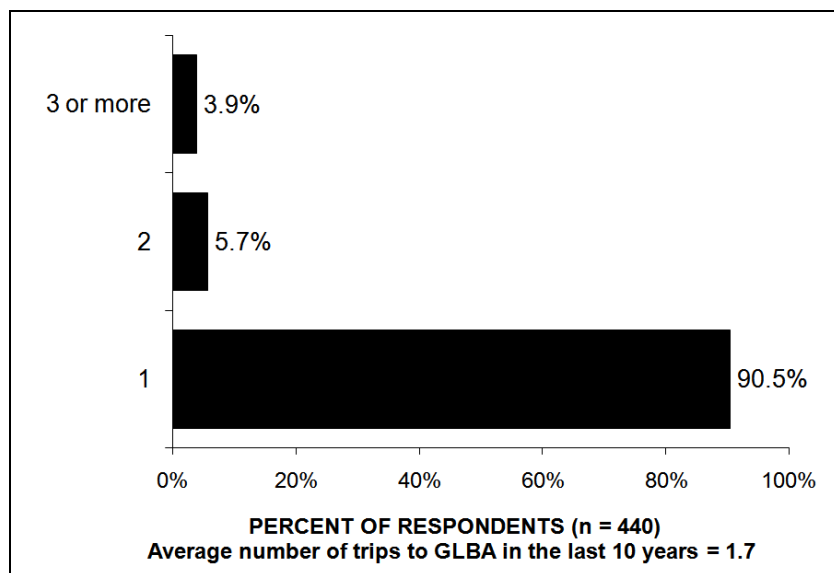


Figure D-7. Number of trips to GLBA in last 10 years

III. Trip Characteristics

Day-boat passengers were asked a variety of questions about their trip that are used here to describe or provide a profile of such visitors. In this section, each question is presented along with the findings in chart format. Highlights of this section are below.

Highlights

- Over half (54.5%) of day-boat respondents' parties consisted of two people and the average party size was 3 people. Three-fourths (74.4%) of day-boat respondents were travelling with family.
- On average, day-boat respondents planned to stay 2.8 nights in Glacier Bay proper with over half (51.9%) planning to spend one or two nights. Seventeen percent of day-boat respondents did not plan to stay overnight in Glacier Bay proper.
- Over half (56.3%) of day-boat respondents stayed overnight within park boundaries. Of those who stayed overnight, 34.6% spent one night and 35.4% spent two nights. About 6% spent five or more nights in the park.
- Of the 43.5% of day-boat passengers that did not stay overnight with park boundaries, 48.4% visited on one day and 32.6% visited on two days. For day-boat respondents visiting one day, the most common number of hours spent in the park was 8 (41.0%) and 10 (22.9%) suggesting that taking the day-boat was their primary activity in the park. For day-boat respondents visiting multiple days, the average number of hours spent in the park was 15.
- Almost every day-boat respondent engaged in four activities: 1) Viewing tidewater glaciers (98.4%), 2) Viewing wildlife (97.5%), 3) Viewing general scenery (96.4%), and 4) Taking photographs (92.3%). Almost half (48.2%) of respondents hiked and 18% kayaked during their visit.
- More than three-fourths (77.3%) of day-boat respondents visited Margerie and Grand Pacific tidewater glaciers. The other tidewater glacier most frequently visited was Johns Hopkins (62.3%) followed by Lamplugh (37.4%). About one-fourth (26.0%) of day-boat passengers did not know/remember if they visited other tidewater glaciers and 8.6% did not know/remember if they visited Margerie and Grand Pacific glaciers..
- Most (87.4%) day-boat respondents did not plan their trip to minimize seeing or hearing other vessels and this did not differ for day-boat respondents visiting on one- or two-cruise ship days. Of those who did, cruise ships (78.6%) and small cruise ships, tour boats, or large private vessels (44.6%) were the vessels that respondents were most likely planning to avoid.
- Day-boat passengers reported experiencing a variety of weather conditions during their trip to Glacier Bay proper. The most common type of weather reported was "Sunny and/or partly cloudy" (75.9%) followed by "Cloudy without fog" (62.1%) and "Rain with or without fog" (58.6%).
- Day-boat passengers were asked the importance of 8 different possible trip experiences (rated on a five-point scale from 1 = not at all important to 5 = extremely important) and none of these differed for respondents visiting on one- or two-cruise ships days. Three trip experiences had average importance ratings between "very important" and "extremely important": 1) Experience the scenic beauty, 2) View wildlife, 3) Experiencing the wonder of nature, and 3) Pristine environment. The trip experience with the lowest average importance rating was "Solitude." It was rated on average as "moderately important" (3 on the rating scale) and for over half of respondents solitude was at

least moderately important (62% of respondents scored 3 or higher on the Solitude scale). Solitude is difficult to have in Glacier Bay without kayaking or being on a smaller boat (e.g., charter or private vessel), both of which can be costly and/or require physical skills

Party size

Contact sheet

2. How many people are in your personal traveling party?

_____ Number of people

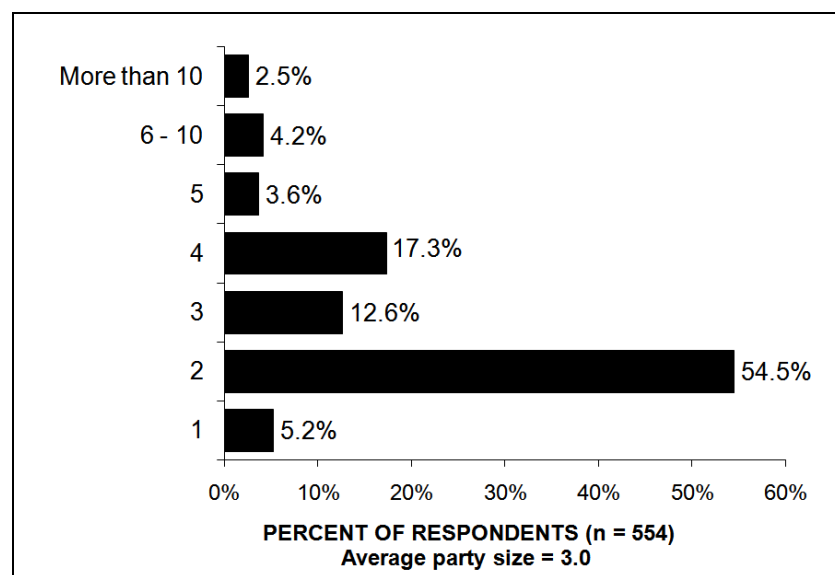


Figure D-8. Party size

Party type

Contact sheet

3. Please check the makeup of your personal traveling party:

- ☐ Individual
- ☐ Family
- ☐ Friends
- ☐ Family and friends
- ☐ Other _____
(please specify)

Day-Boat Visitor Survey

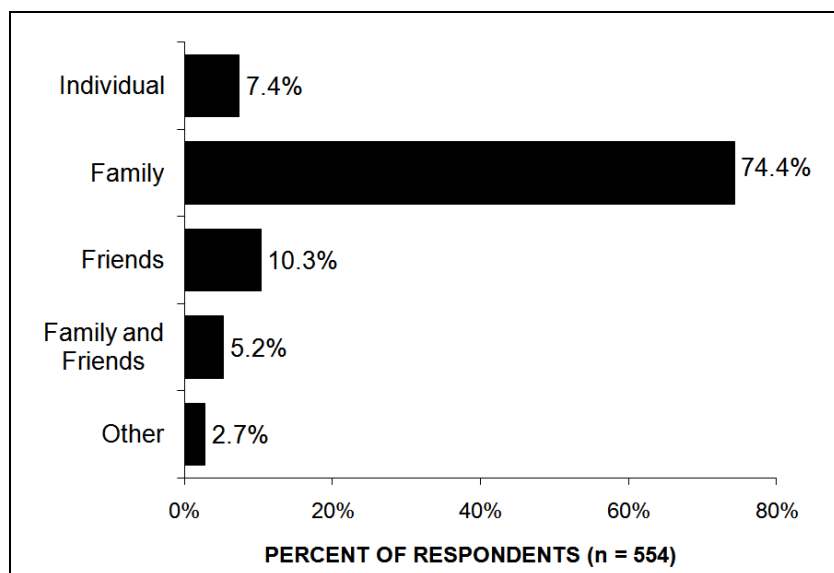


Figure D-9. Type of party

Number of nights plan to stay in Glacier Bay proper

Contact Sheet

1. How many nights do you plan to stay in Glacier Bay proper?

_____ Number of nights plan to stay

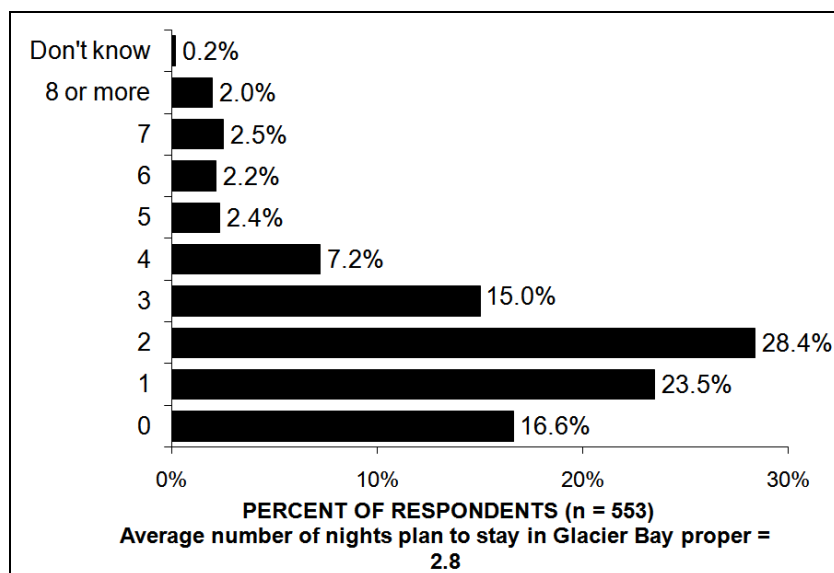


Figure D-10. Number of nights plan to stay in Glacier Bay proper

Length of stay

A series of questions were asked about how long respondents spent in the park and whether they stayed overnight inside the park.

Mail Survey

2. On the trip during which you were contacted, did you stay overnight inside the park? (Glacier Bay Lodge is within park boundaries, but lodging in Gustavus is outside the park).
- ☐ Yes → How many nights did you stay overnight within park boundaries? ____ Nights OR ____ Don't know
 - ☐ Don't remember → GO TO QUESTION 3
 - ☐ No → Did you visit Glacier Bay NPP on more than one day during your trip?
 - ☐ No → How many hours did you spend in the park? ____ Hours OR ____ Don't know
 - ☐ Yes →
 - a. How many days did you visit the park? ____ Days OR ____ Don't know
 - b. How many hours total did you spend in the park? ____ Hours OR ____ Don't know

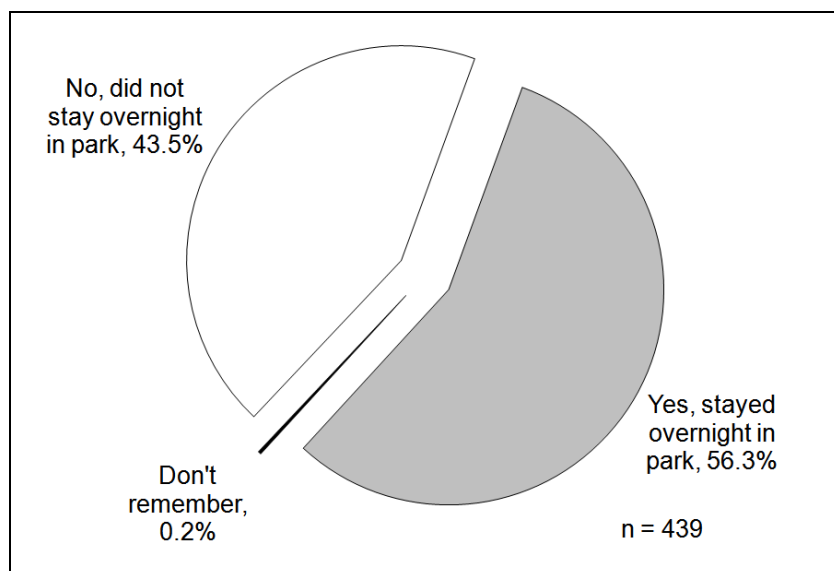


Figure D-11. Stayed overnight within park boundaries

For the 56.3% of visitors who stayed overnight within park boundaries, Figure D-12 shows the number of nights they stayed.

Day-Boat Visitor Survey

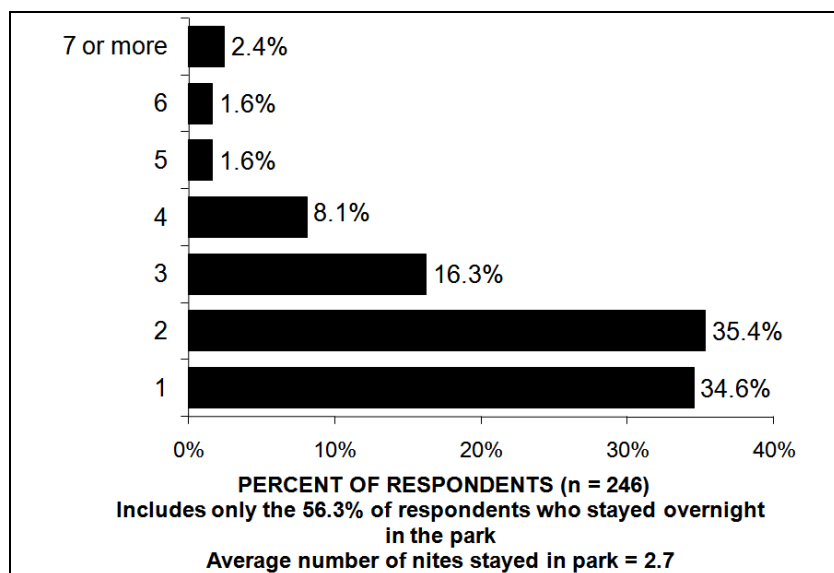


Figure D-12. Number of nights stayed overnight in the park

For the 43.5% of visitors who reported not staying overnight within park boundaries, Figure D-13 shows the number of days these people visited the park. People who did not visit on more than one day are included in Figure D-13 as visiting one day.

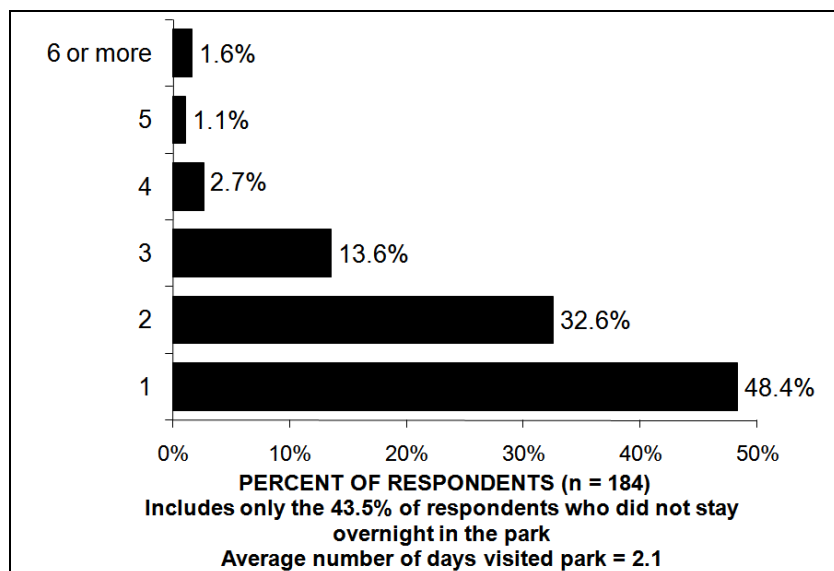


Figure D-13. Number of days visited by those who did not stay overnight

Figure D-14 shows the distribution of the number of hours people spent in the park during their single day visit (i.e., did not stay overnight in the park and only visited one day).

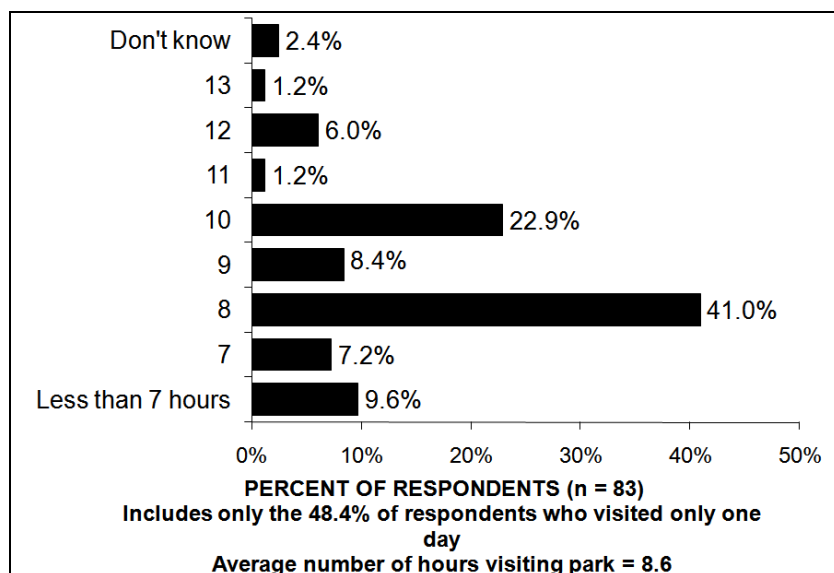


Figure D-14. Number of hours spent in park by those visiting only one day

For people who did not stay overnight within park boundaries and visited on multiple days, Figure D-15 shows the distribution of total number of hours these people spent in the park during their trip.

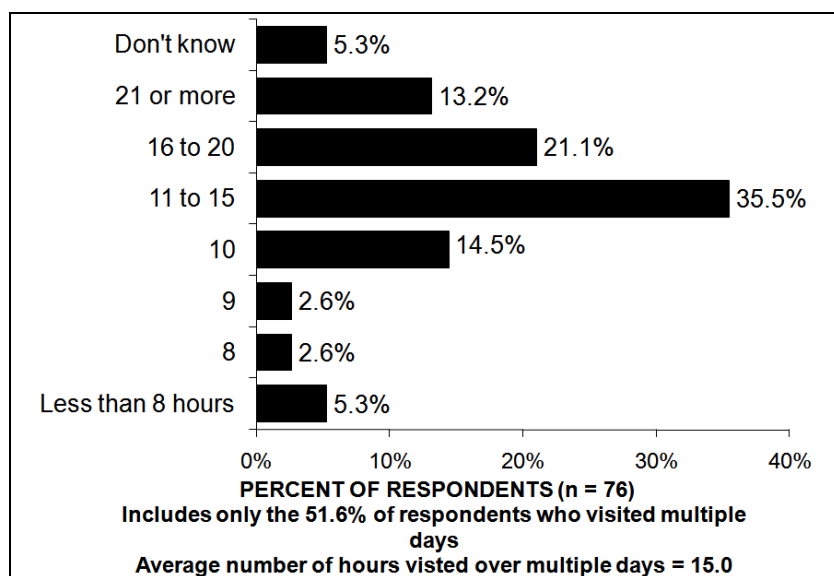


Figure D-15. Number of hours spent in park by those who visited multiple days

Activities engaged in on trip to Glacier Bay National Park

Mail Survey

3. On the trip to Glacier Bay National Park and Preserve during which you were contacted for this survey, which of the following activities did you engage in? *(Circle as many numbers as apply.)*

- 1 Viewing tidewater glaciers
- 2 Viewing wildlife
- 3 Viewing general scenery
- 4 Kayaking or canoeing
- 5 Hiking
- 6 Fishing
- 7 Taking photographs
- 8 Staying at Glacier Bay Lodge (in park)
- 9 Staying at Bartlett Cove campground
- 10 Camping in backcountry
- 11 Other *(please specify)* _____

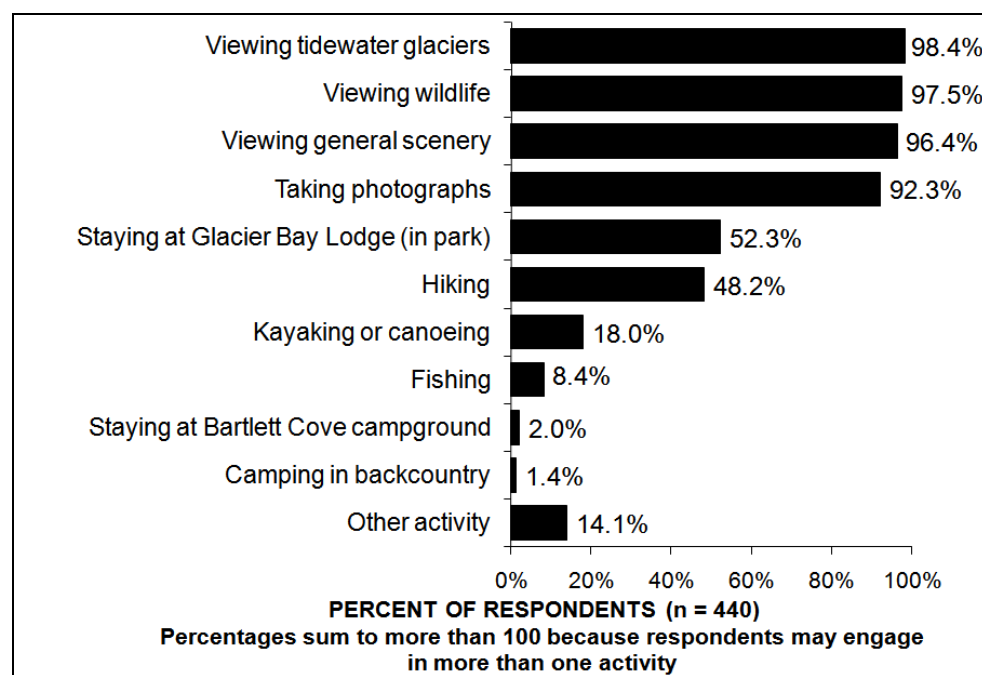


Figure D-16. Activities engaged in on trip to Glacier Bay National Park

Other activities listed by day-boat respondents were reviewed and similar activities tallied (see Table D-4). The most common other activity listed was taking the day-boat tour in Glacier Bay (32% of other activities, 4.1% of all respondents). It should be noted that all visitors contacted for this survey took the day-boat tour even though most did not list it as an activity.

Table D-4. Other activities engaged in by day-boat passengers

Other activity listed	% of other activity respondents	% of all respondents
Boat tour	32.7%	4.1%
Nature walk	18.2%	2.3%
Eating	10.9%	1.4%
Whale watching	10.9%	1.4%
Biking	9.1%	1.1%
Socializing	7.3%	0.9%
Flight seeing	5.5%	0.7%
Visitor center	5.5%	0.7%
Miscellaneous	16.4%	2.0%

Planned trip to minimize seeing or hearing other vessels

Mail Survey

17. Did you plan your trip to minimize seeing or hearing other vessels?

- ☐ No → GO TO QUESTION 18
☐ Yes

17a. Which types of vessels did you plan your trip to minimize seeing or hearing? *(Please check all that apply.)*

- ☐ Large cruise ships
☐ Small cruise ships, tour boats, or large private vessels
☐ Small motor boats or sailboats
☐ Kayaks

17b. Please describe briefly how you planned your trip to minimize seeing or hearing other vessels.

Results for Questions 17 and 17a are in the following charts. Question 17b asked day-boat respondents to describe how they planned to minimize encounters with other vessels. Of the 46 responses, 43.5% indicated that they chose to visit on a smaller vessel (e.g., the day-boat) and 30.4% indicated they planned to visit locations where other vessels (often large cruise ships were mentioned specifically) were not allowed and/or visible. A small number of comments mentioned relying on guides (6.5%) or adjusting the timing of the visit (4.3%). The remaining comments were miscellaneous in nature (8.7%) or irrelevant to the question (4.3%).

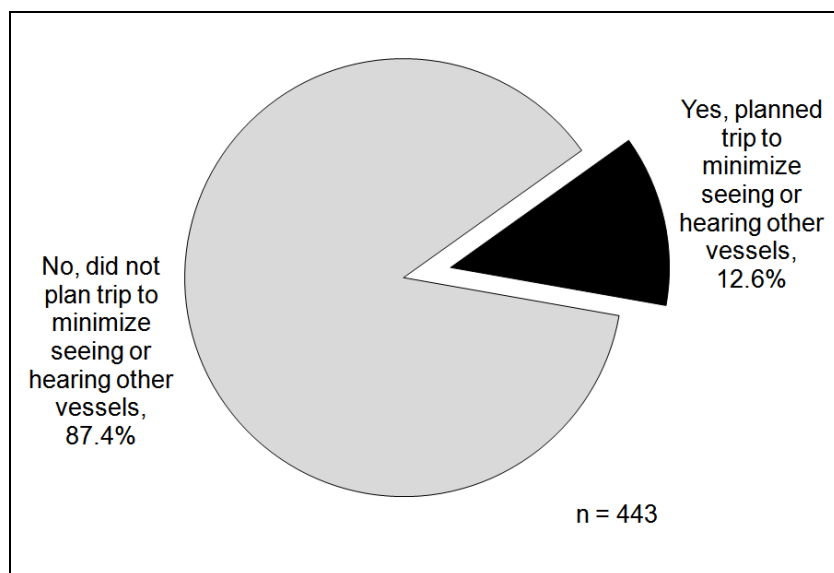


Figure D-17. Planned trip to minimize seeing or hearing other vessels

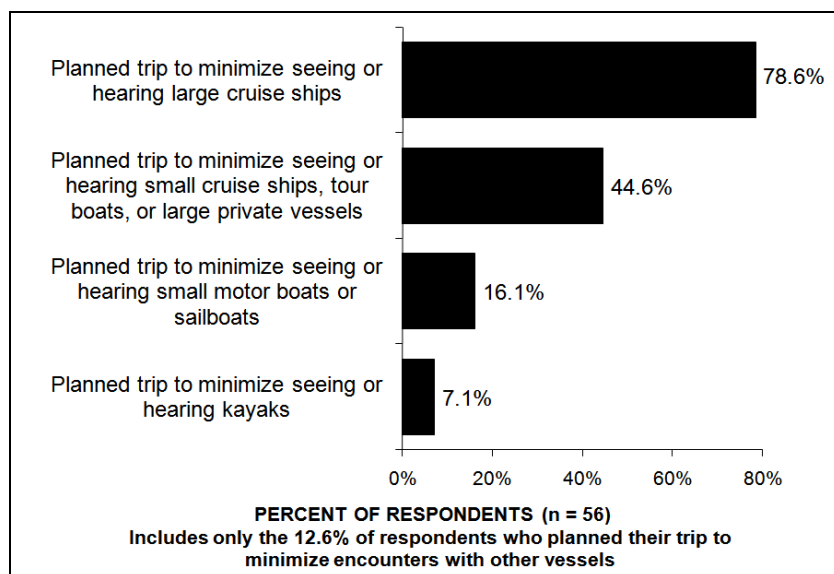


Figure D-18. Planned trip to minimize encounters with different types of vessels

Importance of different trip experiences

The qualitative interviews conducted during Summer 2007 revealed seven dimensions of visitor experience that were affected by cruise ships. These identified dimensions of visitor experience had significant overlap with dimensions of visitor experience measured by the list of Recreational Experience Preference (REP) items. To have two items for each dimension, 9 REP items were selected and 5 new items were constructed using the REP format (see general Introduction for more detail). Respondents were asked the importance of each of these experiences during their visit to Glacier Bay. Additionally respondents were asked how hearing or seeing a large cruise ship affected each possible trip experience (see Section VIII).

Mail Survey

6. Some possible experiences of people who visit recreation areas are listed below. How important to you was each of the following experiences during the visit to Glacier Bay proper in which you were contacted?
(Circle one response for each reason.)

	How important to you was each experience during this visit to Glacier Bay proper?				
	not important	slightly important	moderately important	very important	extremely important
A. EXPERIENCE THE SCENIC BEAUTY					
B. EXPERIENCE TRANQUILITY					
C. BE AMAZED BY NATURE					
D. EXPERIENCE A PRISTINE SETTING					
E. ENJOY THE SOUNDS OF NATURE					
F. EXPERIENCE SOLITUDE					
G. EXPERIENCE NATURE UNTOUCHED BY HUMANS					
H. HAVE PERSONAL EXPERIENCES WITH NATURE					
I. VIEW WILDLIFE					
J. EXPERIENCE NATURE'S WONDERS					
K. BE CLOSE TO NATURE					
L. FEEL ALONE WITH NATURE					
M. EXPERIENCE PEACE AND CALM					
N. EXPERIENCE THE NATURAL SOUNDS					

Day-Boat Visitor Survey

Cronbach's alpha was calculated for each of the seven dimensions to assess the internal consistency of the two scale items selected to measure the effect of cruise ships on each dimension. George and Mallery (2003) provide the following rules of thumb: “_ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and < .5 – Unacceptable” (p. 231). As can be seen in Table D-5, Cronbach's alpha was over 0.7 for 4 of the 7 scales indicating acceptable or better reliability of those scales. The two dimensions of “Experiencing the wonder of nature” and “Pristine environment” had Cronbach alpha's that fell into the questionable reliability range. However, because the Cronbach's alpha for these two scales were acceptable for all the other user groups and for the detraction items, the items were combined into the scale scores to allow comparability across user groups. The Cronbach's alpha for the scale for “Seeing nature” was 0.448 indicating unacceptable reliability. Because it was unlikely that the same latent variable underlies these two items for day-boat passengers, these two items were treated as two separate scales measuring different dimensions. Thus, a total of 8 scales representing 8 dimensions were used in subsequent analyses. It should be noted that this pattern of findings is analogous to that found for the 14 items measuring detraction of cruise ships on these visitor experience dimensions.

Table D-5. Internal consistency measure (Cronbach's alpha) for each importance dimension

Scale	Items	Cronbach's alpha
Seeing nature		0.448
	View wildlife	
	Experience the scenic beauty	
Experiencing the wonder of nature		0.647
	Be amazed by nature	
	Experience nature's wonders	
Intimate experience with nature		0.767
	Have personal experiences with nature	
	Be close to nature	
Hear the sounds of nature		0.882
	Enjoy the sounds of nature	
	Experience the natural sounds	
Tranquility		0.825
	Experience tranquility	
	Experience peace and calm	
Solitude		0.846
	Experience solitude	
	Feel alone with nature	
Pristine environment		0.667
	Experience a pristine setting	
	Experience nature untouched by humans	

The importance of 6 of these 8 trip experience dimensions did not differ for day-boat respondents visiting on one- or two-cruise ships days. The importance of Tranquility and Pristine environment did differ by number of cruise ships in the bay (Table D-6 for statistics). Both these experience dimensions were more important for day-boat passengers who visited when 2-cruise ships were in the bay than when 1-cruise ship was in the bay.

Table D-6 presents the percent of day-boat respondents with each scale score and the average importance rating for that trip experience dimension. Four trip experience dimensions had average importance ratings between “4 = very important” and “5 = extremely important”: 1) Experience the scenic beauty, 2) View wildlife, 3) Experiencing the wonder of nature, and 3) Pristine environment. Most day-boat passengers rated each of the 8 trip experiences as moderately or more important (3 or greater). These findings were consistent with the qualitative study identifying important dimensions of trip experience. The trip experience with the lowest average importance rating was “Solitude.” It was rated on average as “moderately important” (3 on the rating scale) and for over half of respondents solitude was at least moderately important (62% of respondents scored 3 or higher on the Solitude scale). Solitude is difficult to have in Glacier Bay without kayaking or being on a smaller boat (e.g., charter or private vessel), both of which can be costly and/or require physical skills.

Table D-6. Importance ratings for trip experience scales

Trip Experiences	N	Mean	Percent of people rating effect of seeing/hearing large cruise ship during this trip to Glacier Bay proper on experiences ¹								
			1	1.5	2	2.5	3	3.5	4	4.5	5
Experience the scenic beauty	392	4.68	0.0		0.2		1.8		29.0		68.9
View wildlife	391	4.52	0.0		0.9		6.4		32.1		60.6
Experiencing the wonder of nature	393	4.44	0.0	0.0	0.2	0.2	4.6	5.6	24.3	24.8	40.3
Pristine environment ²	391	4.08	0.0	0.9	1.2	4.4	7.7	15.8	25.8	17.0	27.2
1 cruise ship	148	3.97	0.0	0.7	1.4	6.8	9.5	18.9	23.6	17.6	21.6
2 cruise ships	282	4.15	0.0	1.1	1.1	3.2	6.7	14.2	27.0	16.7	30.1
Intimate experience with nature	385	3.93	0.7	1.4	3.0	6.0	7.6	18.5	23.4	18.3	21.1
Hear the sounds of nature	391	3.74	0.5	1.1	6.7	6.0	19.3	9.7	27.1	9.7	20.0
Tranquility ³	392	3.61	0.9	0.5	7.6	9.9	18.2	15.2	21.0	11.5	15.2
1 cruise ship	150	3.47	1.3	0.7	8.0	14.7	21.3	12.7	19.3	7.3	14.7
2 cruise ships	284	3.69	0.7	0.4	7.4	7.4	16.5	16.5	21.8	13.7	15.5
Solitude	388	3.03	6.5	6.8	14.7	10.0	21.7	11.0	15.9	4.2	9.3

¹The rating scale included for each item was: 1 = Not at all important, 2 = Slightly important, 3 = Moderately important, 4 = Very important, 5 = Extremely important. Scale values that fall between the 5 points on the rating scale are due to averaging the ratings for the two scale items for a dimension.

²The average importance of pristine environment differed significantly for respondents visiting on 1- versus 2-cruise ship days, $t(428) = -2.26$, $p = .024$.

³The average importance of tranquility differed significantly for respondents visiting on 1- versus 2-cruise ship days, $t(432) = -2.29$, $p = .023$.

Visited Margerie and Grand Pacific glaciers

Mail survey

11. During your trip to Glacier Bay proper, did you visit Margerie/Grand Pacific tidewater glaciers?

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes

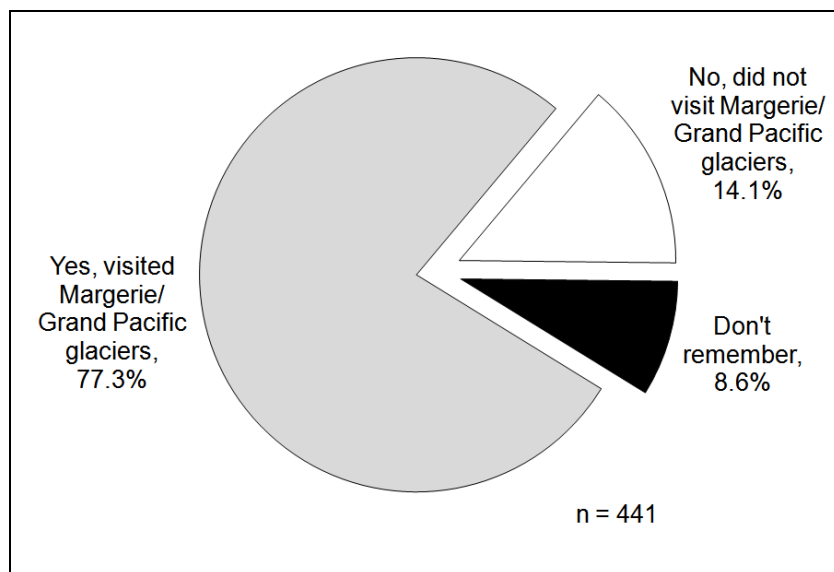


Figure D-19. Percent of respondents who visited Margerie and Grand Pacific glaciers

Other tidewater glaciers visited

Mail survey

12. During your trip to Glacier Bay proper, which of the other tidewater glaciers, if any, did you visit?

- ☐ Did not visit any other tidewater glaciers.
- ☐ Johns Hopkins
- ☐ Lamplugh
- ☐ McBride
- ☐ Reid
- ☐ Other (*please specify*) _____
- ☐ Don't know/Don't remember

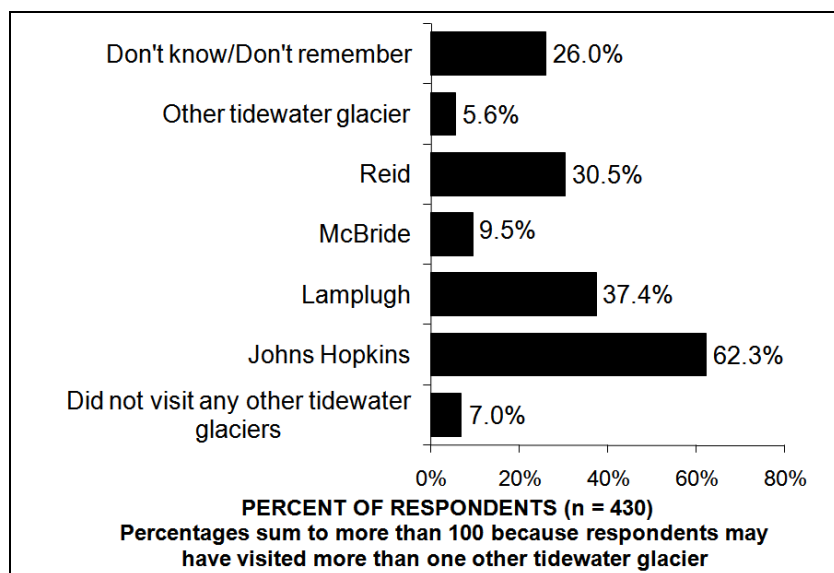


Figure D-20. Other tidewater glaciers visited

The likelihood of visiting other tidewater glacier varied by the number of cruise ships in the bay per day, $\chi^2(1, 432) = 4.02, p = .045$. Day-boat passengers who visited on one-cruise ship in the bay days were more likely to report visiting other tidewater glaciers than day-boat passengers who visited on two-cruise ships in the bay days (8.6% vs. 3.9%, respectively; see Figure D-21).

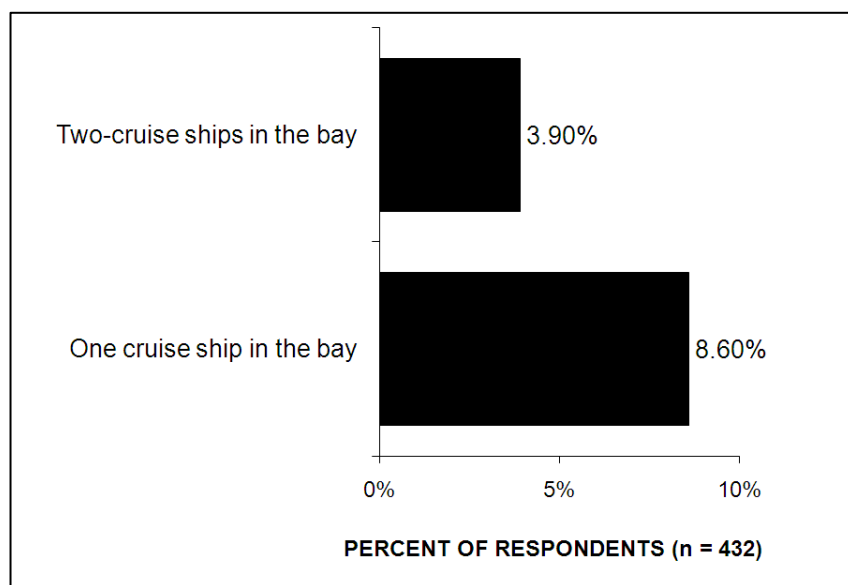


Figure D-21. Other tidewater glaciers visited by number of cruise ships in the bay per day

Weather

Mail Survey

4. We are interested in the kinds of weather you experienced during your trip in Glacier Bay proper. Please indicate each type of weather you experienced and then estimate the number of hours that weather was present. (*Check as many as apply.*)

- ☐ Sunny and/or partly cloudy → About _____ hours OR Don't remember _____
- ☐ Cloudy without fog → About _____ hours OR Don't remember _____
- ☐ Cloudy with fog → About _____ hours OR Don't remember _____
- ☐ Rain with or without fog → About _____ hours OR Don't remember _____

Respondents were asked to report about the kinds of weather they experience during their time in Glacier Bay proper. Figure D-22 shows the percent of respondents who experienced each type of weather at some point during their visit.

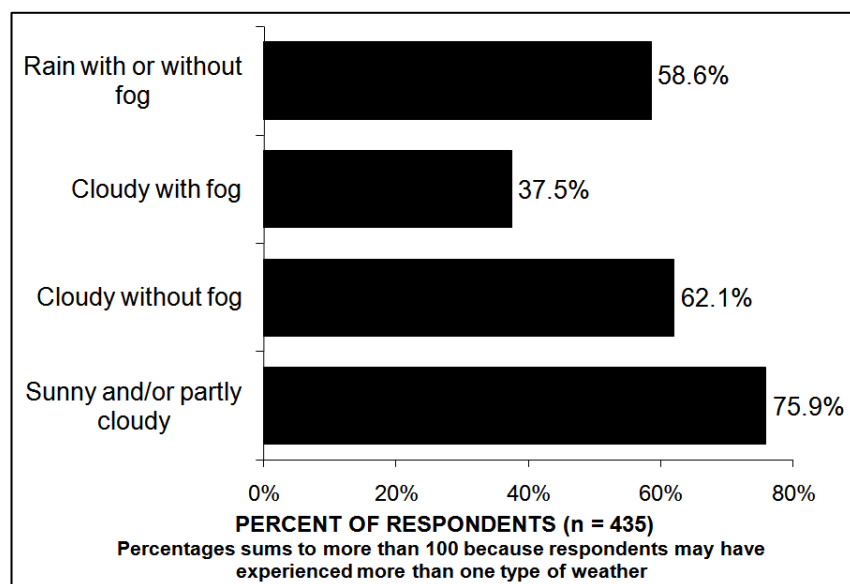


Figure D-22. Percent of respondents who experienced each kind of weather

Question 4 also asked respondents to report about how many hours they experienced each type of weather during their trip in Glacier Bay proper. It was thought that for most respondents their time in Glacier Bay proper would correspond primarily to their time spent on the day-boat or approximately 8 hours. However, review of the hour data indicated for many respondents significantly longer time frames. Review of the activities engaged in by visitors suggested that in addition to the day-boat tour some visitors did engage in activities that would put them on the water in Glacier Bay proper whereas others would be engaging in land-based activities around Bartlett Cove or in water-based activities outside of Glacier Bay proper. Thus, there is uncertainty as to the extent to which the weather data reported correspond to time actually spent in Glacier Bay proper. Because of this uncertainty and the increased difficulty of accurately recalling times over longer time frames (often multiple days), the hour data are not reported. Instead, a series of mutually

exclusive trip weather experience categories were created that generally reflect an ordinal scale of weather experienced during visitors' trips (e.g., mostly sunny to all rain). People were assigned to these categories based on their responses to having experienced each kind of weather listed in Question 4 (see Table D-7).

Table D-7. Trip weather experience categories

Trip weather experience category	Kinds of weather checked in Question 4
Only sunny and/or partly cloudy	Only "Sunny and/or partly cloudy" checked
No fog or rain	"Cloudy without fog" checked, "Sunny and/or partly cloudy" may or may not be checked
Some fog, but no rain	"Cloudy with fog" must be checked, "Sunny and/or partly cloudy" and/or "Cloudy without fog" must also be checked
Some rain	"Rain with or without fog" must be checked and at least one other kind of weather
All fog with or without rain	"Cloudy with fog" must be checked and "Rain with or without fog" may or may not be checked
All rain	Only "Rain with or without fog" checked

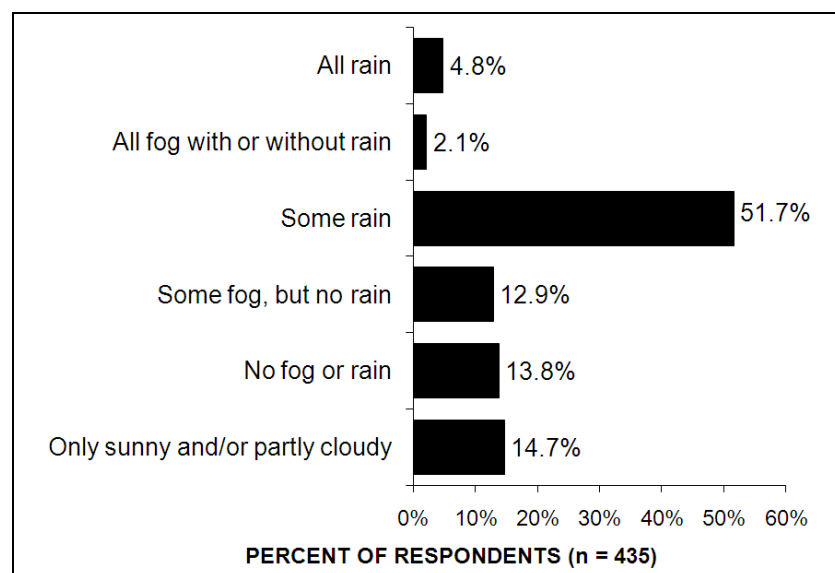


Figure D-23. Trip weather experience categories based on responses to each kind of weather experienced by a visitor

IV. ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS

Day-boat passengers were asked about encounters with cruise ships and other motorized craft. Some questions asked about seeing or hearing different kinds of craft for their trip as a whole and other questions focused on seeing or hearing different kinds of craft while they were at Margerie and Grand Pacific glaciers. This section reports the findings about encounters during their time at Margerie and Grand Pacific glaciers.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 6).

Highlights

- Of the 77.3% of day-boat respondents who visited Margerie and Grand Pacific glaciers, 75.1% reported seeing other craft when at the glaciers. Over half (56.6%) of day-boat passengers who saw craft at the glaciers reported seeing one cruise ship and 10.9% reported seeing two cruise ships at the glaciers. Almost one-fourth (23.0%) of passengers on the day-boat who saw craft at the glaciers reported seeing no cruise ships there. Overall, the average number of cruise ships seen by day-boat passengers at the glaciers was slightly less than one ($M = 0.87$).
- Motorized water craft other than cruise ships were the type of craft second most frequently seen at Margerie and Grand Pacific glaciers with 52.7% of day-boat respondents seeing these craft. The number of motorized water craft seen ranged from none to fifteen with the average number of motorized water craft other than cruise ships seen less than one ($M = 0.86$).
- Kayaks were seen by 30.9% of day-boat passengers who saw craft at Margerie and Grand Pacific glaciers. On average, one kayak was seen.
- Less than 10% of day-boat respondents who saw craft at the glaciers reported seeing propeller-driven airplanes or helicopters.

Mail Survey

11. During your trip to Glacier Bay proper, did you visit Margerie/Grand Pacific tidewater glaciers?

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes



11a. At any time while you were at the Margerie/Grand Pacific tidewater glaciers, did you see one or more other water or air craft present (besides your own)?

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes



11b. Please indicate how many of each type of craft was present (excluding your own vessel) while you were at the Margerie/Grand Pacific tidewater glaciers.

- _____ Large cruise ships
- _____ Motorized water craft other than large cruise ships (other than the one you were on)
- _____ Kayaks
- _____ Propeller-driven airplanes
- _____ Helicopters

Visited Margerie and Grand Pacific glaciers

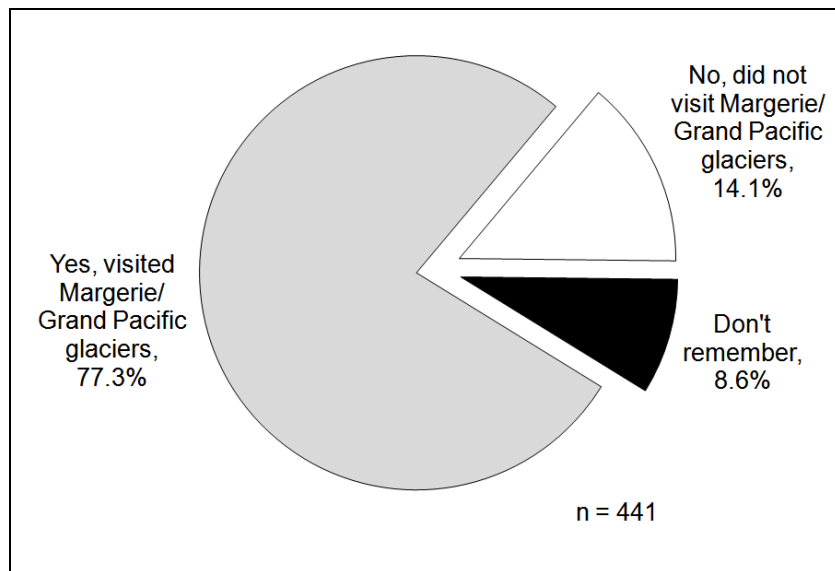


Figure D-24. Percent of respondents who visited Margerie and Grand Pacific glaciers

Saw other craft at Margerie and Grand Pacific glaciers

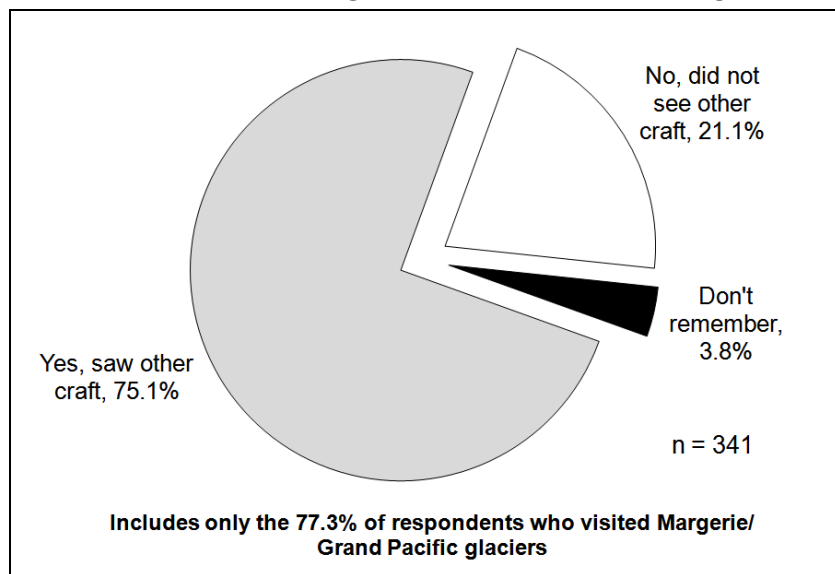


Figure D-25. Percent of respondents who saw other craft at Margerie and Grand Pacific glaciers

Number of different types of craft seen at Margerie and Grand Pacific glaciers

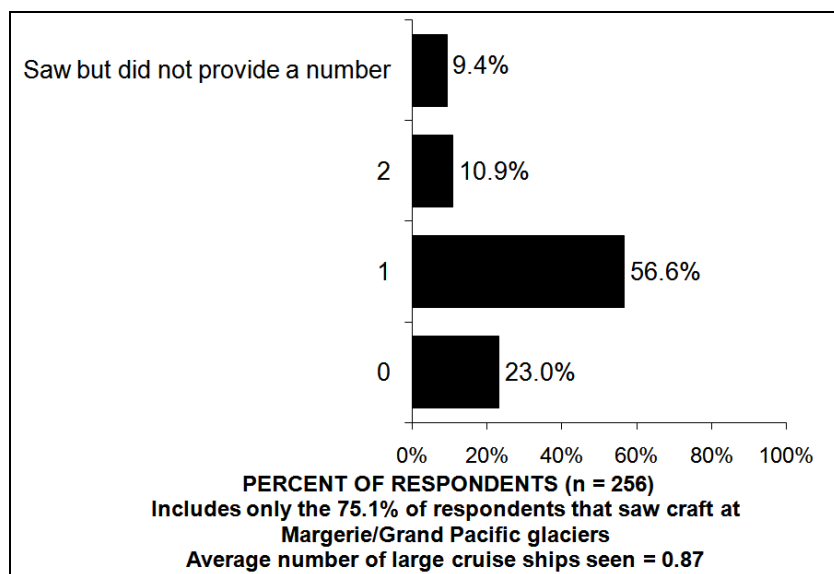


Figure D-26. Number of large cruise ships seen at Margerie and Grand Pacific glaciers

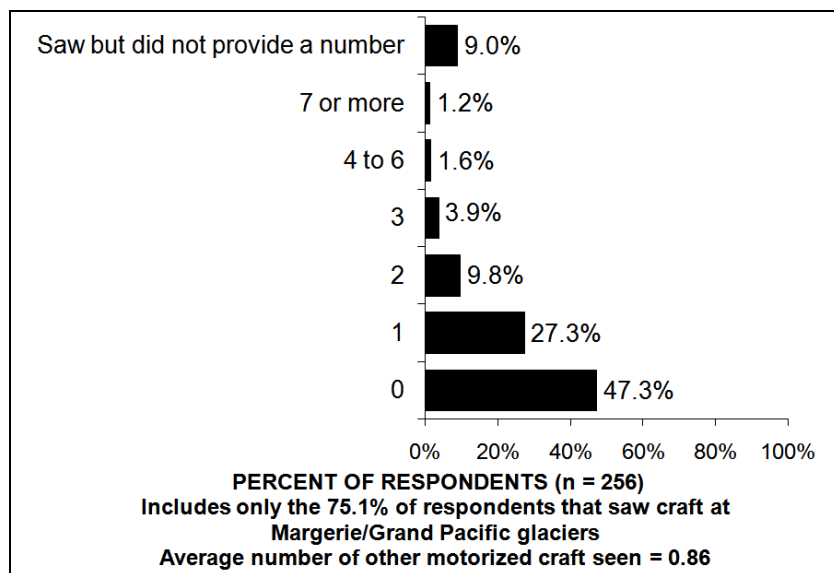


Figure D-27. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers

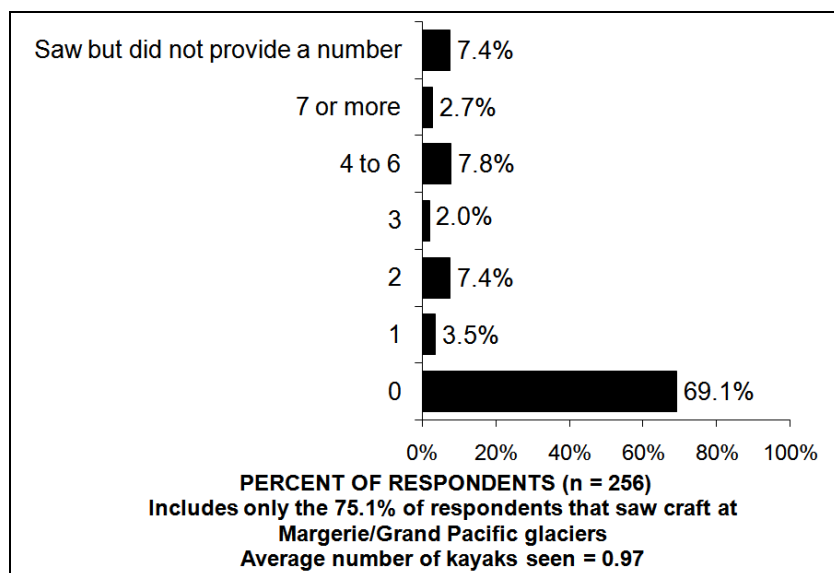


Figure D-28. Number of kayaks seen at Margerie and Grand Pacific glaciers

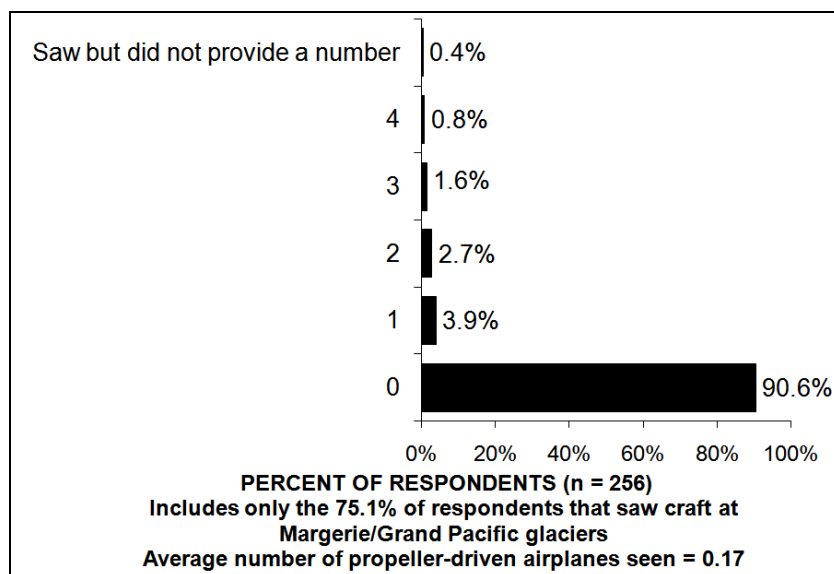


Figure D-29. Number of propeller-driven airplanes seen at Margerie and Grand Pacific glaciers

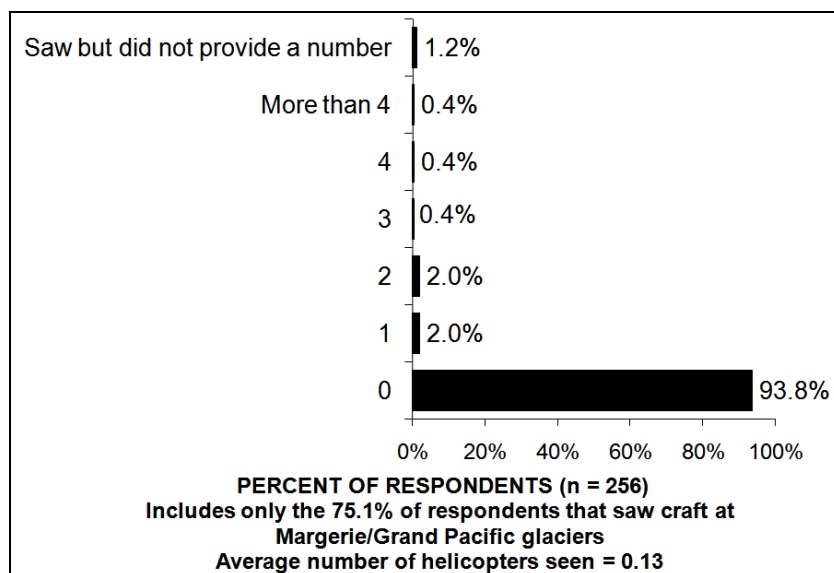


Figure D-30. Number of helicopters seen at Margerie and Grand Pacific glaciers

V. ENCOUNTERS: ENTIRE TRIP

Day-boat passengers were asked about encounters with cruise ships and other motorized craft. Some questions asked about seeing or hearing different kinds of craft for their trip as a whole and other questions focused on seeing or hearing different kinds of craft while they were at Margerie and Grand Pacific glaciers. This section reports the findings about encounters for the trip as a whole.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 6).

Highlights

- The majority (88.8%) of day-boat respondents reported seeing or hearing large cruise ships during their trip. Of those who saw or heard large cruise ships, 78.8% saw them one day. Given the relatively small likelihood of seeing large cruise ships from Bartlett Cove, these day-boat respondents most likely saw the large cruise ships when on the day-boat.
- The total length of time day-boat passengers saw or heard large cruise ships depended on whether there were one- or two-cruise ships in the bay. When two-cruise ships were in the bay, respondents on average saw or heard large cruise ships 1.7 hours. When one-cruise ship was in the bay, respondents on average saw or heard large cruise ships for 1.1 hours. Because current seasonal use conditions reflect a 1:2 ratio of one- to two-cruise ships in the bay days, the difference in total length of time day-boat passengers saw or heard cruise ships between current conditions and two-cruise ships in the bay every day (the maximum seasonal use levels permitted in the ROD) was twelve minutes ($M = 1.5$ hrs and $M = 1.7$ hrs, respectively).
- The length of time day-boat passengers saw or heard large cruise ships on the day they saw or heard the most cruise ships also depended on the number of cruise ships in the bay. When two-cruise ships were in the bay, respondents reported hearing or seeing large cruise ships for 1.2 hours on the day they saw or heard the most cruise ships. When one-cruise ship was in the bay, respondents reported hearing or seeing large cruise ships for 1.0 hours. Because current seasonal use conditions reflect a 1:2 ratio of one- to two-cruise ships in the bay days, the differences between current conditions and two-cruise ships in the bay every day (the maximum permitted under the FEIS) was six minutes ($M = 1.1$ hrs and $M = 1.2$ hrs, respectively).
- Of the different types of craft, large cruise ships were seen by the most day-boat respondents (88.8%) followed by motorized water craft other than large cruise ships (79.0%). Motorized water craft other than large cruise ships were seen on average for 4.3 hours compared to less than 2 hours for large cruise ships.

Question 7 of the mail survey asked about seeing or hearing large cruise ships while Question 9 asked about hearing and seeing other types of craft (see questions below).

Mail Survey

7. During your time in Glacier Bay proper, did you see or hear large cruise ships?

- ☐ No → GO TO QUESTION 9
- ☐ Don't know → GO TO QUESTION 9
- ☐ Yes



7a. During your time in Glacier Bay proper, how long did you see or hear large cruise ships?

A. _____ NUMBER OF HOURS SAW OR HEARD LARGE CRUISE SHIPS IN GLACIER BAY (*Please list partial hours as ¼, ½, etc.*)

B. DON'T KNOW/DON'T REMEMBER

7b. On how many days did you see or hear large cruise ships?

A. _____ NUMBER OF DAYS SAW OR HEARD LARGE CRUISE SHIPS IN GLACIER BAY

B. DON'T KNOW/DON'T REMEMBER

7c. On the day you saw or heard the **most** large cruise ships in Glacier Bay proper, how long did you see or hear large cruise ships?

_____ NUMBER OF HOURS SAW OR HEARD LARGE CRUISE SHIPS ON DAY HEARD/SAW MOST LARGE CRUISE SHIPS IN GLACIER BAY (*Please list partial hours as ¼, ½, etc.*)

☐ I ONLY SAW CRUISE SHIP(S) ONE DAY (SO SAME ANSWER AS QUESTION 7A.).

☐ DON'T KNOW/DON'T REMEMBER

Day-Boat Visitor Survey

Mail Survey

9. During your time in Glacier Bay proper on this trip, you may have seen or heard different kinds of motorized craft. For each type of craft, please indicate if you heard or saw it during your time in Glacier Bay proper. Then, report the total time you heard or saw that type of craft and how many different craft of that type you saw or heard. *(Please do not include your own vehicle.)*

During your time in Glacier Bay proper...			
Type of craft	Did you hear or see? <i>(Circle one for each type)</i>	Total hours heard or seen <i>(Report partial hours as ¼, ½, etc.)</i>	Number of craft heard or seen
A. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	YES→ NO DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW
B. PROPELLER-DRIVEN AIRPLANES	YES→ NO DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW
C. HELICOPTERS	YES→ NO DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW

This section will report the findings in the following order: 1) large cruise ship encounters, 2) comparison of large cruise ship encounters with other motorized craft encounters, and 3) detail of other motorized craft encounters.

Saw or heard large cruise ships

The majority (88.8%) of respondents reported seeing or hearing large cruise ships during their trip.

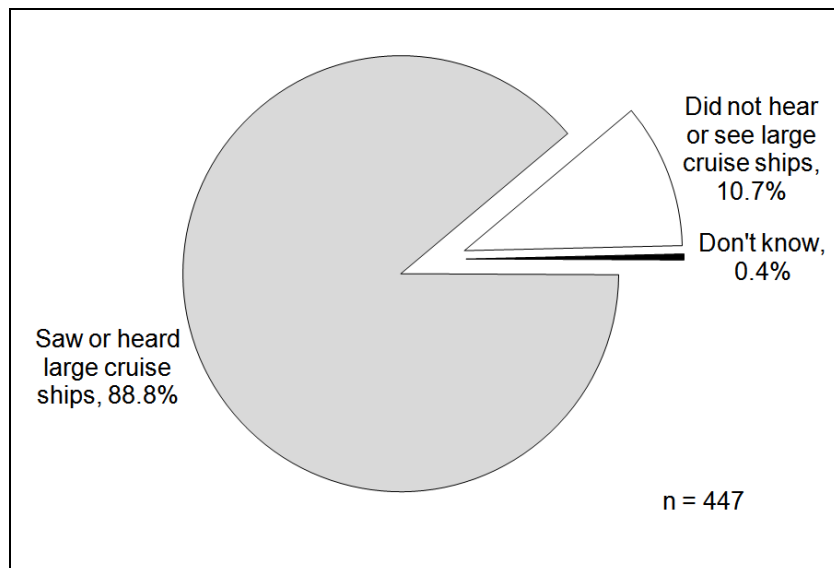


Figure D-31. Percent of respondents who saw or heard large cruise ships

Number of days saw or heard large cruise ships

Of those respondents who saw large cruise ships, the majority (78.8%) saw them on one day. Large cruise ships are less often seen from Bartlett Cove, given the distance and timing of cruise ship passage. Thus, cruise ship encounters are more likely when on the day-boat.

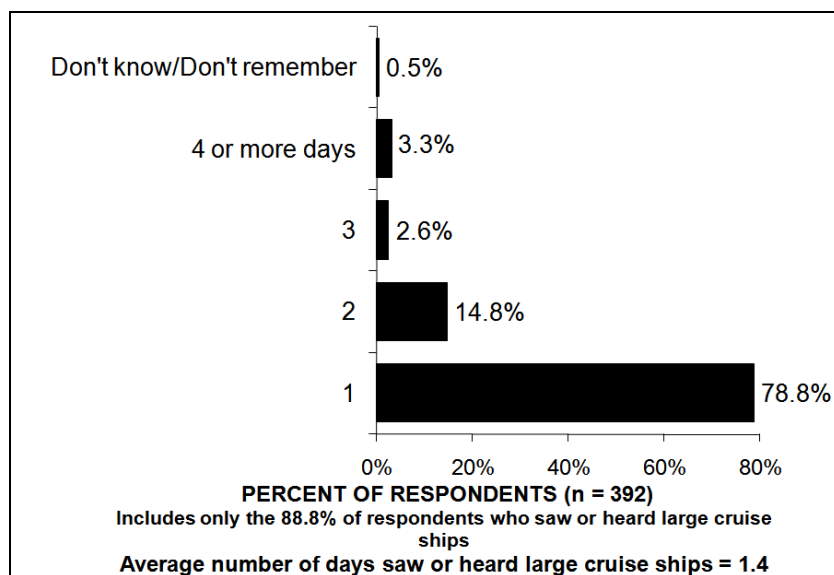


Figure D-32. Number of days respondents saw cruise ships in Glacier Bay proper

Total length of time saw or heard large cruise ships

Respondents were asked to report the number of hours they saw or heard large cruise ships during their stay in Glacier Bay proper. Although this measure of exposure is more subjective than number of cruise ships in the bay per day, it provided more detailed information about exposure to cruise ships. Although the number of hours cruise ships were heard or seen may vary by the number of cruise ships in the bay, it may be that

Day-Boat Visitor Survey

the total amount of time that cruise ships were heard or seen affects day-boat passengers' experiences regardless of how many ships were in the bay on the day they visited. These analyses are described and reported in Section X (see page 80).

The total number of hours that large cruise ships were heard or seen differed significantly by the number of cruise ships in the bay, $t(377) = -2.10$, $p = .036$. Respondents who went on the day-boat on two-cruise ship days saw or heard cruise ships longer than respondents who went on the day-boat on one-cruise ship days ($M = 1.7$ hours and $M = 1.1$ hours, respectively). As can be seen in Figure D-33, compared to respondents who took the day-boat on two-cruise ships in the bay days, respondents who visited on one-cruise ship in the bay days were more likely to report hearing or seeing a large cruise ship for a half hour and less likely to report hearing or seeing them for one hour or for more than two hours.

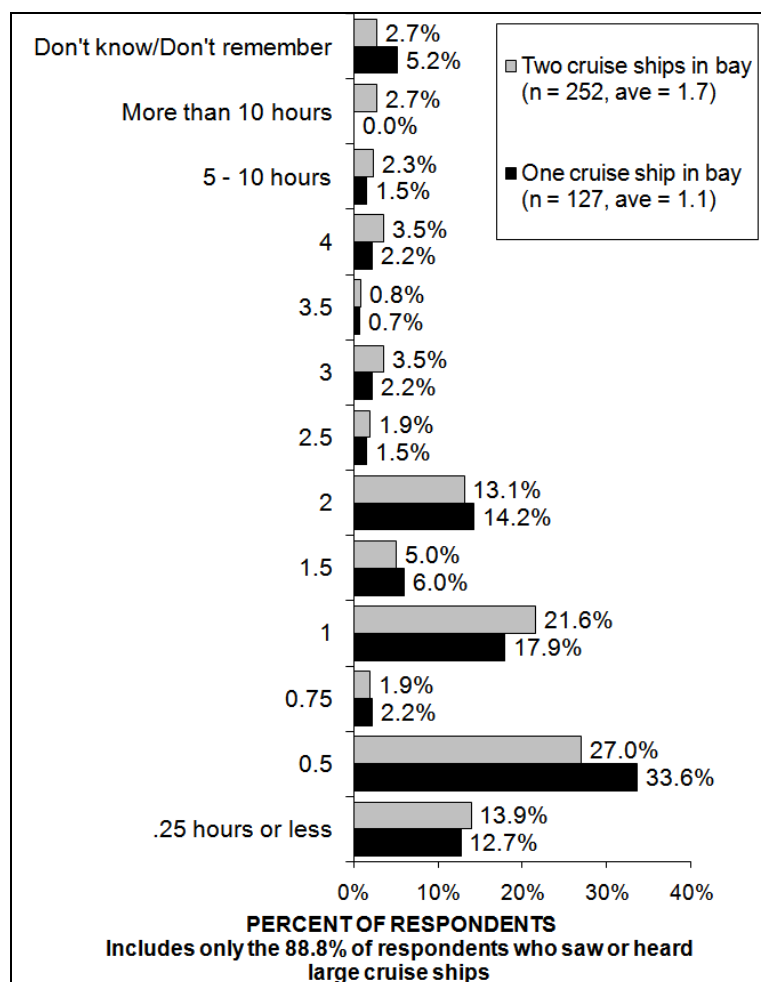


Figure D-33. Total number of hours saw or heard large cruise ships in Glacier Bay proper

Current seasonal use conditions reflect a 1: 2 ratio of one- to two-cruise ships in the bay days. Figure D-34 compares the total number of hours day-boat passengers saw or heard cruise ships under current seasonal use conditions with the results of 2 cruise ships in the bay everyday (our best estimate of maximum future conditions permitted). Review of Figure D-34 suggests that the change in total exposure to cruise ships for day-boat passengers between current conditions and 2-cruise ships in the bay every day would be twelve minutes.

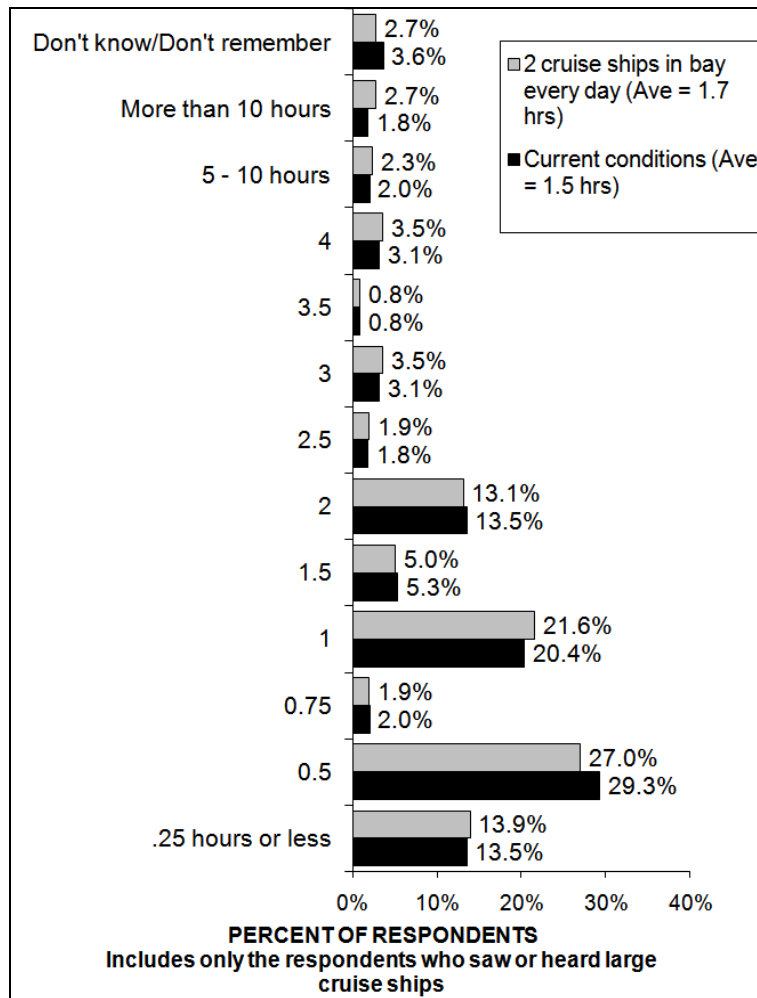


Figure D-34. Total number of hours saw or heard large cruise ships in Glacier Bay proper: Current vs. maximum allowed

Length of time saw or heard large cruise ships on day saw or heard most cruise ships

Respondents were also asked to report the number of hours they heard or saw cruise ships on the day that they saw or heard the most cruise ships. Because 78.8% of respondents saw cruise ships on only one day, this distribution is similar to total number of hours large cruise ships were heard or seen in Glacier Bay proper. Respondents who took the day-boat on two-cruise ship days saw or heard cruise ships significantly longer than respondents who took the day-boat on one-cruise ship days ($M = 1.2$ hours and $M = 1.0$ hours, respectively), $t(324.29) = -1.99$, $p = .047$ (equal variances were not assumed as Levene's test was significant $p = .004$). As can be seen in Figure D-35, respondents who took the day-boat on two-cruise ship days were more likely to report hearing or seeing cruise ships two or more hours than respondents who took the day-boat on one-cruise ship days.

Day-Boat Visitor Survey

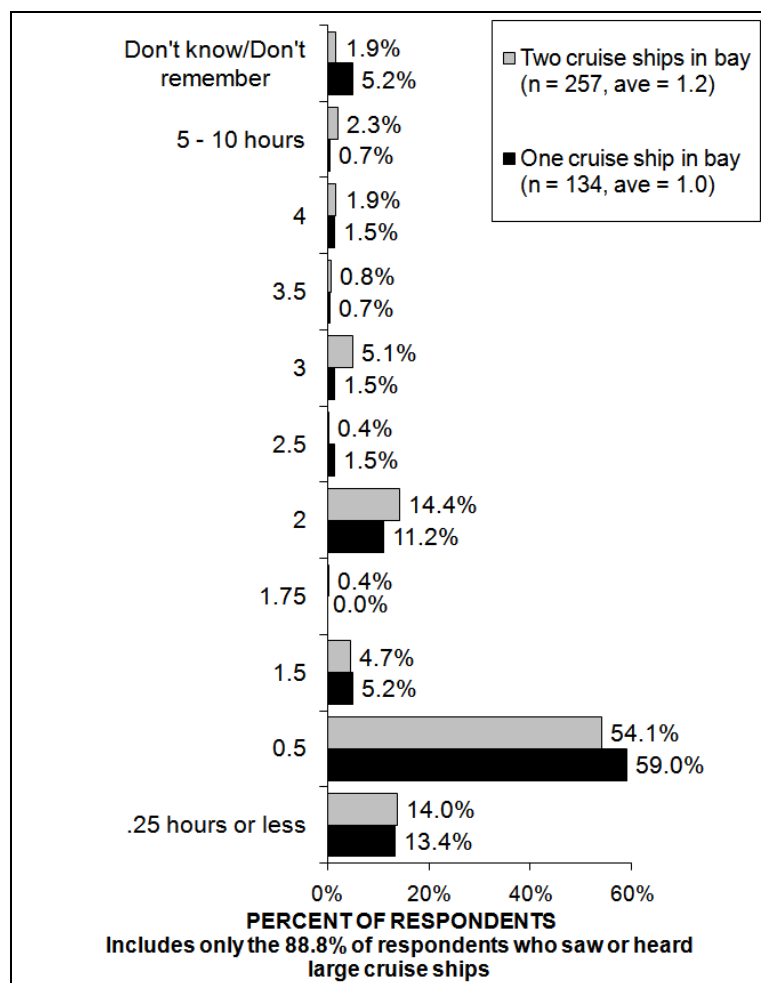


Figure D-35. Number of hours saw or heard large cruise ships on day saw or heard most cruise ships

Current seasonal use conditions reflect a 1: 2 ratio of one- to two-cruise ships in the bay days. Figure D-36 compares the number of hours day-boat passengers saw or heard cruise ships on the day they saw or heard the most cruise ships under current seasonal use conditions with the results of 2 cruise ships in the bay everyday (our best estimate of maximum future conditions permitted). Review of Figure D-36 suggests that the change in total exposure to cruise ships for day-boat passengers between current conditions and 2-cruise ships in the bay every day would be six minutes.

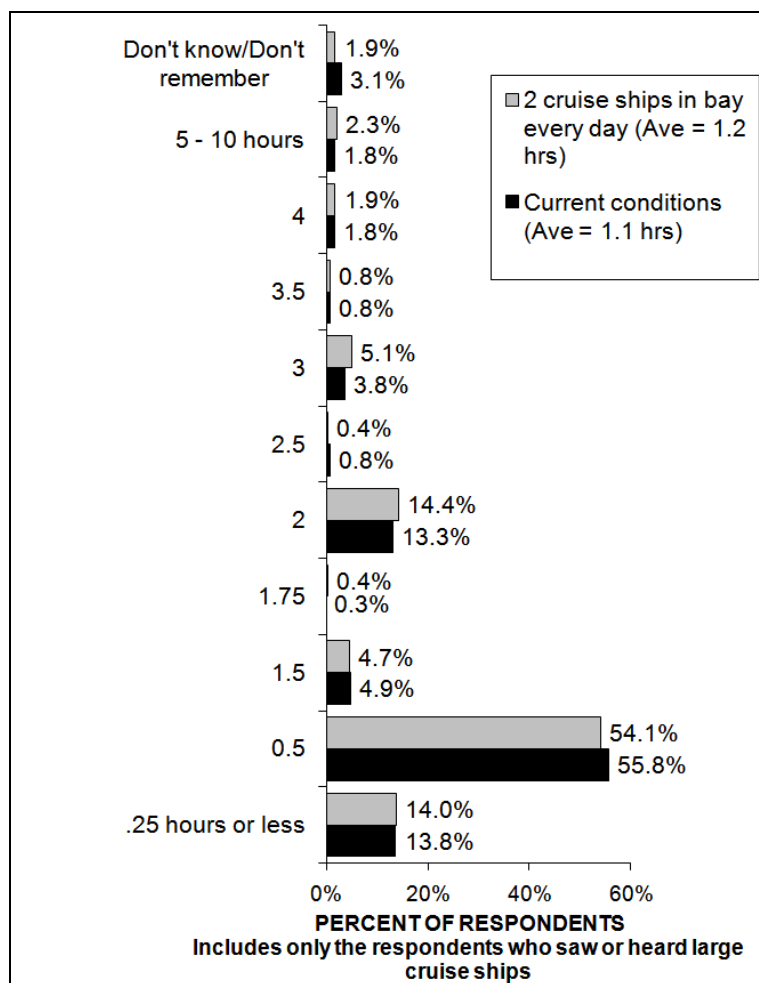


Figure D-36. Number of hours saw or heard large cruise ships on day saw or heard most cruise ships

Comparison of large cruise ship and other motorized craft encounters

Respondents were asked about encounters with other motorized craft to provide a context for the findings regarding large cruise ships. This section compares the findings from large cruise ships with those of other motorized craft. The detailed findings including charts for other motorized craft are presented in the following section.

Table D-8 summarizes the percent of respondents who saw or heard the different types of craft. The percent of respondents who saw or heard the different kinds of craft did not differ by the number of cruise ships in the bay. As can be seen in Table D-8, large cruise ships were the most frequently heard or seen type of craft followed closely by motorized water craft excluding large cruise ships. Aircraft were heard by substantially fewer respondents.

Table D-8. Percent of respondents who encountered different kinds of craft.

Type of craft	Heard or saw craft (percent of respondents)		
	Yes	No	Don't know
Large cruise ship (n = 447)	88.8%	10.7%	0.4%
Motorized water craft other than large cruise ships (n = 438)	79.0%	18.7%	2.3%
Propeller-driven airplanes (n = 436)	28.9%	63.5%	7.6%
Helicopters (n = 437)	14.0%	79.6%	6.4%

Although cruise ships were heard or seen by more respondents than other motorized watercraft, the number of hours that cruise ships were heard or seen was considerably less than the number of hours that motorized water craft were heard or seen ($M = 1.1$ & 1.7 vs. $M = 4.3$, respectively). Propeller-driven airplanes and helicopters were seen or heard, on average, for less than an hour (see Table D-9).

Table D-9. Average number of hours different kinds of craft were heard or seen

Type of craft	Number of cruise ships in bay		
	Combined	1	2
Large cruise ship (n = 127 and n = 252)	1.5	1.1	1.7
Motorized water craft other than large cruise ships (n = 257)	4.3		
Propeller-driven airplanes (n = 81)	0.74		
Helicopters (n = 47)	0.89		

NOTE: n's exclude those respondents who saw craft but did not remember or know how many hours they saw them.

Motorized water craft other than large cruise ships: Length of time and number heard or seen

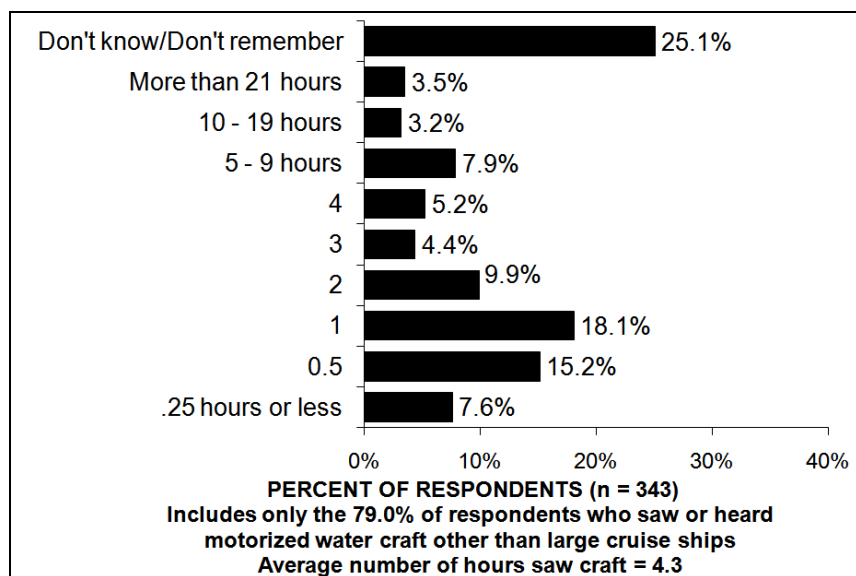


Figure D-37. Number of hours motorized craft other than large cruise ships were heard or seen

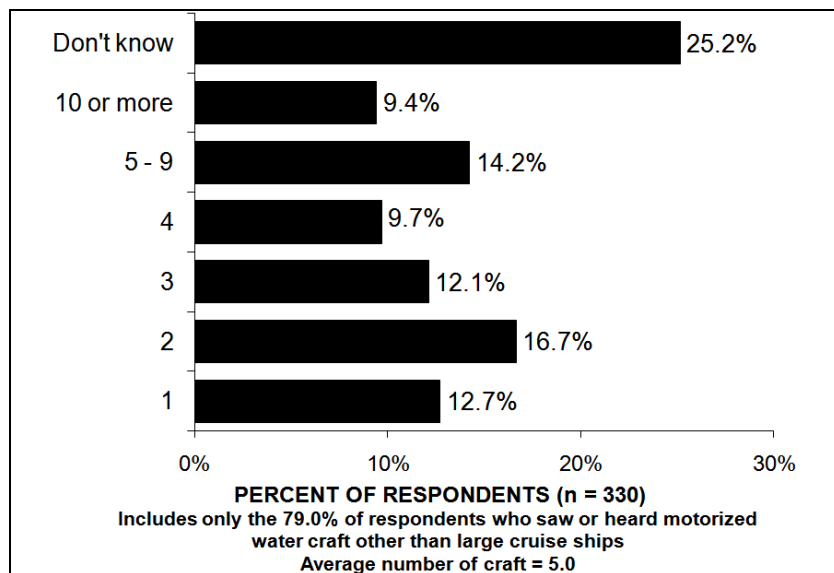


Figure D-38. Number of motorized craft other than large cruise ships heard or seen

Propeller-driven airplanes: Length of time and number heard or seen

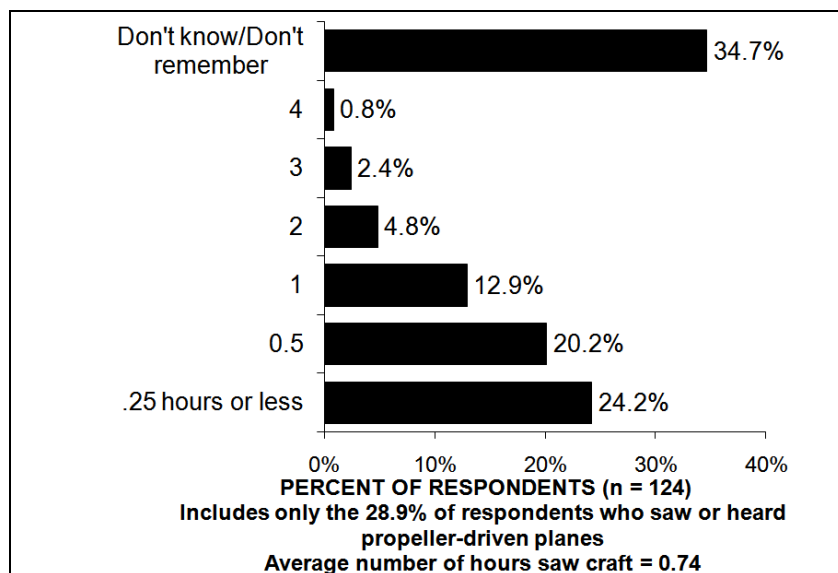


Figure D-39. Length of time propeller-driven airplanes were heard or seen

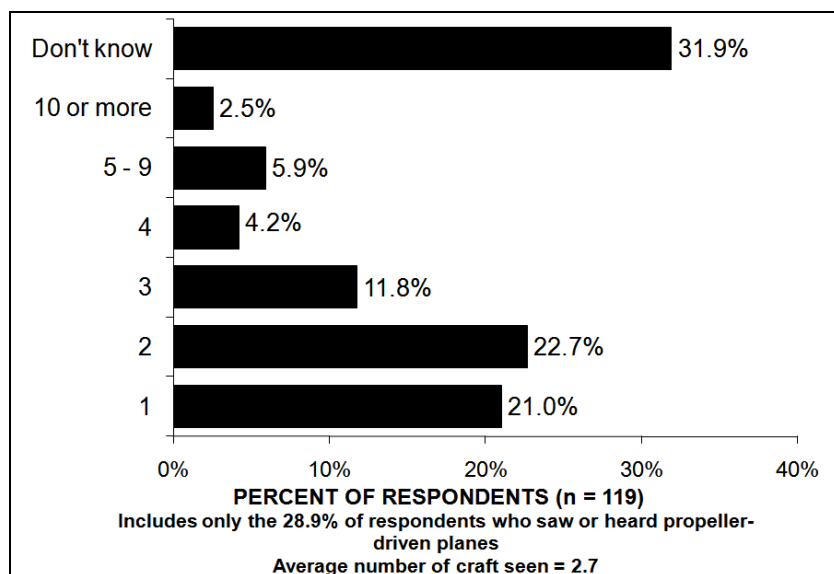


Figure D-40. Number of propeller-driven airplanes heard or seen

Helicopters: Length of time and number heard or seen

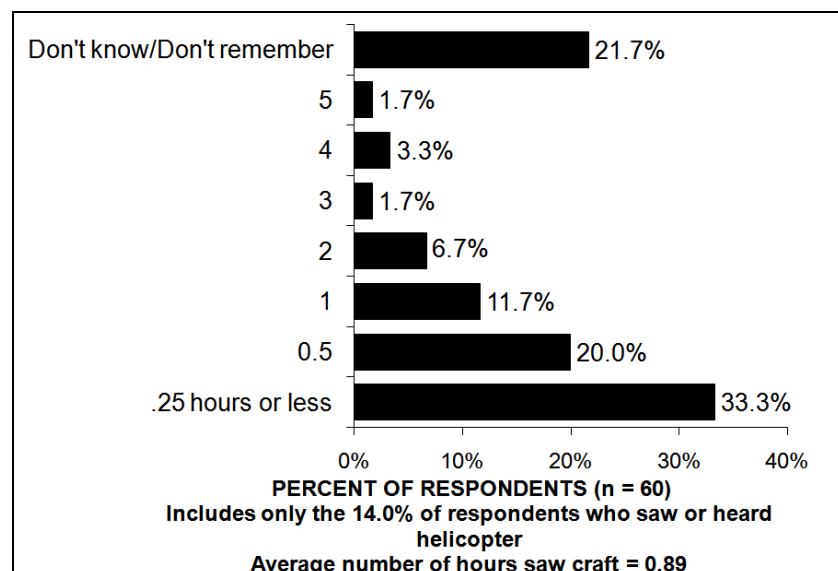


Figure D-41. Number of hours helicopters were heard or seen

The number of helicopters heard or seen differed by the number of cruise ships in the bay per day, $t(42) = -2.41$, $p = .021$. As can be seen in Figure D-42, day-boat passengers who visited on one cruise ship in the bay days reported hearing or seeing fewer helicopters ($M = 1.1$) than day-boat passengers who visited on two-cruise ships in the bay days ($M = 1.8$).

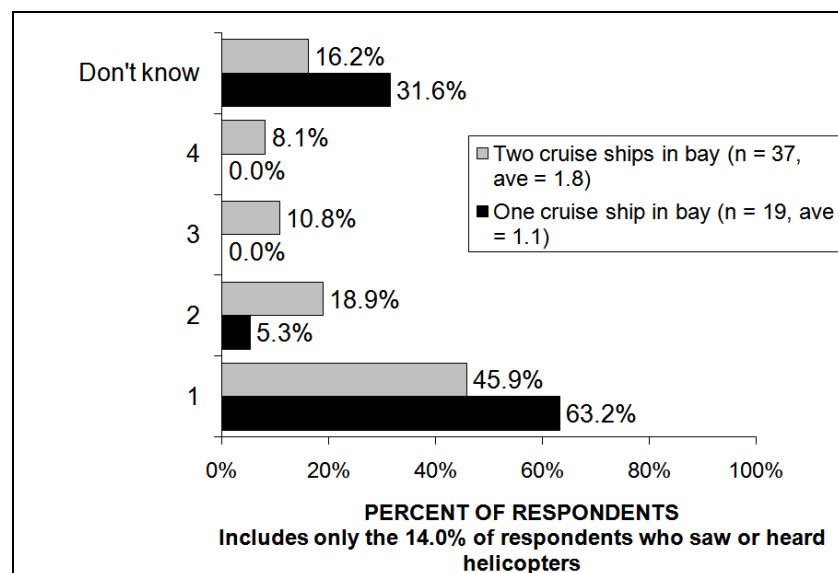


Figure D-42. Number of helicopters heard or seen by number of cruise ships in the bay per day

Current conditions reflect a 1: 2 ratio of one- to two-cruise ships in the bay days. Figure D-43 compares the number of helicopters day-boat passengers saw or heard under current conditions with the results of 2 cruise ships in the bay everyday (our best estimate of maximum future conditions permitted). Review of Figure D-43 suggests a slight increase in the percentage of day-boat passengers who would experience 2 to 4 helicopters if there were two-cruise ships in the bay every day.

Day-Boat Visitor Survey

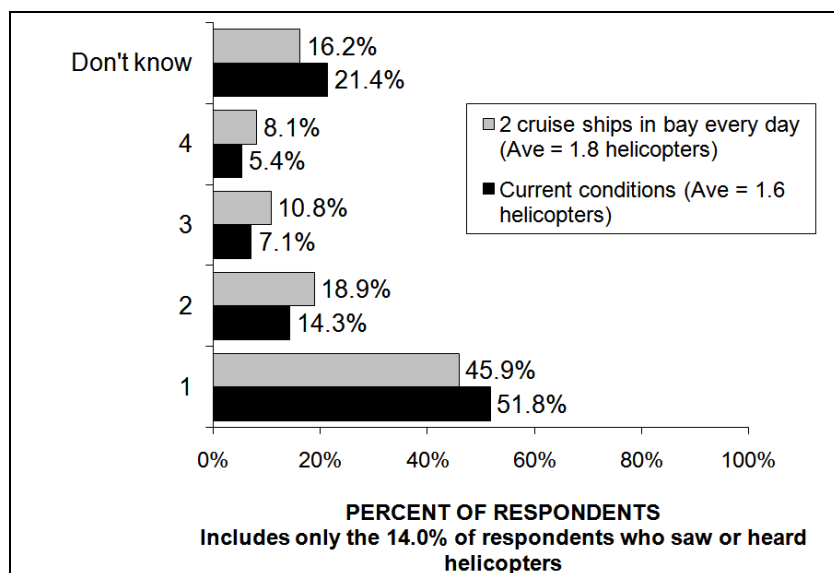


Figure D-43. Number of helicopters heard or seen: Current conditions versus two-cruise ships in bay per day

VI. EXPERIENCES WITH HAZE, PUBLIC ADDRESS SYSTEMS, AND ENGINE SOUNDS

Some aspects of encounters with different craft that may affect the quality of day-boat passengers' trip experiences in Glacier Bay National Park include haze and sounds from public address systems and engines. Day-boat respondents were asked about whether they experienced these different aspects and the effect these aspects had on their enjoyment of Glacier Bay proper. This section reports the findings related to these questions.

Because experiences with aspects of cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between one and two cruise ships in the bay days were found (see Introduction and Method section for estimation procedures, p. 6).

Highlights

- Most day-boat passengers did not see haze from any type of vessel (85% or more). Haze from large cruise ships was seen by 6.9% of day-boat respondents and 1.8% reported seeing haze from unidentified vessels. No one reported seeing haze from small cruise ships or tour boats.
- Haze from large cruise ships had more negative impact on day-boat passengers' trip enjoyment than haze from unidentified vessels. Of those who saw haze from large cruise ships, 53.3% reported that it detracted somewhat and 20.0% reported that it detracted greatly. Of those who saw haze from unidentified vessels, 87.5% reported no effect and 12.5% reported that it detracted somewhat.
- A small percentage of day-boat passengers heard public address systems from large cruise ships (6.7%), small cruise ships (7.6%), and unidentified vessels (6.7%).
- Large cruise ships' public address systems were more likely to detract from day-boat passengers' trip enjoyment than public address systems from small cruise ships, tour boats or unidentified vessels. Of those who heard large cruise ships' public address systems, 48.3% reported that they detracted somewhat and 27.6% reported that they detracted greatly. Of those who heard small cruise ships' public address systems, 27.3% reported that they detracted somewhat and 6.1% reported that they detracted greatly. A total of 24.3% of day-boat respondents reported that small cruise ship or tour boat public address systems added to their trip enjoyment. Public address systems from unidentified vessels did not affect the trip enjoyment of 75% of those who heard them and detracted somewhat from the remaining 25% of visitors' trip enjoyment.
- Large cruise ship engines were heard by fewer day-boat respondents (20.6%) than small cruise ship or tour boat engines (27.0%). Propeller-driven aircraft engines were heard by 23.4% of day-boat respondents and helicopter engines were heard by 12.9% of day-boat respondents.
- Although large cruise ship engines can appear quieter than small cruise ship and tour boat engines, day-boat passengers were more likely to report that large cruise ship engines detracted from their trip enjoyment. Of those who heard large cruise ship engines, 67.0% reported that they detracted

Day-Boat Visitor Survey

somewhat from their trip enjoyment and 9.1% reported they detracted greatly from their trip enjoyment. In comparison, of those who heard small cruise ship or tour boat engines, 51.3% reported they detracted somewhat from their trip enjoyment and 5.2% reported they detracted greatly from their trip enjoyment.

- Engines from propeller-driven airplanes were less likely to detract from day-boat passengers' trip enjoyment (total of 43.6% reported detraction) than engines from watercraft whereas helicopter engines were the least likely to detract from day-boat passengers' trip enjoyment (total of 44.1% reported detraction).

Mail survey

16. On the trip to Glacier Bay proper during which you were contacted for this survey, a variety of events may have occurred. For each event below, please indicate if it occurred and then circle how it affected your trip enjoyment of Glacier Bay proper.

	<u>Did it occur?</u>	How did the event affect your trip enjoyment of Glacier Bay proper?				
		↓	↓	↓	↓	↓
<u>EXPERIENCES WITH HAZE.</u>						
A. Haze from large cruise ship exhaust affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
B. Haze from small cruise ship or tour boat exhaust affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
C. Haze from unidentified vessel affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
<u>EXPERIENCES WITH PUBLIC ADDRESS SYSTEMS</u>						
D. Heard sound from large cruise ship public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
E. Heard sound from small cruise ship or tour boat public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
F. Heard sound from unidentified public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
<u>EXPERIENCES WITH ENGINE SOUNDS</u>						
G. Heard large cruise ship engines.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
H. Heard engines of boats other than large cruise ships.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
I. Heard propeller-driven airplanes.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
J. Heard helicopters.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly

Experiences with haze

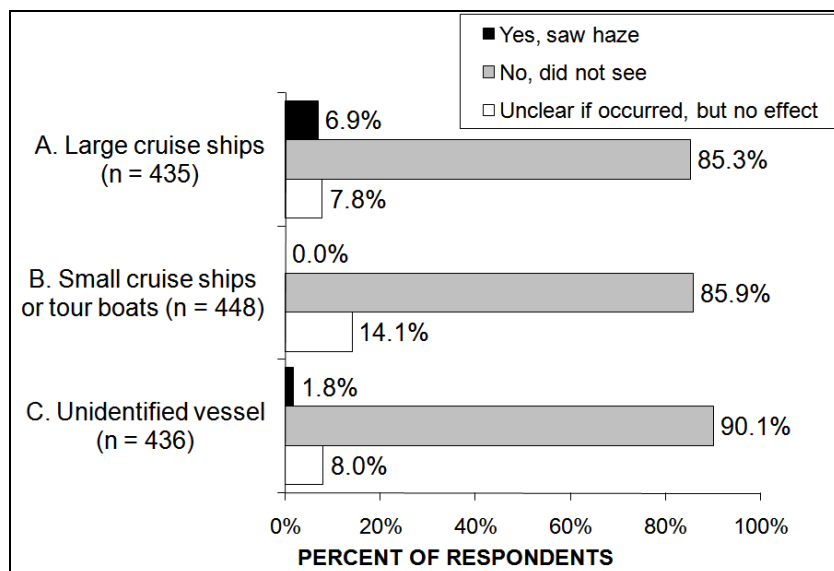


Figure D-44. Percent of respondents who experienced haze from different types of vessels

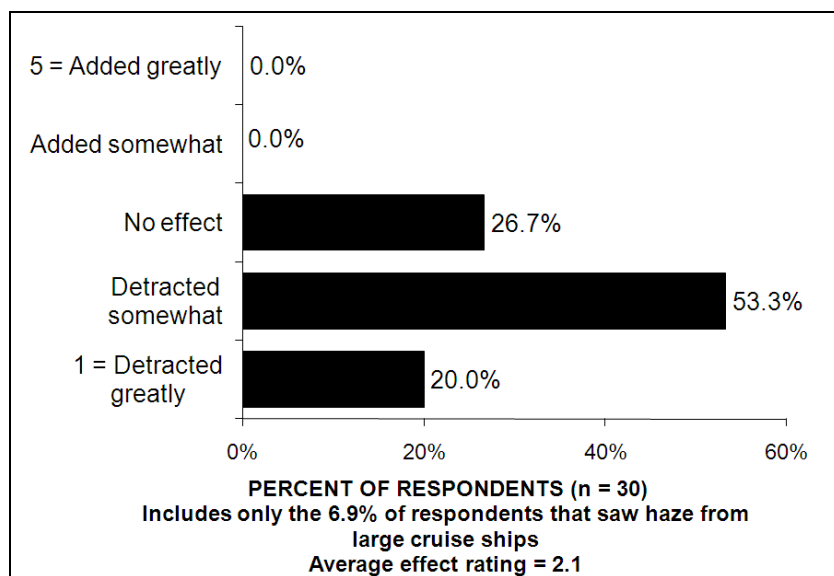


Figure D-45. Effect of experience of haze from large cruise ships on trip enjoyment

Of the 8 day-boat passengers who saw haze from unidentified craft, 7 reported no effect and 1 reported the haze detracted somewhat.

Experiences with public address systems

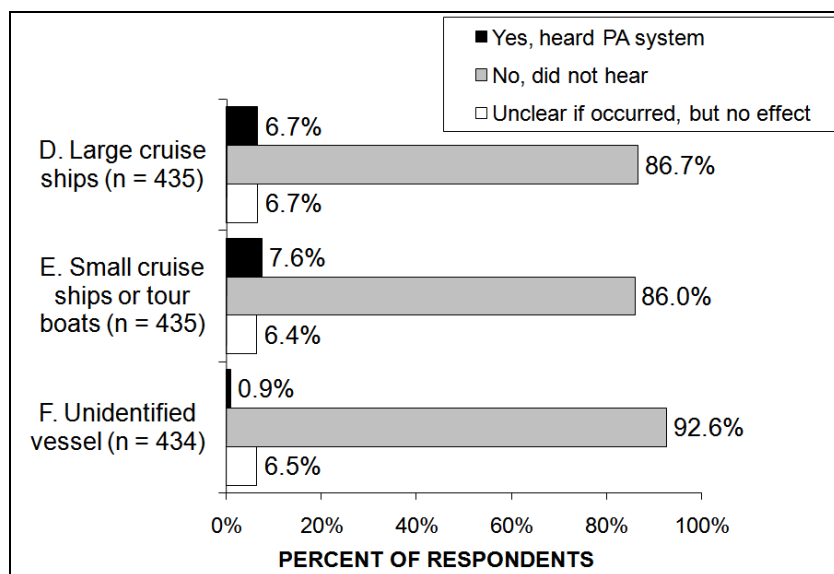


Figure D-46. Percent of respondents who experiences public address systems from different types of vessels

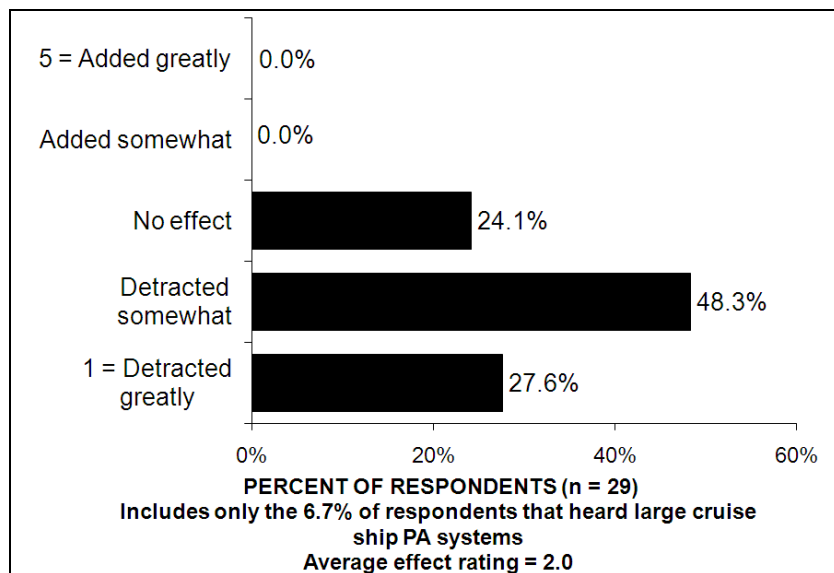


Figure D-47. Effect of large cruise ship public address systems on trip enjoyment

Day-Boat Visitor Survey

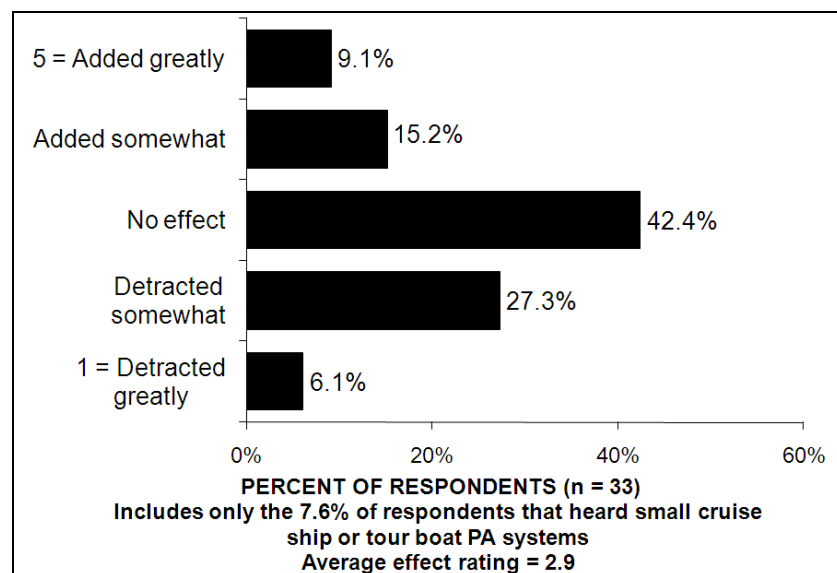


Figure D-48. Effect of small cruise ship or tour boat public address systems on trip enjoyment

Of the four respondents who reported hearing public address systems from unidentified vessels, three reported no effect and one reported that the public address system detracted somewhat from their trip enjoyment. The average effect rating for hearing public address systems from unidentified vessels was 2.75 (1 = Detracted greatly and 5 = Added greatly).

Experiences with engine sounds

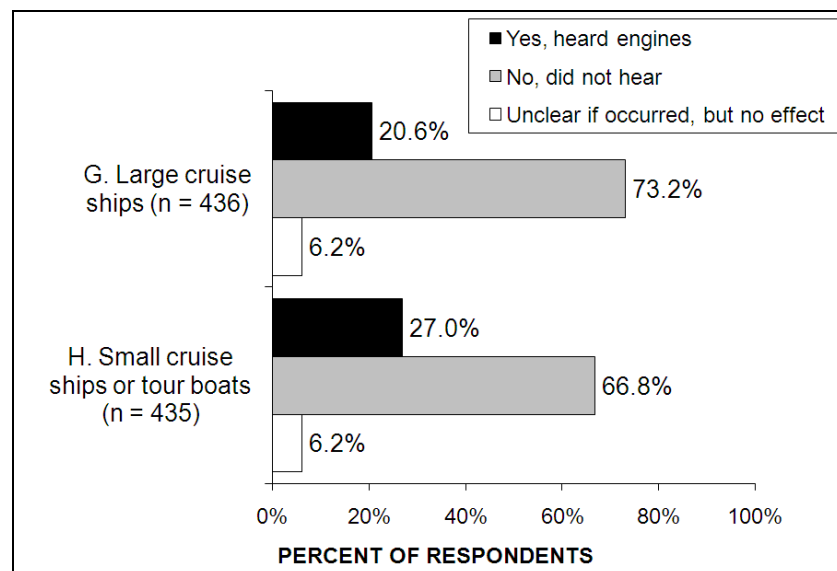


Figure D-49. Experiences with engine sounds from watercraft

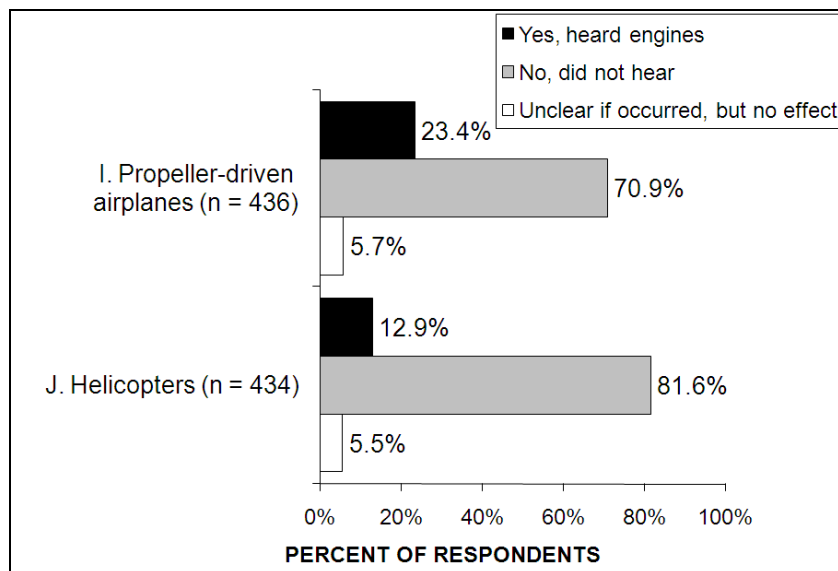


Figure D-50. Experience with engine sounds from aircraft

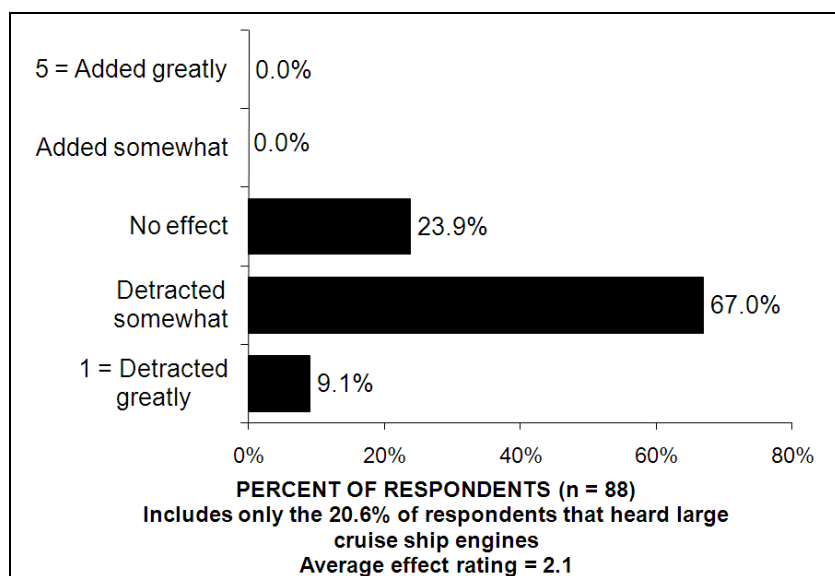


Figure D-51. Effect of hearing large cruise ship engines on trip enjoyment

Day-Boat Visitor Survey

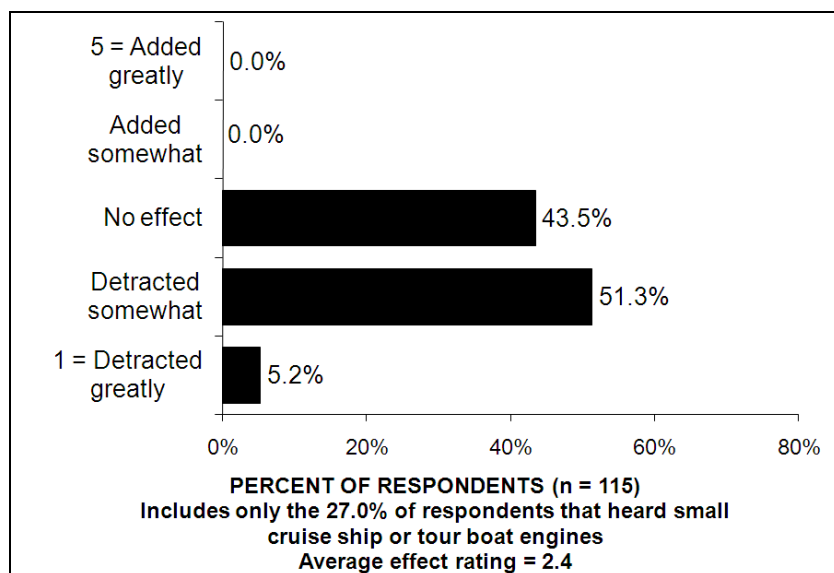


Figure D-52. Effect of hearing small cruise ship or tour boat engines on trip enjoyment

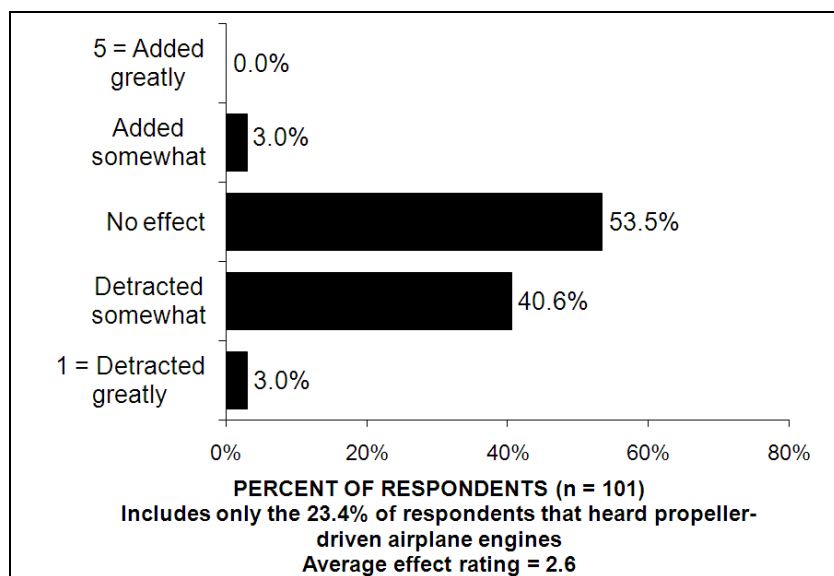


Figure D-53. Effect of hearing propeller-driven airplane engines on trip enjoyment

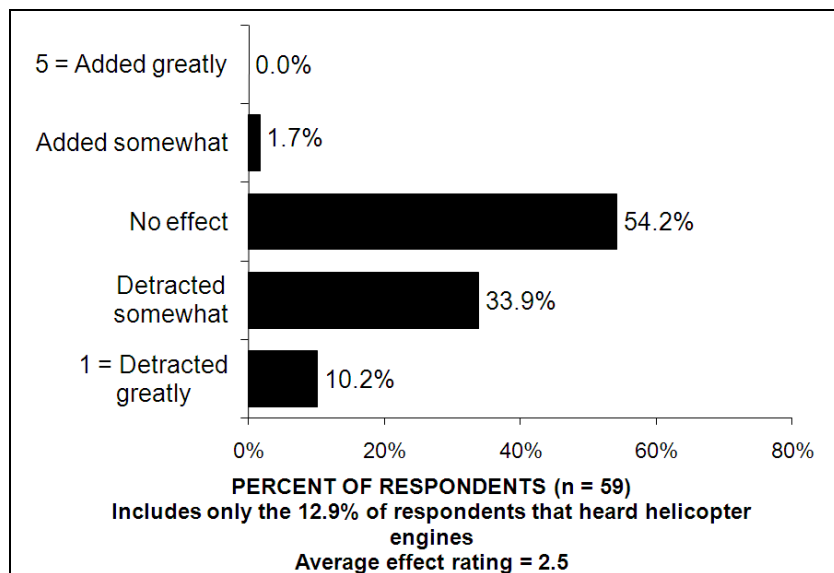


Figure D-54. Effect of helicopter engines on trip enjoyment

VII. EFFECTS OF ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS

Day-boat passengers were asked about encounters with cruise ships and other motorized craft when they were at Margerie and Grand Pacific glaciers. Day-boat respondents were asked how the presence of each type of craft present at the glaciers affected their enjoyment of the Margerie and Grand Pacific glaciers. This section reports the effects of encounters at Margerie and Grand Pacific glaciers.

Because the effects of encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between one and two cruise ships in the bay days were found (see Introduction and Method section for estimation procedures, p. 6).

Highlights

- For day-boat passengers who visited Margerie and Grand Pacific glaciers, large cruise ships were the type of vessel most likely to detract from visitors' enjoyment of the Margerie and Grand Pacific glaciers (33.3%). Motorized craft other than cruise ships (13.0%) was second. (See Chapter XIII for further discussion of the effects of all motorized craft.)
- A small percent (2.9%) of day-boat passengers who visited Margerie and Grand Pacific glaciers indicated that large cruise ships added to their enjoyment of the glaciers and 21.5% reported they had no effect on their enjoyment of Margerie and Grand Pacific glaciers.
- Kayaks were the type of vessel most likely to add to day-boat passengers' enjoyment of the Margerie and Grand Pacific glaciers (12% of day-boat passengers who visited Margerie and Grand Pacific glaciers).
- For day-boat passengers who saw or heard each different type of craft at Margerie and Grand Pacific glaciers, the rates of detraction for large cruise ships and helicopters were the highest of all vessel types (57.7% and 56.2%, respectively). Propeller-driven aircraft had the third highest detraction rate (48.0%).

Presence of different types of craft affected enjoyment of Margerie and Grand Pacific glaciers

Mail survey

11c. How did the presence of each type of craft affect your enjoyment of the Margerie/Grand Pacific tidewater glaciers?

		How did the presence of each type of craft affect your enjoyment of Margerie/Grand Pacific glaciers?				
		↓	↓	↓	↓	↓
A. LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
B. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
C. KAYAKS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
D. PROPELLER-DRIVEN AIRPLANES	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
E. HELICOPTERS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly

Question 11c was completed by day-boat passengers who visited Margerie and Grand Pacific glaciers *and* reported seeing craft at the glaciers. Thus, the “Did not see” response to Q11c does not include day-boat passengers who did not see craft of any kind when visiting the Margerie and Grand Pacific glaciers. To provide more meaningful results, those respondents who visited the glacier and did not see or did not remember seeing any craft at the glaciers were included in the “Did not see/Don’t know” response option. Thus, responses include all day-boat respondents who visited the Margerie and Grand Pacific glaciers.

The data for Question 11c are presented in two ways: Table D-10 presents the effect ratings as a percent of all respondents who visited the Margerie and Grand Pacific glaciers and Table D-11 presents the effect ratings as a percent of those who saw the craft. As can be seen in Table D-10, large cruise ships had the highest overall detraction rates (33.3%) with motorized craft other than large cruise ships second (13.0%).

Looking at Table D-11, for those who saw each different type of craft, large cruise ships and helicopters were most likely to detract from day-boat passengers’ experiences of the glaciers (57.7% and 56.2%, respectively). Propeller-driven airplanes were third (48.0%). Kayaks were the least likely to detract from day-boat passengers’ experiences of the glaciers.

Propeller-driven airplanes and helicopters detracted from less than 5% of all day-boat passengers’ experiences of the glaciers. Table D-11 suggests that these low overall detraction rates were due in part to low encounter rates. Thus, increases in air traffic would increase the negative effects of these craft at a relatively rapid rate.

Day-Boat Visitor Survey

Chapter XIII includes further discussion of the detracting effects of cruises ships relative to the effects of other forms of transport.

Table D-10. Effect of different craft on enjoyment of Margerie/Grand Pacific glaciers

Type of craft	Percent of all the respondents who visited the glaciers ¹					
	Did not see/ Don't know	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
Large cruise ships (n = 340)	42.4%	11.2%	22.1%	21.5%	2.9%	0.0%
Motorized craft other than large cruise ships (n = 340)	60.9%	1.5%	11.5%	24.4%	1.8%	0.0%
Kayaks: current (n = 341)	76.8%	0.3%	0.3%	10.6%	10.0%	2.1%
1 cruise ships in bay (n = 113)	85.0%	0.0%	0.0%	3.5%	8.8%	2.7%
2 cruise ships in bay (n = 228)	72.8%	0.4%	0.4%	14.0%	10.5%	1.8%
Propeller-driven aircraft (n = 341)	93.0%	0.3%	3.2%	3.2%	0.3%	0.0%
Helicopters (n = 341)	95.3%	1.2%	1.5%	2.1%	0.0%	0.0%

¹Includes only the 77.3% of day-boat passengers who visited the Margerie and Grand Pacific glaciers.

Table D-11. Effect of different craft on enjoyment of Margerie/Grand Pacific glaciers: Percent who saw type of craft at the glaciers

Type of craft	Saw craft	Percent of respondents who saw/heard type of craft						
		n	Average effect rating	1 = Detracted greatly	Detracted somewhat	No effect	Added somewhat	5 = Added greatly
Large cruise ships	57.6%	196	2.3	19.4%	38.3%	37.2%	5.1%	0.0%
Motorized craft other than large cruise ships	39.1%	133	2.7	3.8%	29.3%	62.4%	4.5%	0.0%
Kayak—current	23.2%	79	3.6	1.3%	1.3%	45.6%	43.0%	8.9%
1 cruise ship in bay	15.0%	17	3.9	0.0%	0.0%	23.5%	58.8%	17.6%
2 cruise ships in bay	27.2%	62	3.5	1.6%	1.6%	51.6%	38.7%	6.5%
Propeller-driven aircraft	7.0%	24	2.5	4.2%	45.8%	45.8%	4.2%	0.0%
Helicopters	4.7%	16	2.2	25.0%	31.2%	43.8%	0.0%	0.0%

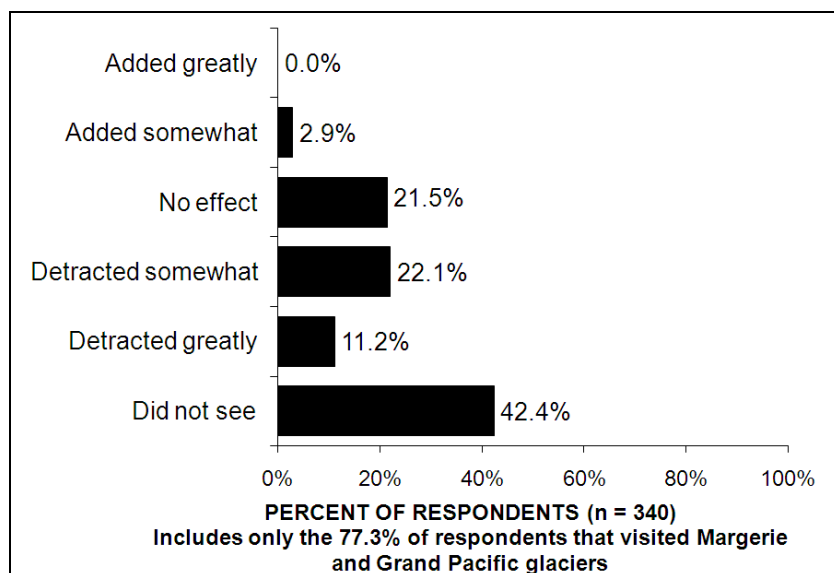


Figure D-55. Effect of seeing large cruise ships at Margerie and Grand Pacific glaciers

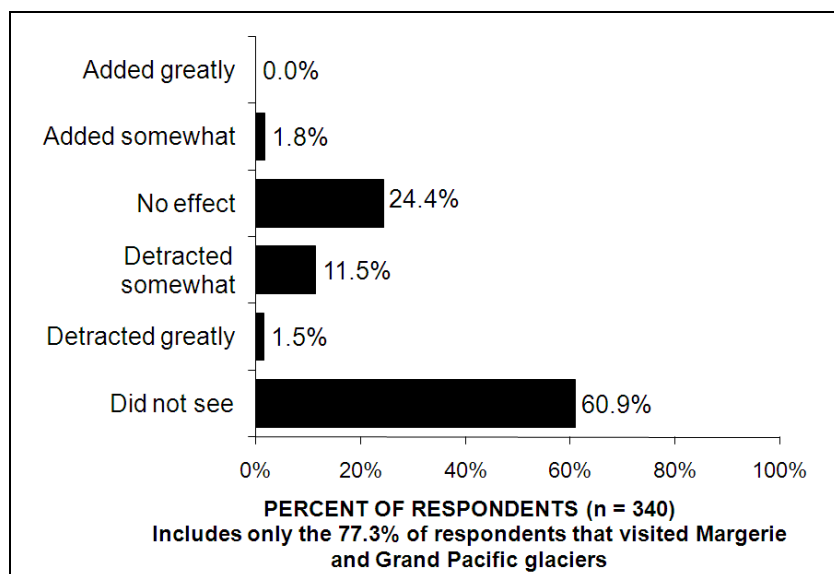


Figure D-56. Effect of seeing motorized water craft other than large cruise ships at Margerie and Grand Pacific glaciers

The effect of seeing kayaks at Margerie and Grand Pacific glaciers varied by the number of cruise ships in the bay per day, $t(77) = 2.45$, $p = .017$. As can be seen in Figure D-57, day-boat passengers who visited on one-cruise ship days reported that seeing kayaks at Margerie and Grand Pacific glaciers added more to their enjoyment ($M = 3.94$) than day-boat passengers who visited on two-cruise ships in the bay days ($M = 3.47$). Figure D-58 compares the effect of seeing kayaks under current conditions with those predicted under the maximum-allowed.

Day-Boat Visitor Survey

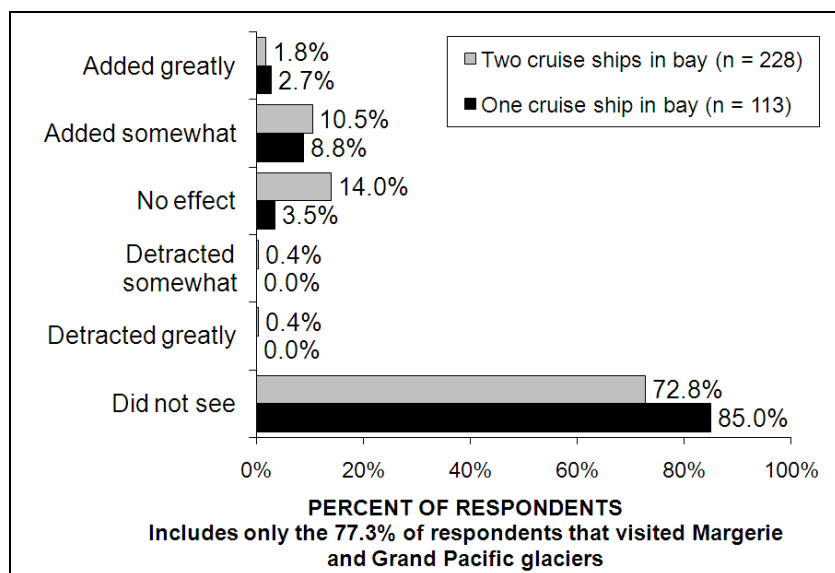


Figure D-57. Effect of seeing kayaks at Margerie and Grand Pacific glaciers: One vs. two cruise ships in bay

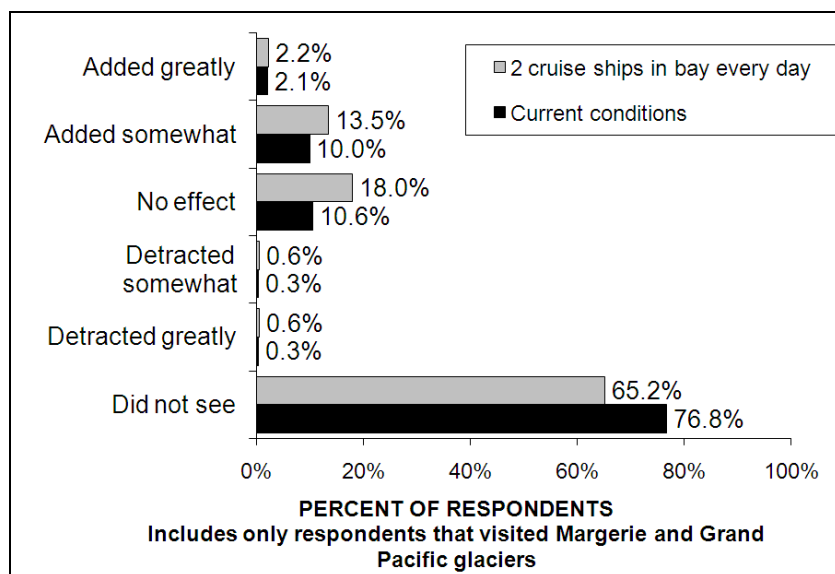


Figure D-58. Effect of seeing kayaks at Margerie and Grand Pacific glaciers: Current conditions vs. maximum allowed

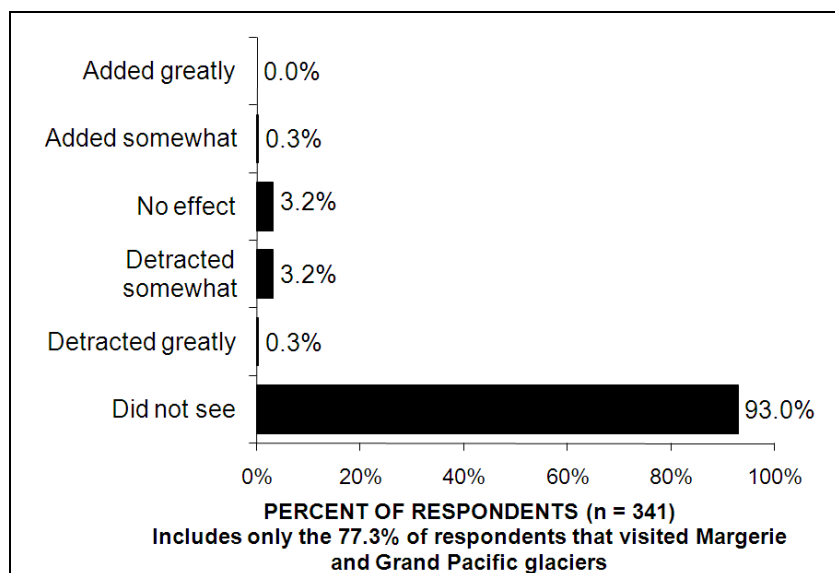


Figure D-59. Effect of seeing propeller-driven airplanes at Margerie and Grand Pacific glaciers

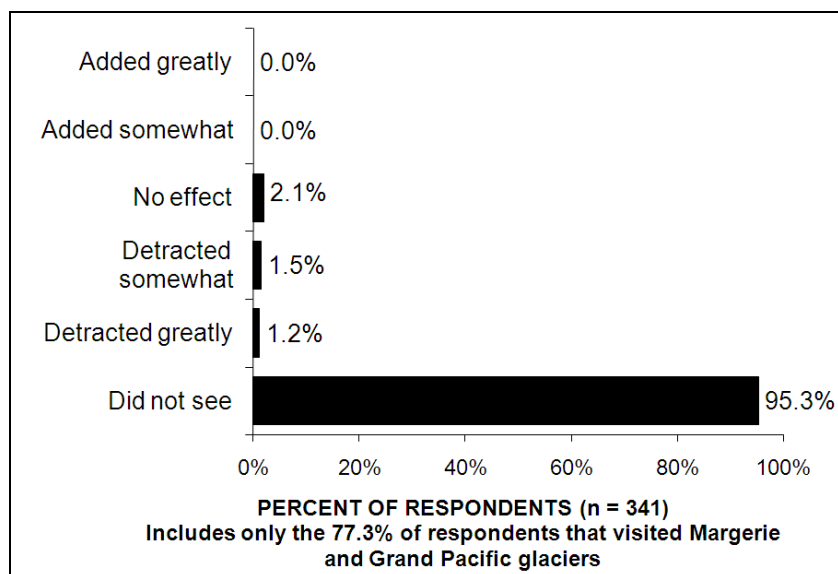


Figure D-60. Effect of seeing helicopters at Margerie and Grand Pacific glaciers

VIII. EFFECTS OF ENCOUNTERS: ENTIRE TRIP

Day-boat passengers were asked about encounters with cruise ships and other motorized craft during their whole trip. Day-boat respondents were asked about the effects of these encounters on 1) enjoyment of Glacier Bay proper, 2) specific aspects of trip experience, and 3) on future recommendations. This section reports the findings for these questions.

Because the effects of encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. No significant differences due to the number of cruise ships in the bay were found. Thus, there are no predicted changes when moving from current to maximum allowed conditions.

Highlights

- Of all motorized craft, large cruise ships detracted from the highest percentage (45.6%) of all day-boat passengers' enjoyment of Glacier Bay proper. This effect was not due to more day-boat passengers seeing cruise ships. Of day-boat respondents who saw each type of craft, day-boat respondents who saw large cruise ships had the highest detraction rates. (See Chapter XIII for further discussion of the effects of all motorized craft.)
- Helicopters and propeller-driven aircraft had the second and third highest rates of detraction on enjoyment of Glacier Bay proper (43.3% and 31.8%, respectively). The overall detraction rates for all day-boat passengers were low (less than 10%) because fewer day-boat passengers encountered these craft than cruise ships or other motorized water craft.
- Of 8 possible trip experiences that day-boat passengers may have in Glacier Bay proper, large cruise ships detracted from those most directly related to the presence of human beings. Specifically, trip experiences most affected by seeing or hearing large cruise ships were Solitude and Pristine environment.
- There was a slight relationship between the importance of a trip experience and the effect of large cruise ships upon it for day-boat passengers. This relationship however was such that items that were more important were less affected by cruise ships. The two dimensions that were most affected, "Solitude" and "Pristine Environment," were the least important and the fourth most important, respectively. The most important dimensions of "Scenic beauty" and "View wildlife" were the fifth and least affected dimensions, respectively.
- Most (83.4%) day-boat passengers reported being very likely to recommend visiting Glacier Bay on the day-boat. Experience with the different types of craft had no effect on the likelihood of making a recommendation for the majority of day-boat passengers (60% or more for each type of craft). Of the different types of craft, experiences with large cruise ships was the most likely to decrease the likelihood that people recommend others visit on the day-boat.
- Overall ratings of the time spent boating/cruising in Glacier Bay proper indicated that 55.6% of day-boat passengers' time was "extremely good" and 35.4% of day-boat passengers' time was "very good." Less than 2% of day-boat visitors rated their time spent boating/cruising in Glacier Bay proper as poor, very poor, or extremely poor.

Effect of encounters of different types of craft on enjoyment of Glacier Bay proper

Mail Survey

10. During the trip in which you were contacted, how did seeing or hearing (other than your own transport) each type of motorized craft affect your enjoyment of Glacier Bay proper?

		How did seeing or hearing the following vehicles affect your enjoyment of Glacier Bay proper?					
		↓	↓	↓	↓	↓	
A.	LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
B.	MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
C.	PROPELLER-DRIVEN AIRPLANES	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
D.	HELICOPTERS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly

The data for Question 10 are presented in two ways: Table D-12 presents the effect ratings as a percent of all respondents and Table D-13 presents the effect ratings as a percent of those who saw the craft. As can be seen in Table D-12, large cruise ships were seen by the most day-boat passengers and also resulted in the highest rates of detraction from enjoyment of Glacier Bay proper. Motorized craft other than large cruise ships were the second most likely to detract from day-boat passengers enjoyment of Glacier Bay proper.

Table D-13 indicates that the higher rates of detraction for large cruise ships was not due to just more day-boat passengers seeing large cruise ships. Of respondents who saw each type of craft, those who saw large cruise ships reported the highest rates of detraction. However, Table D-13 also shows that helicopters and propeller-driven aircraft had the second and third highest rates of detraction. These findings indicate that the low levels of overall detraction rates for these craft were due to low encounter rates rather than the aircraft being innocuous. Thus, increases in air traffic would increase the negative effects of these craft at a relatively rapid rate.

Chapter XIII includes further discussion of the detracting effects of cruises ships relative to the effects of other forms of transport.

Table D-12. Effect of different craft on enjoyment of Glacier Bay proper: Percent of all respondents

Type of craft	Percent of all respondents					
	Did not see/ Don't know	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
Large cruise ships (n = 426)	11.0%	9.4%	36.2%	40.8%	2.6%	0.0%
Motorized craft other than large cruise ships (n = 434)	21.2%	1.8%	18.4%	55.1%	3.0%	0.5%
Propeller-driven aircraft (n = 435)	71.0%	0.9%	8.3%	18.4%	1.1%	0.2%
Helicopters (n = 437)	86.3%	1.4%	4.6%	7.1%	0.7%	0.0%

Table D-13. Effect of different craft on enjoyment of Glacier Bay proper: Percent who saw craft

Type of craft	Saw craft	n	Average effect rating	Percent of respondents who saw craft				
				1 = Detracted greatly	Detracted somewhat	No effect	Added somewhat	5 = Added greatly
Large cruise ships	88.8%	379	2.4	10.6%	40.6%	45.9%	2.9%	0.0%
Motorized craft other than large cruise ships	79.0%	342	2.8	2.3%	23.4%	69.9%	3.8%	0.6%
Propeller-driven aircraft	28.9%	126	2.7	3.2%	28.6%	63.5%	4.0%	0.8%
Helicopters	14.0%	60	2.5	10.0%	33.3%	51.7%	5.0%	0.0%

Effect of encounters with large cruise ships on different trip experiences

The qualitative interviews conducted during Summer 2007 revealed seven dimensions of visitor experience that were affected by cruise ships. These identified dimensions of visitor experience had significant overlap with dimensions of visitor experience measured by the list of Recreational Experience Preference (REP) items. To have two items for each dimension, 9 REP items were selected and 5 new items were constructed using the REP format (see general Introduction for more detail). Respondents were asked the importance of each of these experiences during their visit to Glacier Bay (see page 22). Additionally respondents were asked how hearing or seeing a large cruise ship affected each possible trip experience.

Mail survey

8. How did hearing or seeing a large cruise ship affect each of the following aspects of your experience in Glacier Bay proper? *(Circle one response for each aspect of your experience.)*

		How did hearing or seeing a large cruise ship affect each of the following aspects of your experience?				
		↓	↓	↓	↓	↓
A.	EXPERIENCE THE SCENIC BEAUTY	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
B.	EXPERIENCE TRANQUILITY	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
C.	BE AMAZED BY NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
D.	EXPERIENCE A PRISTINE SETTING	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
E.	ENJOY THE SOUNDS OF NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
F.	EXPERIENCE SOLITUDE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
G.	EXPERIENCE NATURE UNTOUCHED BY HUMANS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
H.	HAVE PERSONAL EXPERIENCES WITH NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
I.	VIEW WILDLIFE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
J.	EXPERIENCE NATURE'S WONDERS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
K.	BE CLOSE TO NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
L.	FEEL ALONE WITH NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
M.	EXPERIENCE PEACE AND CALM	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
N.	EXPERIENCE THE NATURAL SOUNDS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly

Day-Boat Visitor Survey

Cronbach's alpha was calculated for each of the seven dimensions to assess the internal consistency of the two scale items selected to measure the effect of cruise ships on each dimension. George and Mallery (2003) provide the following rules of thumb: “ $\alpha > .9$ – Excellent, $\alpha > .8$ – Good, $\alpha > .7$ – Acceptable, $\alpha > .6$ – Questionable, $\alpha > .5$ – Poor, and $\alpha < .5$ – Unacceptable” (p. 231). As can be seen in Table D-14, Cronbach's alpha was over 0.8 for 6 of the 7 scales indicating good reliability of those scales. The Cronbach's alpha for the scale for “Seeing nature” was 0.645 indicating questionable reliability. Because it was unlikely that the same latent variable underlies these two items for day-boat passengers, these two items were treated as two separate scales measuring different dimensions. Thus, a total of 8 scales representing 8 dimensions were used in subsequent analyses.

Table D-14. Internal consistency measure (Cronbach's alpha) for each dimension

Scale	Items	Cronbach's alpha
Seeing nature		0.645
	View wildlife	
	Experience the scenic beauty	
Experiencing the wonder of nature		0.875
	Be amazed by nature	
	Experience nature's wonders	
Intimate experience with nature		0.848
	Have personal experiences with nature	
	Be close to nature	
Hear the sounds of nature		0.927
	Enjoy the sounds of nature	
	Experience the natural sounds	
Tranquility		0.871
	Experience tranquility	
	Experience peace and calm	
Solitude		0.896
	Experience solitude	
	Feel alone with nature	
Pristine environment		0.861
	Experience a pristine setting	
	Experience nature untouched by humans	

Table D-15 reveals that the trip experiences most affected by seeing or hearing a large cruise ship were: 1) Solitude and 2) Pristine environment. Review of all items suggests that the presence of large cruise ships affected the ratings on the items that most strongly represent wilderness experience as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). Furthermore, for each of the 8 trip experiences, the majority of scale scores indicated “No effect.” A few day-boat passengers indicated for each trip experience that large cruise ships “Added somewhat” to their experience and only the Experience the scenic beauty dimension had anyone respond “Added greatly.” Averaging the effect ratings of day-boat survey respondents resulted in means that were below 3, the “No effect” point on the scale.

Table D-15. Effects of large cruise ships on trip experiences

Trip Experiences	N	Mean	Percent of people rating effect of seeing/hearing large cruise ship during this trip to Glacier Bay proper on experiences ¹								
			1	1.5	2	2.5	3	3.5	4	4.5	5
Solitude	394	2.37	10.7	4.6	29.4	11.7	42.6	0.3	0.8	0.0	0.0
Pristine environment	395	2.38	9.1	7.1	26.6	14.4	41.8	0.5	0.5	0.0	0.0
Tranquility	395	2.49	6.6	3.5	26.3	13.4	49.1	0.3	0.5	0.3	0.0
Experience the scenic beauty	397	2.54	7.3		36.3		51.6		4.5		0.3
Intimate experience with nature	395	2.62	4.1	3.3	19.5	11.9	60.8	0.3	0.3	0.0	0.0
Experiencing the wonder of nature	395	2.62	5.1	3.0	18.7	12.7	58.2	1.3	1.0	0.0	0.0
Hear the sounds of nature	393	2.64	5.1	3.1	19.1	6.4	65.6	0.0	0.8	0.0	0.0
View wildlife	396	2.71	4.8		20.2		74.5		0.5		0.0

¹The rating scale included for each item was: 1 = Detracted greatly, 2 = Detracted somewhat, 3 = No effect, 4 = Added somewhat, 5 = Added greatly. Scale values that fall between the 5 points on the rating scale are due to averaging the ratings for the two scale items for a dimension.

Respondents were asked about the importance of each of these 8 trip experiences as well (see page 25). To see whether the important trip experiences were more (or less) likely to be affected by large cruise ships, the average importance ratings were plotted against the average detraction ratings. As shown in Figure D-61, points of greatest concern would be those that fell in the lower right-hand quadrant of the plot. This area corresponds to important trip experiences from which cruise ships detracted. The area denoted by the dotted line corresponds to the area presented in Figure D-62 showing the average importance ratings by average detraction ratings for day-boat passengers.

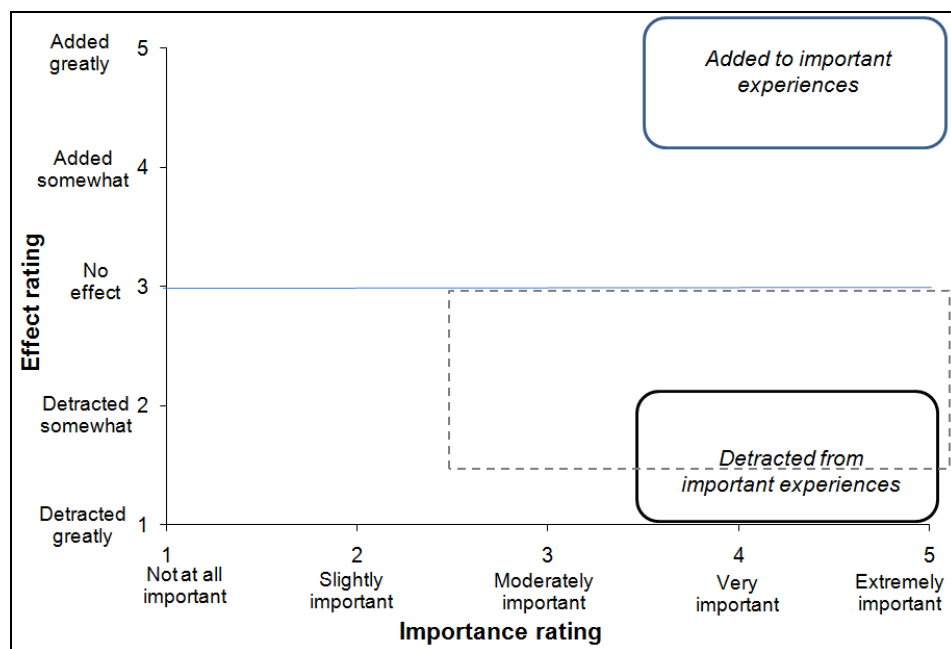


Figure D-61. Average importance ratings by average effect ratings for each type of trip experience

As can be seen in Figure D-62, for day-boat passengers there was a slight relationship between the importance of a trip experience and the effect of large cruise ships upon it. This relationship however was such that items that were more important were less affected by cruise ships. The two dimensions that were most affected, “Solitude” and “Pristine Environment,” were the least important and the fourth most important, respectively. The most important dimensions of “Scenic beauty” and “View wildlife” were the fifth and least affected dimensions, respectively.

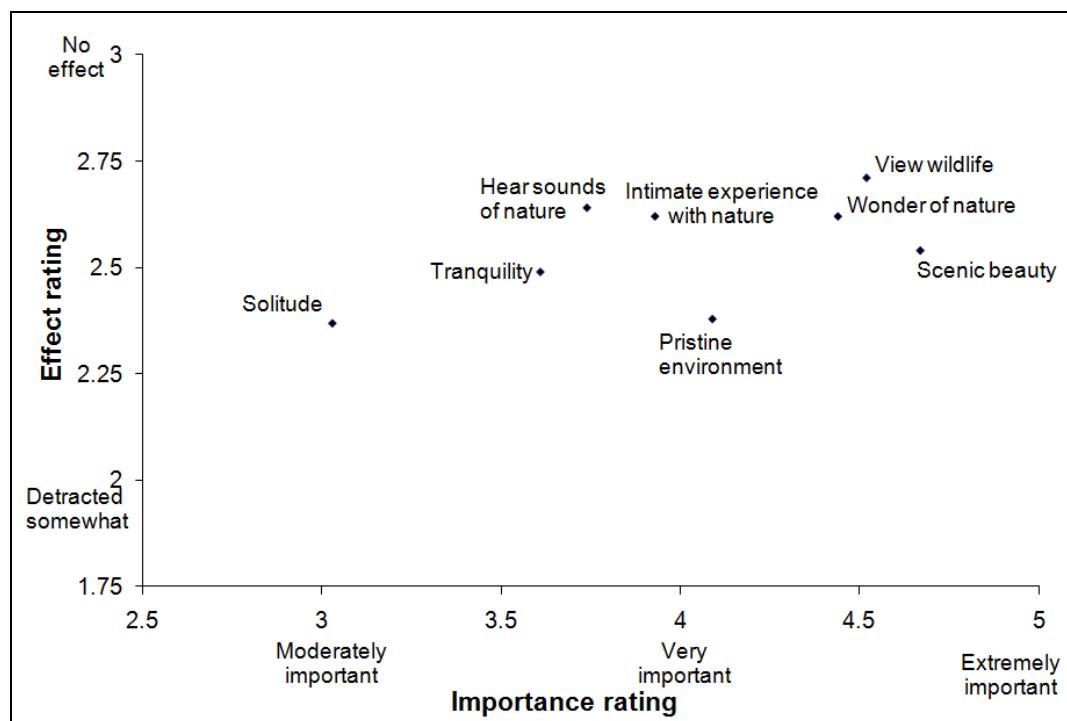


Figure D-62. Average importance ratings by average effect ratings for each trip experience dimension

Effect of encounters with large cruise ships on viewing land animals

Mail survey

13. During your trip to Glacier Bay proper, how did large cruise ships affect your viewing of **land animals** (e.g., bear, moose, etc.)? (Check all that apply)

- ☐ Large cruise ships blocked my view of land animals.
- ☐ Large cruise ships made land animals move to where I could easily see them.
- ☐ Large cruise ships made land animals move to where I could not easily see them.
- ☐ Large cruise ships had no effect.
- ☐ Don't know/Don't remember.

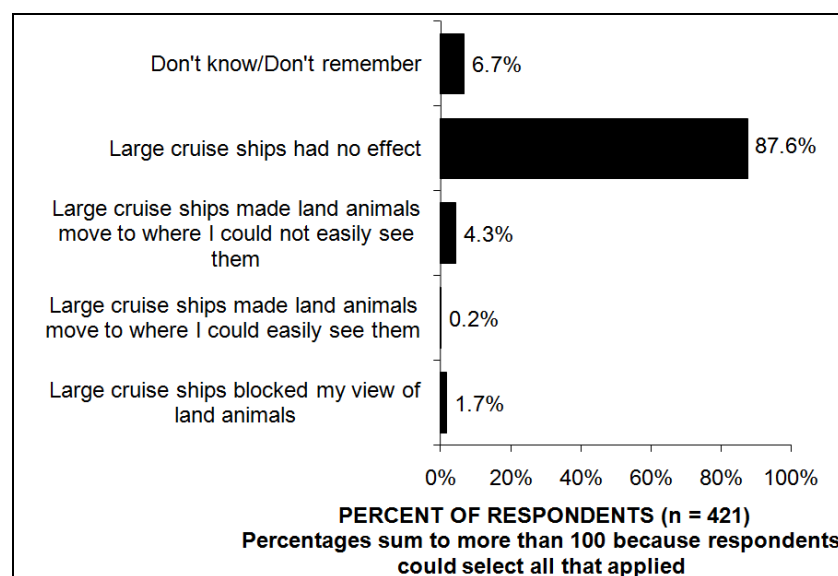


Figure D-63. Effect of large cruise ships on viewing land animals

Effect of encounters with large cruise ships on viewing marine animals

Mail survey

14. During your trip to Glacier Bay proper, how did large cruise ships affect your viewing of **marine animals** (e.g., whales, sea lions, etc.)? (Check all that apply)

- ☐ Large cruise ships blocked my view of marine animals.
- ☐ Large cruise ships made marine animals move to where I could easily see them.
- ☐ Large cruise ships made marine animals move to where I could not easily see them.
- ☐ Large cruise ships had no effect.
- ☐ Don't know/Don't remember.

Day-Boat Visitor Survey

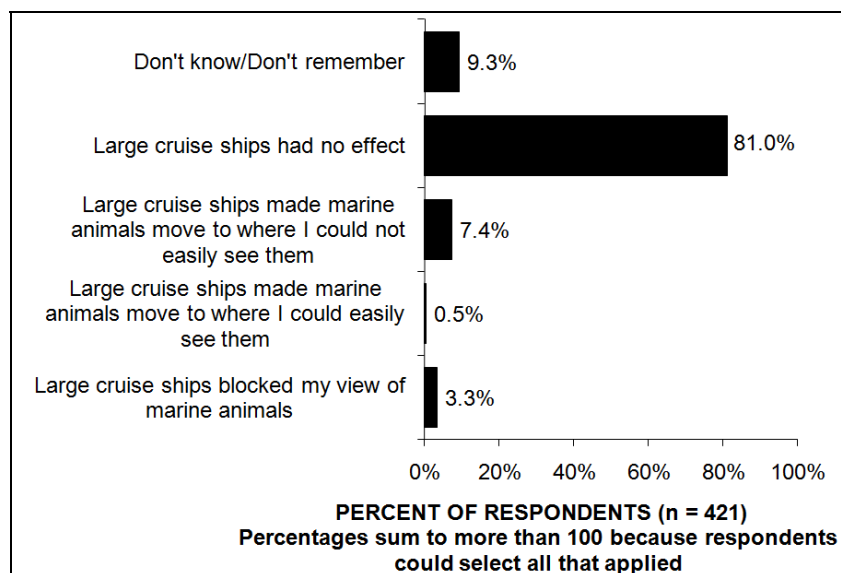


Figure D-64. Effect of large cruise ships on viewing land animals

Future recommendations to visit Glacier Bay

Given their trip experience, day-boat survey respondents were asked how likely they would be to recommend a friend or family member visit Glacier Bay on the day-boat (Q-18). A follow-up question asked how their experience with different kinds of craft affected their likelihood of recommending a similar visit (Q-19).

Mail Survey

18. Based on your trip experience boating/cruising in Glacier Bay, how likely would you be to recommend that a friend or family member visit Glacier Bay on the same kind of vessel you used (e.g., charter, small cruise, private vessel, etc.)?

- ☐ Very likely to recommend visiting Glacier Bay.
- ☐ Somewhat likely to recommend visiting Glacier Bay.
- ☐ No opinion
- ☐ Somewhat unlikely to recommend visiting Glacier Bay.
- ☐ Very unlikely to recommend visiting Glacier Bay.

19. How did your experience (or lack of it) with each of the following types of craft affect whether you would recommend that a friend or family member visit Glacier Bay proper on the same kind of vessel you used (e.g., charter, small cruise, private vessel, etc.)?

	How did your experience (or lack of) with each craft affect whether you recommend others to visit Glacier Bay on the same kind of vessel you used?				
	↓	↓	↓	↓	↓
A. LARGE CRUISE SHIPS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
B. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
C. PROPELLER-DRIVEN AIRPLANES	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
D. HELICOPTERS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely

As can be seen in Figure D-65, 83.4% of day-boat passengers reported being very likely to recommend visiting Glacier Bay on the day-boat. A small percentage of day-boat passengers said they would be somewhat or very unlikely to recommend visiting Glacier Bay on the same vessel. As can be seen in Table D-16, experience with the different types of craft had no effect for the majority of day-boat passengers. Experience with large cruise ships was the most likely to decrease the likelihood that people recommend others visit on the day-boat whereas experience with motorized craft other than large cruise ships was the most likely to increase the likelihood of recommending others visit Glacier Bay on the day-boat.

The reported effect of experiences with the different types of craft on future recommendations were compare for day-boat passengers who indicated that they were somewhat or very unlikely to recommend visiting Glacier Bay and those who had no opinion or were likely to recommend visiting. Review of these data revealed that a higher percentage of the day-boat passengers who indicated that they were somewhat or very unlikely to recommend visiting Glacier Bay reported that their experience with large cruise ships made it less likely that they would recommend visiting Glacier Bay on the day-boat (59%) compared to those day-boat passengers who had no opinion or were likely to recommend (24%), $\chi^2(1, n = 368) = 10.62$, $p = .001$ (expected frequencies < 5 could not be eliminated in one cell).

Day-Boat Visitor Survey

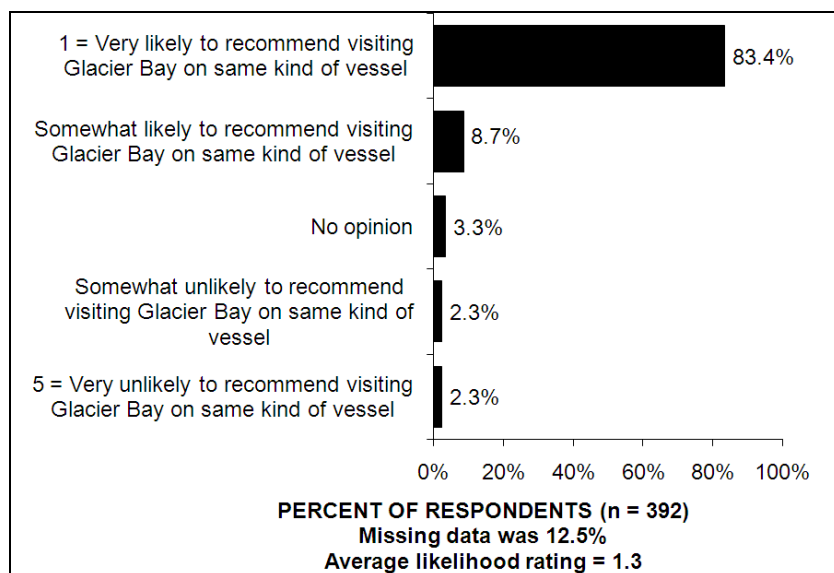


Figure D-65. Likelihood of recommending a friend or family member visit Glacier Bay on the day-boat

Table D-16. Effect of experience with different craft on future recommendations

Experience with ...	Percent of all respondents				
	A lot less likely	Somewhat less likely	No effect	Somewhat more likely	A lot more likely
Large cruise ships	14.9%	13.2%	60.8%	6.0%	5.0%
Motorized craft other than large cruise ships	1.9%	3.1%	63.2%	11.7%	20.0%
Propeller-driven aircraft	9.6%	6.8%	74.9%	4.1%	4.6%
Helicopters	11.4%	6.8%	75.2%	2.8%	3.8%

Overall rating of time spent boating/cruising in Glacier Bay proper

Day-boat passengers were asked to rate overall the time they spent boating/cruising in Glacier Bay proper. This question served as a global measure of effect of cruise ships on visitor experience. As can be seen in Figure D-66, 55.6% of day-boat passengers rated their time boating or cruising in Glacier Bay proper as “Extremely good” and 35.4% rated the time as “Very good”.

Mail Survey

20. Overall, how would you rate the time you spent boating/cruising in Glacier Bay proper during your trip?
(Check one box.)

- ☐ Extremely poor
- ☐ Very poor
- ☐ Poor
- ☐ Good
- ☐ Very good
- ☐ Extremely good

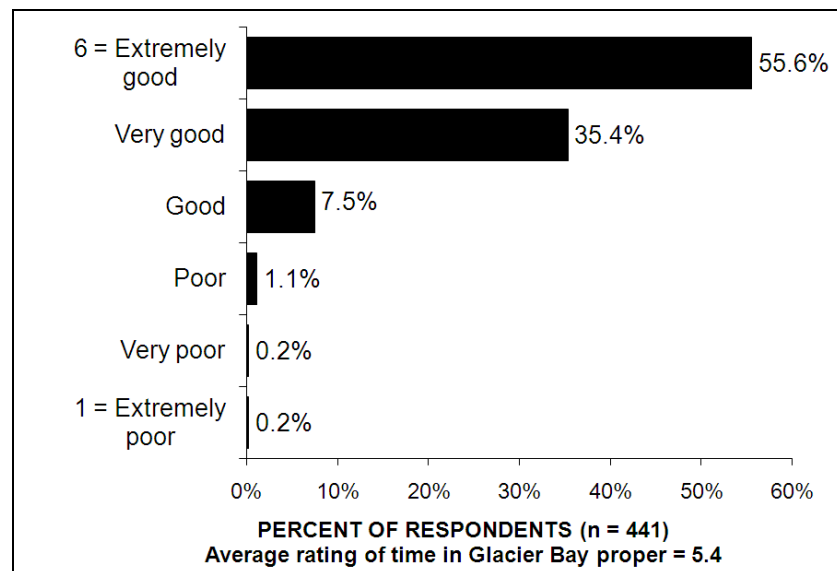


Figure D-66. Overall rating of time spent boating/cruising in Glacier Bay proper

IX. OPINIONS REGARDING CRUISE SHIPS IN GLACIER BAY PROPER

Day-boat passengers were asked the extent to which they agreed with four statements regarding the presence of cruise ships in Glacier Bay proper (see Q-15 below). This section reports the findings from these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between one and two cruise ships in the bay days were found (see Introduction and Method section for estimation procedures, p. 6).

Mail survey

15. Please indicate the extent to which you agree or disagree with each of the following statements.						
		Do you agree or disagree with this statement?				
		↓	↓	↓	↓	↓
A.	LARGE CRUISE SHIPS IN GLACIER BAY PROPER ARE MAJESTIC.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
B.	LARGE CRUISE SHIPS PROVIDED A SENSE OF SCALE WHEN VIEWING SCENERY IN GLACIER BAY	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
C.	LARGE CRUISE SHIPS ARE A GOOD WAY FOR A LARGE NUMBER OF PEOPLE TO VISIT GLACIER BAY PROPER	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
D.	IT IS INAPPROPRIATE FOR LARGE CRUISE SHIPS TO BE IN GLACIER BAY PROPER	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Highlights

- Of the four statements, day-boat passengers were most likely to agree with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper” (46.4%) and with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay” (42.5%).
- Two-thirds of day-boat passengers disagreed that “Large cruise ships in Glacier Bay proper are majestic” and 38.8% agreed that “It is inappropriate for large cruise ships to be in Glacier Bay proper.”
- Day-boat passengers responses to these four statements were correlated (r ’s ranged from .45 to .63).

Agreement with “Large cruise ships in Glacier Bay proper are majestic.”

Two-thirds of day-boat passengers disagreed or strongly disagreed that large cruise ships in Glacier Bay proper are majestic. A small number (9.3%) of day-boat passengers felt that large cruise ships in Glacier Bay proper were majestic.

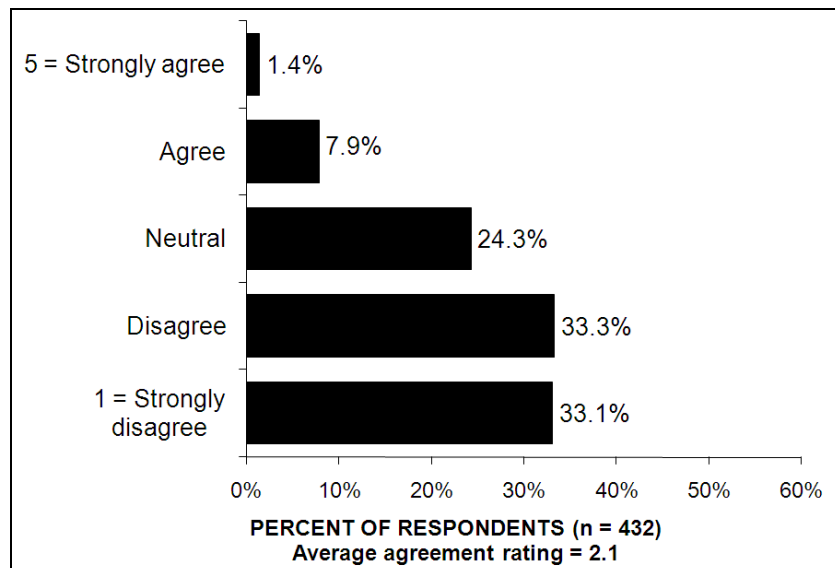


Figure D-67. Agreement with “Large cruise ships in Glacier Bay proper are majestic”

Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay.”

About 40% of day-boat respondents felt that large cruise ships provided a sense of scale (i.e., agreed or strongly agreed).

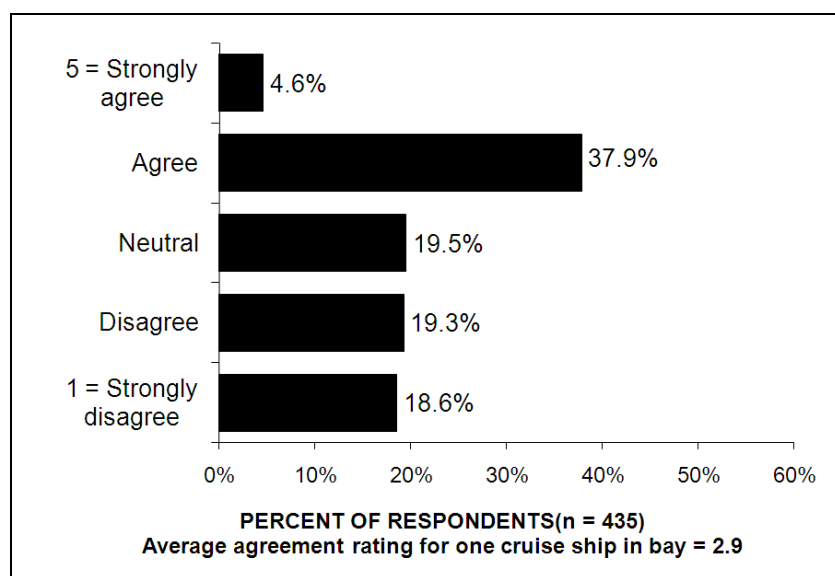


Figure D-68. Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay”

Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.

About twice as many day-boat passengers agreed as disagreed (46.4% vs. 28.2%) with the statement, “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.”

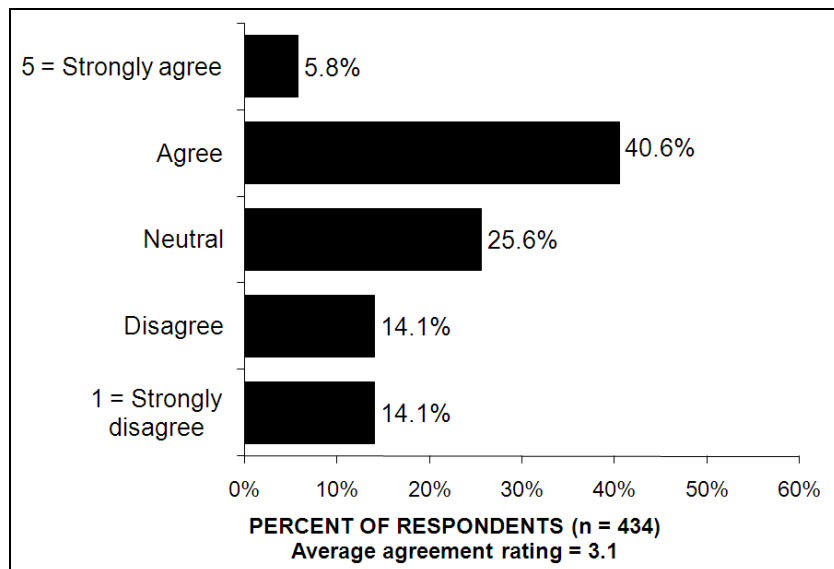


Figure D-69. Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper”

Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper.”

Almost 40% of day-boat respondents agreed or strongly agreed with the statement, “It is inappropriate for large cruise ships to be in Glacier Bay proper.”

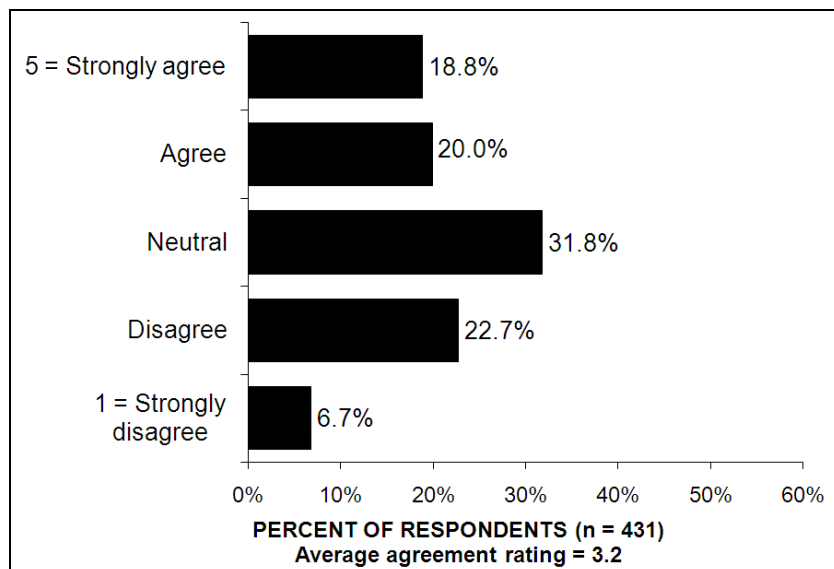


Figure D-70. Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper”

Table D-17. Correlations among agreement with opinion statements

Variable		A	B	C	D
A	Large cruise ships in Glacier Bay proper are majestic	--			
B	Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay	.52	--		
C	Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.	.51	.48	--	
D	It is inappropriate for large cruise ships to be in Glacier Bay proper	-.53	-.45	-.63	--

Note: All correlations are significant at $p < .001$.

Opinion Scale

A scale measure that consists of multiple items (i.e., responses) with internal consistency is a more reliable measure than any of the individual items. Cronbach's alpha was calculated to assess the internal consistency of these four items as a measure of opinions about large cruise ships in Glacier Bay proper. George and Mallery (2003) provide the following rules of thumb: " $> .9$ – Excellent, $> .8$ – Good, $> .7$ – Acceptable, $> .6$ – Questionable, $> .5$ – Poor, and $< .5$ – Unacceptable" (p. 231). The Cronbach's alpha for dayboat passengers was .813 indicating a scale that has good reliability. Because it is useful to be able to compare across the user groups and because the reliability for these four items was just below the acceptable range for only one user group (cruise ship passengers), it was decided to compute a single opinion scale for these four items for all user groups. The opinion scale score was computed by averaging the responses to the four individual opinion items. Because of the increased reliability, the opinion scale was used in subsequent analyses rather than the individual items.

Figure D-71 shows the distribution of opinion scale scores for day-boat passengers. The mean for all day-boat passengers on the opinion scale was 2.75 indicating that on average day-boat passengers slightly disagreed with large cruise ships being in Glacier Bay proper.

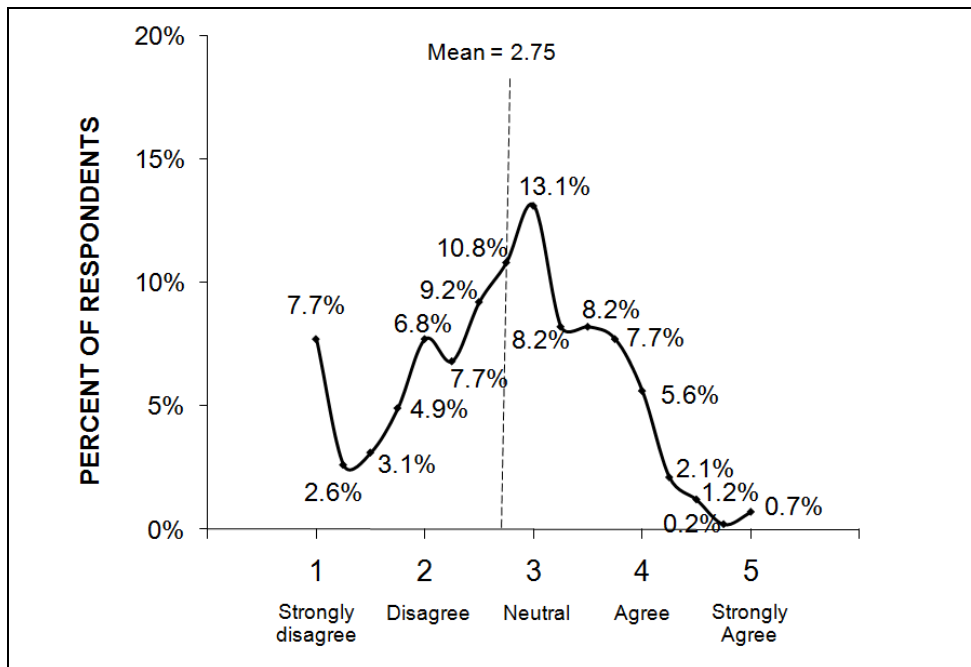


Figure D-71. Distribution of opinion scale scores

X. LENGTH OF EXPOSURE EFFECTS ON VISITOR EXPERIENCE

Day-boat passengers were asked to report the number of hours they saw or heard large cruise ships during their stay in Glacier Bay proper. Although a more subjective measure of exposure than number of cruise ships in the bay per day and one that park managers have considerably less control over, this measure provided more detailed information about exposure to cruise ships. It may be that the effect of cruise ships heard or seen depended on the length of time that day-boat passengers heard or saw cruise ships regardless of the number of cruise ships in the bay the day they visited. These analyses are described and reported in this section.

Length of exposure was the total number of hours that day-boat respondents reported seeing cruise ships during their stay in Glacier Bay proper. Along with individuals who did not see or hear cruise ships, individuals who did not know or remember the hours they saw or heard cruise ships were excluded from these analyses. The effect of length of exposure to cruise ships was examined for the following measures of effects of cruise ships on visitor experience: 1) cruise ship detraction ratings for each of the eight visitor experience dimensions, 2) likelihood of future recommendations and the effect of seeing large cruise ships on the likelihood of future recommendations, 3) overall enjoyment ratings, 4) effect of cruise ships on trip enjoyment, 5) effect of cruise ships on enjoyment of Margerie and Grand Pacific glaciers), and 6) the opinion scale.

Of the 14 measures examined, total number of hours heard or saw cruise ships was significantly related to ten measures (see Table D-18). As can be seen in Table D-18, higher total number of hours heard or saw cruise ships were associated with greater negative effects of cruise ships for each measure. The largest correlation observed was $-.295$, meaning that 8.7% of the variance in scores was explained by the relationship between total number of hours saw or heard cruise ships and effect ratings on the “Experience solitude scale.” Thus, for day-boat passengers who saw or heard cruise ships, the total number of hours cruise ships were seen or heard was not strongly predictive of reported effects of cruise ships on day boat passengers’ experience in Glacier Bay proper.

Table D-18. Significant correlations between total number of hours heard or saw cruise ships and different measures of effects of cruise ships

Measure	Correlation (r)	p -value
Cruise ships effect on experiencing the scenic beauty	$-.184$	$<.001$
Cruise ships effect on experience of viewing wildlife	$-.206$	$<.001$
Cruise ships effect on experiencing the wonder of nature scale	$-.237$	$<.001$
Cruise ships effect on intimate experience with nature scale	$-.242$	$<.001$
Cruise ships effect on hearing the sounds of nature scale	$-.265$	$<.001$
Cruise ships effect on experiencing tranquility scale	$-.263$	$<.001$
Cruise ships effect on experiencing solitude scale	$-.295$	$<.001$
Cruise ships effect on experiencing pristine environment scale	$-.229$	$<.001$
Rating of overall trip enjoyment	$-.115$	$.027$
Effect of cruise ships on trip enjoyment	$-.174$	$.001$

XI. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS

This section examines whether there were particular features of cruise ships (e.g., haze, public address system, etc.) that were associated with effects of cruise ships on day-boat passengers. Knowing whether certain characteristics of cruise ships are more predictive of effects on day-boat passengers can provide insights into possible mitigation strategies, if needed.

A total of 397 (88.8%) day-boat passengers reported hearing or seeing cruise ships during their visit to Glacier Bay proper. The data from these individuals were used in the following analyses and thus, the results reflect only those individuals who had experience with cruise ships during the trip in which they were contacted to participate in the survey.

Characteristics of encounters with cruise ships measured

As part of the mail survey, day-boat passengers were asked to report about different characteristics of their encounters with large cruise ships. These characteristics were captured by the eight variables listed in Table D-19.

Table D-19. Characteristics of cruise ships used as predictors in regression analyses

Number of cruise ships in the bay (1 vs. 2)
Total length of time saw or heard large cruise ships
Haze from large cruise ship exhaust affected my views in some manner.
Heard sound from large cruise ship public address system.
Heard large cruise ship engines.
Number of large cruise ships seen at Margerie and Grand Pacific glaciers
Other large cruise ships had no effect on viewing land animals
Other large cruise ships had no effect on viewing marine animals

Measures of effect of cruise ships on visitor experience

A number of measures of effects of cruise ships on visitor experience were included in the survey: 1) effects of cruise ships on different dimensions of visitor experience, 2) effect of cruise ships on trip enjoyment, 3) likelihood of future recommendations, 4) overall ratings of trip enjoyment. To determine if there were common factors underlying responses on these measures, an exploratory factor analysis was done.¹ The results of the factor analysis revealed a single factor underlying responses to these measures and explained 73.5% of the variance. The measures of cruise ships effects on 8 dimensions of trip experience and the measure of effect of cruise ships on trip enjoyment had factor loadings ranging from .679 to .926 while likelihood of future recommendations and overall ratings of trip enjoyment had loadings below .3 and thus, were excluded. A factor scale score was computed by averaging the scores on each measure which had a factor loading over 0.3.² This computed factor score will be referred to as the cruise ship effect

¹ In the exploratory factor analysis, the factors were extracted using maximum likelihood and oblimin rotation. The scree test was used to determine the appropriate number of factors to retain by selecting and interpreting the number of factors above the bend in the curve. This approach to exploratory factor analysis is consistent with “best practices” outlined in Costello and Osborne (2005).

² The factor scale score based on the average of the items loading on the factor was compared to the factor score derived based on the factor score coefficients. The two scores were correlated at 1.00. The factor scale score based on the average of the items was used for the following reasons: 1) the scale for the factor score was the same as the original items, 2) analyses indicated that the detractor factor score for the other user groups could be computed using the average and still achieve high correlations, thus allowing a way to compare across user groups if desired.

factor score and it is a continuous measure of effects of cruise ships ranging from 1 = “detracted greatly” to 5 = “added greatly.” Analyses that use this continuous measure as the dependent variable will show which variables predict different levels of effects of cruise ships ranging from detracted greatly to added greatly.

It may also be useful for park managers to understand how changes in significant predictors can affect the likelihood that visitors will report that cruise ships detract from their enjoyment. To obtain this information, a dichotomous variable, cruise ships detracted, was created from the continuous cruise ship effect factor score. Individuals who had a cruise ship effect factor score ranging from 1.0 to 2.9 were classified as “cruise ships detracted from experience” whereas individuals who had cruise ship effect factor scores of 3 were classified as “no effect.” Individuals with cruise ship effect factor scores above 3.0 were excluded from the analyses as these individuals reported that cruise ships added to their trip enjoyment. Twenty day-boat passengers (5.3%) had cruise ship effect factor scores over 3.0 and thus, were excluded from analyses using the cruise ships detracted score. Analyses that use this dichotomous measure as the dependent variable will show which variables predict changes in the likelihood that cruise ships detract from day-boat visitors’ enjoyment.

Individual relationships between characteristics of cruise ship encounters and the effect of cruise ships

Analyses were conducted to determine whether any of the eight measured characteristics of cruise ship encounters were related to the effect of cruise ships on day-boat visitors experience as measured by the cruise ship effect factor score (the continuous dependent measure). For characteristics of cruise ship encounters that were continuous in nature, correlations were calculated. For characteristics of cruise ship encounters that were nominal in nature, t-tests or one-way ANOVAs were calculated.

Analyses indicated that seven of the eight measured characteristics of cruise ship encounters were significant predictors of the effect of cruise ships as measured by the detraction factor score. Only number of cruise ships in the bay each day was not a significant predictor ($p = .479$).

Table D-20 summarizes the characteristics of cruise ships that were found to be significant predictors of the effect of cruise ships as measured by the detraction factor score. The findings below indicate that cruise ships detracted more (lower scores on the detract factor) from day-boat passengers’ trip experience:

1. the longer the total length of time day-boat passengers saw or heard cruise ships,
2. if day-boat passengers reported that haze from large cruise ship exhaust affected their views in some manner,
3. if day-boat passengers heard large cruise ships’ public address systems,
4. if day-boat passengers heard large cruise ship engines,
5. the more cruise ships they saw at Margerie and Grand Pacific glaciers,
6. if day-boat passengers reported large cruise ships affected their viewing of land animals, and
7. if day-boat passengers reported large cruise ships affected their viewing of marine animals.

Table D-20. Characteristics of cruise ships that were significant predictors of effects of cruise ships

Predictor variable	<i>r</i>	<i>p</i> -value
Total length of time saw or heard large cruise ships	-.294	<.001
Haze from large cruise ship exhaust affected my views in some manner.	-.192	<.001
Heard sound from large cruise ship public address system.	-.336	<.001
Heard large cruise ship engines.	-.380	<.001
Number of large cruise ships seen at Margerie and Grand Pacific glaciers	-.180	.001
Other large cruise ships had no effect on viewing land animals	.432	<.001
Other large cruise ships had no effect on viewing marine animals	.444	<.001

NOTE: Higher scores of the detractor factor reflect more positive effects of cruise ships.

To understand the unique relationship of each of the predictor variables with the effects of cruise ships on day-boat passengers' visitor experience, a regression was performed that included the seven significant variables as predictor variables. A stepwise procedure was adopted to determine the best fitting model. The final model included four of the seven variables (see Table D-21). The omnibus test of the model was significant, $F(4, 260) = 29.14$, $p < .001$, and the R^2 indicated that 31.0% of the variance in cruise ship effect scores was explained by the model.

Table D-21. Summary of model for effects of cruise ships measured by cruise ship effect score for day-boat passengers

Predictor Variable	B	S.E.	<i>t</i>	<i>p</i> -value
Other large cruise ships had no effect on viewing marine animals	.336	.103	3.27	.001
Other large cruise ships had no effect on viewing land animals	.244	.121	2.01	.045
Heard sound from large cruise ship public address system.	-.413	.114	-3.62	<.001
Heard large cruise ship engines	-.237	.071	-3.32	.001
Constant	2.14	.097	21.96	<.001

The regression equation associated with the above model is below.

Cruise ship effect score = $2.14 + (0.336 * \text{Cruise ships had no effect on viewing marine animals}) + (.244 * \text{cruise ships had no effect on viewing land animals}) + (-0.413 * \text{Heard cruise ship PA system}) + (-0.237 * \text{Heard cruise ship engines})$

The regression coefficients (B) show the change in one variable given that all other variables are held constant. For example, for people not hearing large cruise ship engines or PA systems, having a large cruise affect the viewing of marine animals will decrease the cruise ship effect score by .336 points compared to those who experience no effect of large cruise ships on their viewing of marine animals.

Because the predictor variables are all dichotomous categorical variables, it is possible to compute the predicted cruise ship effect score for the different combinations of potential experiences with cruise ships using the above regression equation. Table D-22 shows the predicted cruise ship effect score for the sixteen

Day-Boat Visitor Survey

possible scenarios. As can be seen in Table D-22, the greatest detraction (i.e., lowest score) is predicted under Scenario 16 when cruise ship engines and PA systems are heard and cruise ships affect the viewing of marine and land animals. Currently, 2.3% of day-boat visitors have this mix of experience. The predicted cruise ship effect score of 1.49 is halfway between detracted greatly and detracted somewhat.

Scenario 1 where cruise ships have no effect on viewing land or marine animals and their PA systems and engines are not heard is the most commonly reported mix of experiences for day-boat passengers (65%) and this mix of experiences predicts a detraction factor score of 2.72 indicating a minimal detraction effect of large cruise ships on visitor experience (3 = no effect). The next most frequently experienced mix of characteristics was only hearing large cruise ship engines (10.5% of day boat passengers) with a cruise ship effect score of 2.48 (halfway between detracted somewhat and no effect).

Scenarios 2 through 5 show the individual effects of each of the characteristics of cruise ships on the cruise ship effect score. Comparing scenarios 2 through 5 indicates that 1) hearing large cruise ship PA systems have the greatest individual detraction effect of the four characteristics (cruise ship effect score of 2.30), 2) cruise ships affecting the viewing of marine animals detracts slightly more than when cruise ships affect the viewing of land animals (2.38 vs. 2.47, respectively), and 3) cruise ships affecting viewing of land animals was only slightly more detracting than hearing large cruise ship engines (2.47 vs. 2.48, respectively).

Scenarios 6 through 11 show the effects when two of the four characteristics are experienced during one's trip. Predicted cruise ship effect scores range from 2.24 to 1.97. Thus, effects for these scenarios range from slightly less detraction than "detracted somewhat" to basically "detracted somewhat."

Scenarios 12 through 15 show the effects when three of the four characteristics are experienced during one's trip. Review of these scenarios indicates that there are minimal differences in cruise ship effect scores depending on which of the three characteristics are experienced. Across all sixteen scenarios, the more characteristics experienced the greater predicted detraction from large cruise ships.

Table D-22. Predicted detraction factor scores for the sixteen possible scenarios

Scenario		Cruise ships had no effect on viewing of marine animals ¹	Cruise ships had no effect on viewing of land animals ¹	Heard sound from large cruise ships public address system ²	Heard large cruise ship engines ²	Detraction factor score ³
1	No effects experienced	1	1	0	0	2.72
2	Only heard cruise ship engines	1	1	0	1	2.48
3	Only affected viewing of land animals	1	0	0	0	2.47
4	Only affected viewing of marine life	0	1	0	0	2.38
5	Only heard cruise ship PA system	1	1	1	0	2.30
6	Affected viewing of land animals and heard cruise ship engine	1	0	0	1	2.24
7	Affected viewing of marine life and heard cruise ship engine	0	1	0	1	2.14
8	Affected viewing of land and marine animals	0	0	0	0	2.14
9	Heard cruise ship PA system and engine	1	1	1	1	2.07
10	Affected viewing of land life and heard cruise ship PA system	1	0	1	0	2.06
11	Affected viewing of marine life and heard cruise ship PA system	0	1	1	0	1.97
12	Affected viewing of land and marine animals and heard cruise ship engines	0	0	0	1	1.90
13	Affected viewing of land animals, heard cruise ship PA system and engines	1	0	1	1	1.82
14	Affected viewing of marine life, heard cruise ship PA system and engines	0	1	1	1	1.73
15	Affected viewing of land and marine animals and heard cruise ship PA system	0	0	1	0	1.72
16	Affected viewing of land and marine animals, heard cruise ship PA system and engines	0	0	1	1	1.49

¹ Values for this variable are 1 = agreement with statement (i.e., no effect of cruise ships on viewing) and 0 = disagreement with statement (i.e., effect of cruise ships on viewing)

² Values for this variable are 0 = Did not hear, and 1 = Heard

³ The detraction factor score ranges from 1 to 5 with the following demarcations: 1 = Detracted greatly, 2 = Detracted somewhat, 3 = No effect, 4 = Added somewhat, 5 = Added greatly

Individual relationships between characteristics of cruise ship encounters and the likelihood that cruise ships detract from trip enjoyment

Analyses were conducted to determine whether any of the measured characteristics of cruise ship encounters were related to the likelihood cruise ships detract from day-boat visitors experience as measured

by the cruise ship detracted score (the dichotomous dependent measure). Logistic regression analysis was used to determine whether any of the measured characteristics of cruise ship encounters (see Table D-19) predicted who was negatively affected by cruise ships. Logistic regression is a form of linear regression used when the dependent variable is dichotomous (e.g., cruise ships detracted: yes or no)³. In logistic regression, predictor variables may be either categorical (e.g., heard cruise ship engines: yes or no) or continuous (e.g., total length of time heard or saw large cruise ships).

In logistic regression there are multiple ways to evaluate whether the generated model is good fit to the data. The first is the omnibus chi-square test of the model coefficients. A significant chi-square indicates that the coefficients in the model as a whole significantly predict the dependent variable. When a model has only one predictor variable, a significant model chi-square indicates that the predictor variable significantly predicted the dependent variable. Second, the Hosmer and Lemeshow Goodness of Fit test statistic⁴ can be computed when the predictor variables are continuous. The Hosmer and Lemeshow Goodness of Fit test statistic is a measure of the difference between the data predicted by the model and the observed data. A significant Hosmer and Lemeshow Goodness of Fit test statistic indicates that the data predicted by the model differ significantly from the observed data and thus, the model is not a good fit. Third, examining the percent of cases correctly classified by the model provides information on the goodness of fit of the model. Higher percentages correctly classified indicate a better fitting model.

Predicting for whom cruise ships detracted from trip enjoyment

A separate logistic regression was run for each predictor variable listed in Table D-23 with cruise ships detracted (detracted vs. not effected) as the dependent variable. The maximum number of observations for these analyses was 352, as twenty day-boat respondents indicated that cruise ships added to their enjoyment and were thus, excluded from these analyses. Of the eight variables, seven resulted in models with significant model chi-squares indicating they were significant predictors of cruise ships detracting from trip enjoyment (see Table D-23). All of these had non-significant Hosmer and Lemeshow's Goodness of Fit test statistics indicating that these models did not predict values significantly different from what they ought to be (i.e. from the observed values), and therefore, indicated good fits. Although these variables were statistically significant predictors, they were not sufficiently strong to improve upon prediction based on selecting the most common condition of "detracted." Thus, these models will not be considered a good fit because they were not strong predictors.

³Discriminant function analysis may also be used to predict membership in two or more groups. Given that there were only two groups, logistic regression was selected over discriminant function analysis because it requires fewer assumptions in theory, is more statistically robust in practice and easier to use and understand.

⁴ The Hosmer and Lemeshow Goodness of Fit test examines the null hypothesis that the data were generated by the model fitted by the researcher. The test divides subjects in to deciles based on predicted probabilities, and then computes a chi-square from observed and expected frequencies. If the computed test statistic has a probability of .05 or less, the null hypothesis that there is no difference between the observed and model-predicted values of the dependent variable is rejected. Well-fitting models generate data that do not differ from what was observed and their Hosmer and Lemeshow Goodness of Fit Test statistic is not significant.

Table D-23 contains the results of these seven logistic regressions. As none of the individual variables were adequate predictors of likelihood that cruise ships detract from trip enjoyment, no further analyses were performed.

Table D-23. Model summaries for predicting likelihood that cruise ships detracted from trip enjoyment

Predictor Variable	Constant	B ¹	Chi-Sq p-value	Hosmer & Lemeshow	% classified ²
Total length of time saw or heard large cruise ships	0.37	0.35	<.001	.559	68.8%
Haze from large cruise ship exhaust affected my views in some manner.	0.73	1.76	.003	nc	69.5%
Heard sound from large cruise ship public address system.	0.72	2.37	.001	nc	69.3%
Heard large cruise ship engines.	0.54	1.44	<.001	nc	69.5%
Number of large cruise ships seen at Margerie and Grand Pacific glaciers	0.28	0.79	<.001	.354	67.0%
Large cruise ships had no effect on viewing land animals	3.05	-2.46	<.001	nc	68.3%
Large cruise ships had no effect on viewing marine animals	2.53	-2.04	<.001	nc	68.3%

¹In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

²The variation in the percent classified for each predictor variable was due to small differences in the number of respondents in each analysis rather than due to the predictor variables being better or worse. Each logistic regression resulted in 100% of people being classified as "cruise ships detracted" and thus, were no better than predicting "detracted".

Summary

For the continuous dependent measure, cruise ship effect scale, four cruise ship characteristics were found to be significant predictors of the effects of cruise ships on visitors' enjoyment: 1) Hearing the public address system of a large cruise ship, 2) Hearing large cruise ship engines, 3) Large cruise ships did not affect the viewing of marine animals, and 4) Large cruise ships did not affect the viewing of marine animals. However, for the dichotomous measure, no situational variables resulted in good fitting models to predict the likelihood of cruise ships detracting from visitors' enjoyment. Taken together, these findings suggest that the cruise ship variables while predictive of smaller shifts in experience (as measured by the continuous measure) are not predictive of larger shifts that would indicate a shift from no effect of cruise ships to cruise ships detracting.

Review of the data suggests that of those day-boat passengers who see or hear cruise ships, most do not report hearing cruise ship public address systems or engines. Furthermore, most do not report that cruise ships affected their ability to view marine or land animals. Thus, most day-boat passengers tended to have similar experiences with cruise ships and those who had different experiences did not have strong reactions. If the mix of experiences with cruise ships changes so that more people have more varied experiences with cruise ships and thus, potentially more varied reactions, then perhaps these or other variables would be more predictive of the likelihood of cruise ships in Glacier Bay detracting from trip enjoyment.

XII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM VISITOR CHARACTERISTICS

The experience day-boat passengers have with cruise ships may also be affected by some characteristic(s) associated with them. For example, visitors for whom it was important to experience a pristine environment may react more negatively to their encounters with cruise ships than visitors for which experiencing a pristine environment was not as important. Knowing whether certain characteristics of day-boat passengers are more predictive of effects of cruise ships on day-boat passengers can provide insights to park managers. For some visitor characteristics (e.g., gender, age) that may be significant predictors, park managers have few options for mitigating their impacts. For others (e.g., importance of different trip dimensions, attitudes toward cruise ships), park managers may be able to design mitigation efforts such as managing expectations to match the most likely visitor experience.

A total of 397 (88.8%) day-boat passengers reported hearing or seeing cruise ships during their visit to Glacier Bay proper. The data from these individuals were used in the following analyses and thus, the results reflect only those individuals who had experience with cruise ships during the trip in which they were contacted to participate in the survey.

Characteristics of day-boat passengers measured

As part of the mail survey, day-boat respondents were asked to report about different characteristics of themselves. These characteristics were captured by the 18 variables listed in Table D-24.

Table D-24. Visitor characteristics used as predictors in regression analyses

Gender	Hispanic (yes or no)
Age	First trip to GLBA
Education level (years of schooling)	Type of party
Residence	Party size
Caucasian (White: yes or no)	
Importance of experiencing the wonder of nature	Importance of experiencing solitude
Importance of intimate experience with nature	Importance of experiencing pristine environment
Importance of hearing the sounds of nature	Importance of experiencing the scenic beauty
Importance of experiencing tranquility	Importance of viewing wildlife
Opinion scale re: large cruise ships in Glacier Bay proper	

Measures of effect of cruise ships on visitor experience

A number of measures of effects of cruise ships on day-boat visitor experience were included in the survey: 1) effects of cruise ships on different dimensions of visitor experience, 2) effect of cruise ships on trip enjoyment, 3) likelihood of future recommendations, and 4) overall ratings of trip enjoyment. As described in the previous section, two composite measures were calculated. The first was a continuous measure of the effects of cruise ships on visitor experience based on the results of a factor analysis (see above for complete description). The range of the cruise ship effect factor score was from 1 “detracted greatly” to 5 “added greatly.” The second was a dichotomous measure of whether cruise ships detracted from trip experience (detracted versus no effect) based on the continuous measure cruise ships effects factor score (see section above for complete description).

Individual relationships between characteristics of day-boat passengers and the effect of cruise ships

Analyses were conducted to determine whether any of the measured characteristics of day-boat passengers were related to the effect of cruise ships on their experience as measured by the detraction factor score. For

characteristics of visitors that were continuous in nature, correlations were calculated. For characteristics of visitors that were nominal in nature, *t*-tests or one-way ANOVAs were calculated.

Table D-25 summarizes the characteristics of day-boat passengers that were found to be significant predictors of the effect of cruise ships as measured by the detraction factor score. The older respondents were the more positive effects cruise ships had on their experience. Seven of the eight trip dimension scales were significant predictors indicating for each that the more important the trip dimension was the more cruise ships detracted from trip experience. More agreement favoring cruise ships as measured by the opinion scale was associated with more positive effects of cruise ships on day-boat passengers' experience. Because these opinion measures were asked in the mail back questionnaire, it is possible that the opinion scale reflects day-boat passengers' experiences with cruise ships during their trips. Thus, while the opinion scale and effects of cruise ships are related, there was no way from the current data to determine 1) whether visitor opinions shaped the perception of the experience, 2) whether the experience shaped visitors' opinions, or 3) whether some other more complex relationship underlies the observed correlation.

Table D-25. Day-boat passenger characteristics that were significant predictors of effects of cruise ships

Predictor variable	<i>r</i>	<i>p</i> -value
Age	.151	.007
Importance of experiencing the wonder of nature	-.196	<.001
Importance of intimate experience with nature	-.279	<.001
Importance of hearing the sounds of nature	-.297	<.001
Importance of experiencing tranquility	-.292	<.001
Importance of experiencing solitude	-.327	<.001
Importance of experiencing pristine environment	-.348	<.001
Importance of experiencing the scenic beauty	-.158	.002
Opinion scale	.503	<.001

NOTE: Higher scores of the detraction factor reflect more positive effects of cruise ships.

To understand the unique relationship of each of the predictor variables with the effects of cruise ships on day-boat passengers' visitor experience, a stepwise regression was performed that included all nine variables as predictor variables. A stepwise procedure was adopted to determine the best fitting model. The final model included four of the nine variables (see Table D-26). The omnibus test of the model was significant, $F(4, 328) = 45.17$, $p < .001$, and the R^2 indicated that 35.5% of the variance in cruise ship effect scores was explained by the model.

Table D-26. Summary of model for effects of cruise ships measured by cruise ship effect score for day-boat passengers

Predictor Variable	<i>b</i>	S.E.	<i>t</i>	<i>p</i>
Age	.007	.002	3.78	<.001
Importance of experiencing pristine environment	-.104	.038	-2.71	.007
Importance of experiencing solitude	-.075	.027	-2.84	.005
Opinion scale	.278	.038	9.56	<.001
Constant	2.04	.202	10.12	<.001

The regression equation associated with the above model is below.

Cruise ship effect score = $2.04 + (0.007 * \text{Age}) + (-.104 * \text{Importance of experiencing pristine environment}) + (-.075 * \text{Importance of experiencing solitude}) + (.278 * \text{Opinion scale})$

The regression coefficients (B) show the change in one variable given that all other variables are held constant. If the mean for each variable is used in the equation, the cruise ship effect score is predicted to be 2.51—halfway between detracted somewhat and no effect. Increasing the importance of experiencing solitude from 3.03 (the mean) to 4.03 while keeping all the other variables at their mean levels results in a predicted cruise ship effect score of 2.44 (.07 lower than the 2.51). If all variables are kept at their mean levels except increasing the agreement with cruise ships being in Glacier Bay proper from 2.73 (the mean) to 3.73, the predicted cruise ship effect score is 2.79 (0.28 higher than 2.51)

The opinion regarding large cruise ships in Glacier Bay proper measure was included in the mail survey and thus, it is unclear what the relationship between it and cruise ships detracting. While the opinion scale and effects of cruise ships were related, there was no way from the current data to determine 1) whether visitor opinions shaped the perception of the experience, 2) whether the experience shaped visitors' opinions, or 3) whether some other more complex relationship underlies the observed relationship. Future research could address this issue by asking visitors' their opinions prior to the trip.

Individual relationships between characteristics of day-boat passengers and the likelihood that cruise ships detract from trip enjoyment

Analyses were conducted to determine whether any of the measured characteristics of day-boat passengers were related to the likelihood cruise ships detract from visitors experience as measured by the cruise ship detracted score (the dichotomous dependent measure). Logistic regression analysis was used to determine whether any of the measured characteristics of day-boat passengers (see Table D-24) predicted who was negatively affected by cruise ships. Logistic regression is a form of linear regression used when the dependent variable is dichotomous (e.g., cruise ships detracted: yes or no)⁵. In logistic regression, predictor variables may be either categorical (e.g., gender: male or female) or continuous (e.g., age).

In logistic regression there are multiple ways to evaluate whether the generated model is good fit to the data. The first is the omnibus chi-square test of the model coefficients. A significant chi-square indicates that the coefficients in the model as a whole significantly predict the dependent variable. When a model has only one predictor variable, a significant model chi-square indicates that the predictor variable significantly predicted the dependent variable. Second, the Hosmer and Lemeshow Goodness of Fit test statistic⁶ can be computed when the predictor variables are continuous. The Hosmer and Lemeshow Goodness of Fit test statistic is a measure of the difference between the data predicted by the model and the observed data. A significant Hosmer and Lemeshow Goodness of Fit test statistic indicates that the data predicted by the model differ significantly from the observed data and thus, the model is not a good fit. Third, examining the percent of cases correctly classified by the model provides information on the goodness of fit of the model. Higher percentages correctly classified indicate a better fitting model.

Predicting for whom cruise ships detracted from trip enjoyment

A separate logistic regression was run for each predictor variable listed in Table D-24 with cruise ships detracted (detracted vs. not effected) as the dependent variable. The maximum number of observations for these analyses was 346. Of the 18 variables, ten resulted in models with significant model chi-squares

⁵Discriminant function analysis may also be used to predict membership in two or more groups. Given that there were only two groups, logistic regression was selected over discriminant function analysis because it requires fewer assumptions in theory, is more statistically robust in practice and easier to use and understand.

⁶ The Hosmer and Lemeshow Goodness of Fit test examines the null hypothesis that the data were generated by the model fitted by the researcher. The test divides subjects in to deciles based on predicted probabilities, and then computes a chi-square from observed and expected frequencies. If the computed test statistic has a probability of .05 or less, the null hypothesis that there is no difference between the observed and model-predicted values of the dependent variable is rejected. Well-fitting models generate data that do not differ from what was observed and their Hosmer and Lemeshow Goodness of Fit Test statistic is not significant.

indicating they were significant predictors of cruise ships detracting from trip enjoyment: 1) age, 2) years of schooling, 3) the importance ratings for all trip dimensions except “View scenery”, and 4) the opinion scale for large cruise ships in Glacier Bay proper. The opinion scale for large cruise ships in Glacier Bay proper had a significant Hosmer and Lemeshow’s Goodness of Fit test statistic indicating that the model predicted values significantly different from what they ought to be (i.e. from the observed values), and therefore, was not a good fit. The remaining nine variables had non-significant Hosmer and Lemeshow’s Goodness of Fit test statistics indicating good fits. However, these remaining nine variables were not sufficiently strong predictors to improve upon prediction based on selecting the most common condition of “detracted.” Thus, none of the variables resulted in a good fitting model based on the criteria above. Table D-27 contains the results of these ten logistic regressions. Because none of these were good fitting models, no further analyses were performed.

Table D-27. Model summaries for predicting likelihood that cruise ships detracted from trip enjoyment based on day-boat visitor characteristics

Predictor Variable	Constant	B*	Chi-Sq p-value	Hosmer & Lemeshow	% classified
Age	2.70	-.036	<.001	.506	68.4%
Years of school	-1.04	.106	.011	.221	68.6%
Importance of experiencing the wonder of nature	-2.42	.726	<.001	.969	68.8%
Importance of intimate experience with nature	-1.49	.527	<.001	.863	68.5%
Importance of hearing the sounds of nature	-1.22	.540	<.001	.709	68.2%
Importance of experiencing tranquility	-0.79	.435	.001	.212	68.2%
Importance of experiencing solitude	-0.32	.365	.001	.281	68.6%
Importance of experiencing pristine environment	-2.24	.740	<.001	.068	68.3%
Importance of viewing wildlife	-0.87	.366	.029	.738	68.1%
Opinion scale for large cruise ships in Glacier Bay proper	4.08	-1.173	<.001	.025	69.7%

*In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

Summary

Four individual characteristics were found to predict effects of cruise ships as measured by the continuous dependent measure: 1) age, 2) importance of experiencing pristine environment, 3) importance of experiencing solitude, and 4) opinions regarding large cruise ships in Glacier Bay proper. In contrast, none of the measured individual characteristics were found to predict the likelihood of cruise ships detracting. These findings suggest that the four individual characteristics while predictive of smaller shifts in cruise ship effects (as measured by the continuous measure) are not predictive of larger shifts that would indicate a shift from no effect of cruise ships to cruise ships detracting.

Review of the data indicated most day-boat passengers who saw cruise ships had similar experiences with them. These findings indicate that for this limited range of experiences with cruise ships, individual difference variables have little predictive utility. If experiences with cruise ships become more varied, then individual difference variables may be more predictive.

XIII. EXPERIENCES WITH DIFFERENT FORMS OF TRANSPORT

When day-boat visitors are visiting Glacier Bay, evidence of human presence is generally limited to the other visitors in the bay, and the forms of transport used by those visitors.⁷ Although this report focuses on the effects of cruise ships on day-boat experiences, survey questions also asked about encounters with other forms of transport. There were two primary reasons for considering the effects of other forms of transport: 1) to set the effect of cruise ships in a context relative to the effects of those other forms, and 2) to determine whether visitors' experiences with multiple forms of transport affect the degree to which those encounters (including encounters with cruise ships) detract from their experiences.

Effects of cruise ships relative to other forms of transport

Tables D-10 to D-13 in chapters VII and VIII above summarized the detraction ratings for different forms of transport encountered at Margerie/Grand Pacific glaciers and during the entire trip. Table D-28 shows that for both situations, cruise ships detracted from more than twice as many day-boat visitor experiences than any other single form of visitor transport.

Table D-28. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip

Type of craft	Percent who said craft detracted (somewhat or greatly) from enjoyment of Margerie/Grand Pacific glaciers ¹	Percent who said craft detracted (somewhat or greatly) from enjoyment of Glacier Bay proper ²
Large cruise ships	33.3%	45.6%
Motorized craft other than large cruise ships	13.0%	20.2%
Propeller-driven aircraft	3.5%	9.2%
Helicopters	2.7%	6.0%

¹ These summary data were derived from those presented in Table D-10.

² These summary data were derived from those presented in Table D-12.

Detraction due to cruise ships was higher than other forms of transport in part because cruise ships were encountered by more day-boat visitors (see Chapter V). However, even when detraction was calculated only for the respondents who saw each form of transport, cruise ships were the form most likely to detract from visitor experiences (see Table D-29).

Table D-29. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip

Type of craft	Percent of respondents who encountered each form of transport that said craft detracted (somewhat or greatly)	
	Detracted from enjoyment of Margerie/Grand Pacific glaciers ¹	Detracted from enjoyment of Glacier Bay proper ²
Large cruise ships	57.7%	51.2%
Motorized craft other than large cruise ships	33.1%	25.7%
Propeller-driven aircraft	6.7%	31.8%
Helicopters	27.2%	43.3%

¹ These summary data were derived from those presented in Table D-11.

² These summary data were derived from those presented in Table D-13.

⁷ Exceptions would be NPS staff or scientific researchers and commercial jetliners at high altitudes.

In sum, cruise ships were the form of mechanized transport that had the greatest detracting effect on the experiences of day-boat visitors. Whereas other types of craft had some detracting effects, cruise ships: a) were more likely to detract from the experiences of visitors who encountered them and b) were more likely to be encountered than other types of craft (resulting in higher overall detraction rates).

Does the number of cruise ships affect encounters with other forms of transport and ratings of their detraction?

One indirect way in which cruise ships could affect visitor experiences is by altering the number of encounters visitors have with other forms of transport. For example, if captains of smaller vessels planned their trips to the tidewater glaciers for days when only one cruise ship visits Glacier Bay, then encounters with those motorized vessels would be higher on 1-cruise ship days. Analyses of the survey data found very little evidence of such an indirect effect. The only measure of encounters that differed for 1 and 2-cruise ship days was the number of helicopters seen and/or heard (1.1 helicopters seen on 1-cruise-ship days and 1.8 seen on 2-cruise ship days⁸). In addition, there was no evidence that any effects of cruise ships on encounters detracted from visitors' experiences. None of the detraction measures differed for 1 and 2-cruise ship days.

The survey results showed that encounters with other forms of mechanized transport (and their effects on visitor experiences) were not altered by the number of ships in Glacier Bay, and thus, these results should not substantially alter managers' decisions about cruise ship policy. The next section discusses evidence (consistent with Johnson, 1990) that encounters with multiple forms of transport were not cleanly separated in visitors' detraction ratings.

Do encounters with one type of craft affect experiences with other types of craft?

In addition to shifting actual encounters with different types of craft, cruise ships may affect how those experiences with different craft are perceived. More broadly, experiences with one type of craft may affect how visitors perceive their experiences with other types of craft. Johnson (1990) discussed evidence for such effects in a 1989 study of Glacier Bay visitors. Understanding the inter-related reactions to different types of craft can help managers more effectively measure and mitigate the impacts of changes in vessel management policy.

The current research program focused on assessing the effects of cruise ships on visitor experiences. Some limited additional questions asking about other types of craft were included to provide context for understanding the effects of cruise ships. However, the nature of these questions was only sufficient to support exploratory analyses regarding the possible relationships between encounters with and effects of the different type of craft. These exploratory analyses are discussed below to help managers appreciate the complexity of visitor experiences and to provide researchers with information that may be useful in the development of future surveys.

Relationships between encounters with various forms of transport and ratings of their detraction were assessed by examining the correlations between the variables shown in Table D-30. Measures of encounters with each form of transport (i.e., cruise ships, other motorized vessels, propeller-driven aircraft, and helicopters) were included, as well as measures of the detracting effects of those encounters.

⁸ Note that these results produce estimates of 1.6 helicopters seen under current conditions, and 1.8 estimated sightings for 2 cruise ships in the bay every day; see Figure D-43

Table D-30. Measures used in analysis of relationships between encounters with various forms of transport and ratings of their detraction

Type of craft	Encounter Measures						Detraction Measures		
	Saw/heard Y/N	Number saw/heard	Hours saw/heard	Heard engine	Heard P.A.	Saw haze	Detract Y/N	Degree detract	Detract scale*
Large cruise ships	X		X	X	X	X	X		X
Motorized craft other than large cruise ships	X	X	X	X	X	X	X	X	
Propeller-driven aircraft	X	X	X	X			X	X	
Helicopters	X	X	X	X			X	X	

*Average of cruise ship detraction scales for each REP item and the rated detraction of cruise ships in Glacier Bay proper.

The results of the correlation analysis showed that in some cases, the detracting effects of encounters were intertwined. Table D-31 contains some of these cases as examples. First, the detraction due to cruise ships was related to encounters with other motorized watercraft but not to encounters with cruise ships, while conversely, detraction due to other motorized watercraft was related to encounters with cruise ships but not to encounters with other motorized watercraft. Likewise, the detraction due to helicopters is related to encounters with other motorized watercraft, while conversely, detraction due to other motorized watercraft was related to encounters with helicopters.

Table D-31. Correlation between measures of encounters with watercraft and craft-specific measures of detraction (significant correlations shown, those in bold have $p < .01$).

Hours of encounters with:	Measure of detraction		
	Cruise ship detraction scale*	Other motorized vessel detraction	Helicopter detraction
Large cruise ships	ns	-.15	
Motorized craft other than large cruise ships	-.12	ns	-.418
Helicopters		-.253	ns

A variety of hypotheses may account for such intertwined relationships. Some visitors may be both more observant of other craft and more likely to say such craft detracted from their experiences, or a disturbing encounter with one type of craft may sensitize them to the presence of other forms of transport. Alternately, visitors might respond to all the detraction measures based on a generalized feeling of how much they were “bothered” by the presence of other visitors, and be either unwilling or unable to clearly separate the effects of different vessels or craft. Future research could be designed to test these different explanations. Because a complete investigation of these relationships was not a focus of the current research, we can say little about the specific ways in which encounters with the various forms of transport affect visitor ratings of detraction. However, there was strong evidence that those encounters do not have independent effects on the rated detraction due to each type of craft.

Although the exploratory analyses discussed in this section do not clearly define the relationships between encounters with and effects of the different type of craft, they can help managers decide whether information designed to mitigate the detracting effects of cruise ships should focus entirely on cruise ships or should also address the effects of other forms of transport. Specifically, if the detracting effects of each form of transport were unrelated to each other, then each effect could be treated independently. However, because the effects are related, mitigation efforts focused on all forms of transport are likely to be more effective.

Because of the limited understanding of the factors that determine day-boat visitor ratings of the detracting effect of cruise ships, some might argue that the measure should not be used in formulating vessel management policy. A complete understanding of the visitor experience would be ideal. However, it is important to remember that no matter what factors actually led some visitors to report that cruise ships detracted from their experiences, there is every reason to believe that those visitors thought that cruise ships did detract from their experiences. Measuring the prevalence of such detraction is a necessary first step in determining whether it is an issue that merits further study or management action.

XIV. SOCIAL VALUES CONFLICT

Reviewers of an earlier draft of this report suggested that the concept of recreational conflict might shed light on the ways cruise ships affect visitor experiences. Because the current research was not conceptualized from this perspective, the measures collected in this study do not map directly onto key variables or concepts used in the conflict approach. However, as described below, several measures that approximate the concepts were available. The findings and discussion below are based on these approximate measures, and thus, are exploratory in nature. Their primary value is to guide the planning of future research that might seek to understand how and why cruise ships affect visitors' experiences (rather than if they do).

Recreational conflict overview

When diverse groups use a common recreation area, conflict between those groups is likely. Interpersonal (or goal interference) conflict arises when a physical encounter with (i.e., hearing and/or seeing) an individual or group interferes with the goals of another individual or group (Jacob & Schreyer 1980). For example, in Glacier Bay proper, individuals who wish to experience nature untouched by humans may experience interpersonal/goal interference conflict when seeing a cruise ship in the otherwise pristine environment of the bay. Recreationists may also experience a second type of conflict – social value conflict occurs between groups who do not share the same norms and/or values, and does not require a physical encounter between the conflicting groups (Ruddell & Gramann 1994). For example, individuals who feel that cruise ships in Glacier Bay are inappropriate may perceive conflict with cruise ships even if they never see a cruise ship during their visits to Glacier Bay proper.

Research examining conflict among recreationists has found that social value conflict occurs not only for individuals who do not encounter a potentially conflicting other group, but can also occur in individuals who encountered the other group. A study by Vaske, Needham, and Cline, Jr. (2007) asked snowmobilers and skiers whether they agreed with the statement “just knowing that skiers (snowmobilers) are in the area bothers me.” Agreement with this statement was used as a measure of social value conflict in individuals who also experienced interpersonal conflict. Findings indicated that a sub-group of individuals who were classified as experiencing interpersonal conflict also experienced social value conflict.⁹ In sum, individuals who have encounters with another potentially conflicting group can experience interpersonal conflict and/or social value conflict whereas individuals who do not have physical encounters with another potentially conflicting group can only experience social value conflict.

Understanding the source of conflict can be useful when setting policy intended to reduce such conflict. For example, interpersonal conflicts, those that arise solely from physical encounters, can be addressed by separating user groups through restricted use or zoning (i.e., limiting opportunities for physical encounters). However, these strategies will not reduce social value conflict, which is independent of actual encounters. Education has been suggested as a more effective means to reduce social value conflicts (Vaske et al. 2007). Thus, managers may be better able to mitigate the detracting effects of cruise ships on day-boat visitors if they know the nature of the conflict (or conflicts) that underlies reported detraction.

⁹ Although their methods did not allow this determination, it should be noted that it was possible that some of the people reported as experiencing both interpersonal conflict and social value conflict may have experienced only social value conflict.

Applying the conflict framework to current research

The current research was designed to inform park management of potential changes in the effects of cruise ships associated with the shift from the 1:2 mix of one- versus two-cruise ships in the bay days to every day being a two-cruise ships in the bay day. Accordingly, it provided cruise ship detraction rates only for those day-boat respondents who saw cruise ships, and was not designed to distinguish whether these detraction effects were due to interpersonal conflict or social value conflict. It was presumed that only the detraction arising from actual interaction with cruise ships (either hearing or seeing) would be affected by the change in policy. Therefore, the primary objective was to determine whether changes in the number of cruise ships in the bay would produce significant changes in: a) the likelihood of encountering cruise ships and b) the likelihood that cruise ships would detract from visitor experiences.

Applying the conflict framework to the current research suggests that for some people, conflict may arise that is not due to physical encounters with cruise ships. As noted above, the current research was not conceptualized using the conflict framework and thus does not have all the necessary data to assess rates of interpersonal conflict and social value conflict among all day-boat visitors. However, for some visitors, data were collected that approximated some of the key concepts from the conflict approach, and those data were used in these exploratory analyses. Specifically, among visitors who saw cruise ships, data were available that could serve as reasonable operationalizations for: a) problems/conflicts and b) social value conflict. For those who did not see cruise ships, only a measure assessing social value conflict was available.

Measure of problem/conflict

Recreational conflict research typically considers a problem or conflict to exist if a person reports a problem with specific behaviors engaged in by another user group. The current research was interested in the effects of cruise ships rather than the behavior of those aboard them. Thus, for analyses of conflict, if a visitor indicated that cruise ships detracted from their trip experience, a problem or conflict was assumed to be inherent in that detraction. If cruise ships did not detract, then no problem or conflict was considered present.

A dichotomous measure of cruise ship detraction based on an aggregated measure of cruise ship effects was developed for other analyses (see Measures of Effect of Cruise Ships on Visitors Experience for a description of this measure). Individuals whose scores on the aggregated measure indicated a negative effect of cruise ships on their trip enjoyment were coded as “cruise ships detracting” whereas individuals who reported no effects of cruise ships were coded as “cruise ships did not detract”. The small number of individuals with aggregate scores indicating cruise ships added to their trip enjoyment were excluded. Because only visitors who saw or heard cruise ships were asked cruise ship effect questions, there were no problem/conflict data for people who did not see cruise ships.

As seen in Table D-32, 89% of day-boat respondents saw or heard cruise ships and of those, 68% reported that cruise ships detracted from their trip experience.

Table D-32. Summary of variables related to social value conflict

% of all day-boat visitors who saw/heard cruise ships	89%
% for whom cruise ships detracted of those who saw/heard them	68%
% of all day-boat visitors agreed it is inappropriate for large cruise ships to be in Glacier Bay proper (social value conflict)	39%

Measure of social value conflict

Social value conflict is defined as arising when the values a person holds are in conflict with the values of another individual or group. These value conflicts can exist and result in perceived problems even if the two user groups have no physical contact. Review of the questionnaire suggested that one of the included opinion items could serve as a reasonable measure of social value conflict between day-boat visitors and

cruise ships in Glacier Bay proper. This item asked respondents' agreement with the statement, "It is inappropriate for large cruise ships to be in Glacier Bay proper." Individuals who indicated that they strongly agreed or agreed with the statement were classified as having a social value conflict with cruise ships in Glacier Bay proper. Individuals who indicated that they were neutral, disagreed, or strongly disagreed were classified as having no social value conflict. Because all respondents completed the opinion measures, social value conflict data were available for all day-boat respondents.

As can be seen in Table D-32, 39% of all day-boat respondents agreed that it is inappropriate for large cruise ships to be in Glacier Bay proper suggesting over one-third of day-boat respondents experience social value conflict with cruise ships in Glacier Bay proper.

Analyses

Within the framework of user conflict, it is possible that cruise ships detracted from the experiences of some day-boat visitors who did not see cruise ships due entirely to their social value conflict with cruise ships being in Glacier Bay proper. In addition, for day-boat visitors who saw cruise ships and reported that the ships detracted from trip experience, understanding whether that detraction arose from interpersonal conflict, social value conflict, or a mix of the two can help park managers assess whether limiting encounters with cruise ships is likely to reduce conflict and associated detraction. Thus, further analysis of these variables has the potential to: 1) provide an estimate of negative effects of cruise ships due to social value conflict among day-boat visitors who did not see cruise ships and 2) provide insight into the possible sources of conflict underlying the reported detraction for those who did see cruise ships.

Source of conflict for those who saw/heard cruise ships

A total of 68% of the day-boat visitors who saw/heard cruise ships indicated that cruise ships detracted from their trip enjoyment. When these individuals are separated by their agreement with "It is inappropriate for large cruise ships to be in Glacier Bay proper", 36% of those who saw/heard cruise ships experienced only interpersonal conflict (see Table D-33).

The methods used in prior social value conflict research allowed the separation of individuals who experienced problems due to their encounters with another user group into those who had social value conflict and those who did not. However, these methods did not provide a means to distinguish if those who experienced problems from encountering another group did so due to both interpersonal and social value conflict or due to social value conflict only. Thus, per the conflict literature, the remaining 32% would be considered to have experienced a mix of social value conflict and interpersonal conflict. However, it is possible that the detraction effects experienced by these individuals could have been entirely due to either social value conflict or to interpersonal conflict.

For those who saw/heard cruise ships but reported no conflict, a small percentage were classified as having social value conflict. However, because these individuals did not report detraction, it is possible that: 1) the level of conflict was insufficient to result in detraction, 2) our opinion item was a less than ideal measure of social value conflict, or 3) there was inconsistency within individuals. Prior research examining social conflict used methods that examined or distinguished the rate of social value conflict among only those users who both encountered another user group and reported effects of the encountered group (Vaske et al. 2007). If they had looked at rates of social value conflict in other groups, it is possible that they would have seen similar patterns to those reported in Table D-33.

Table D-33. Source of conflict for day-boat respondents

	Did not see/hear cruise ships		Saw/heard cruise ships	
Cruise ships did not detract	100%		32%	
No conflict		39%		26%

Social value conflict only		61%		6%
Cruise ships detracted	0%		68%	
Interpersonal conflict only				36%
Both types of conflict*				32%
Total	100%	100%	100%	100%

Estimating additional detraction effects due to social value conflict.

In the current survey, visitors who did not see or hear cruise ships were not asked whether cruise ships in Glacier Bay affected their trip enjoyment. However, the social value conflict literature suggests that some individuals who do not see another user group may still experience negative effects of that group because of differing social values. Using the information in Table D-32 and Table D-33, we can estimate the percentage of day-boat respondents who did not see cruise ships but would be expected to have negative reactions due to social value conflict.

Our proxy measure for social value conflict indicated that 61% of day-boat respondents who did not see cruise ships agreed that it was inappropriate for large cruise ships to be in Glacier Bay proper (see Table D-33). As 11% of day-boat visitors did not encounter cruise ships (100% - 89% per Table D-32), it would be expected that up to 7% ($11\% \times 61\%$) of day-boat visitors who did not see cruise ships in Glacier Bay proper would report negative effects of cruise ships on their trip experience from simply knowing that the ships are in the bay (i.e., because of social value conflict).

Discussion

The survey focused primarily on effects of cruise ships on those visitors who encountered ships and did not include measures traditionally used to measure the different sources of user conflict. Thus, analyses examining social value conflict among day-boat passengers were exploratory and are presented for park managers' consideration in light of current and future visitor research.

More than one-third (39%) of day-boat visitors reported social value conflict with cruise ships in Glacier Bay proper. This rate was comparable to those observed for other tour-boat passengers and backcountry visitors.

Both the day-boat and other tour-boats provide visitors with an experience of Glacier Bay that is relatively intimate compared to that available on a cruise ship. The comparable (and relatively high) rates of social value conflict for these visitor groups may arise from this similarity in their desired experiences.

The fact that some day-boat visitors believe it is inappropriate for large cruise ships to be in Glacier Bay is undoubtedly not surprising to park management. The idea that this belief can result in cruise ships detracting from park visitors' experiences even when they do not encounter cruise ships during the trip may be more novel.

The concept of social value conflict also suggests that people who never go to Glacier Bay proper can experience negative effects of cruise ships because they hold values incongruent with cruise ships being in the bay. If managers make use of social value conflict when considering the impacts of cruise ships, a question naturally arises concerning the population in which such conflicts should be considered. Is the relevant population park visitors? Park visitors and AK residents? All U.S. residents? All North Americans? The world? In light of such complex decisions, managers might reasonably elect to focus on the experiences of park visitors, recognizing that those experiences may be influenced by a variety of factors including social value conflict.

Managers can still benefit from the insight that there are people whose experiences are negatively affected by cruise ships independent of whether they physically encounter one. This insight suggests that vessel limits or zoning efforts that reduce encounters will not have a directly proportional effect on detraction.

Day-Boat Visitor Survey

rates (because some visitors' experiences will be negatively affected as long as any cruise ships are allowed in Glacier Bay, whether or not they encounter one). Research to better understand the specific value conflicts for these visitors may help managers to determine whether other mitigation efforts, such as educational programs, would mitigate the negative effects of cruise ships on their experiences. For example, if people believe that large cruise ships are inappropriate in Glacier Bay proper because they pollute the environment, then providing information about the air and water standards/monitoring for cruise ships that are much more rigorous than most Alaskan coastal villages may help to reduce the conflict. However, if individuals believe that large cruise ships are simply incongruent with the park aesthetic, then educational programs are unlikely to be effective. Qualitative information from interviews with visitors found evidence of both beliefs, but their prevalence in visitors who reported detraction due to cruise ships is unknown.

XI. SUMMARY AND IMPLICATIONS

The Day-boat Passenger Mail Survey was designed to address the following three research objectives:

1. How do cruise ships affect, if at all, day-boat visitors' experiences in Glacier Bay proper?
 - a. Which dimensions of day-boat visitor experiences in Glacier Bay proper, if any, do cruise ships affect?
 - b. If cruise ships affect day-boat visitor experiences in Glacier Bay proper, which features of cruise ships have effects?
2. What are estimated effects for day-boat visitors under the Record of Decision maximum use level of 2 cruise ships per day, every day?
3. How do the effects of cruise ships on day-boat visitor experiences in Glacier Bay proper compare to the effects of other forms of mechanized transport?

This section addresses each of these objectives. However, the third objective will not be discussed independently. Rather, when the effects of cruise ships on visitor experiences (either current effects or estimated effects under the maximum use level) are discussed, the analogous effects of other forms of mechanized transport will be compared and contrasted.

Objective 1: How do cruise ships affect, if at all, day-boat visitors' experiences in Glacier Bay proper?

Recalled encounters with cruise ships

It is difficult to imagine how cruise ships could have a direct effect on visitor experiences if visitors did not remember seeing them.¹⁰ Accordingly, the maximum possible extent of such direct effects is indicated by the proportion of visitors who report seeing cruise ships. In this survey, 88.8% of day-boat visitors reported seeing or hearing large cruise ships. In comparison, a slightly smaller percentage (79.9%) saw motorized watercraft other than large cruise ships. (For more detail regarding encounters on the entire trip see Section V.)

Qualitative interviews conducted in 2007 suggested that cruise ships might have particularly strong effects on experiences at focal attractions in Glacier Bay. Perhaps the foremost attraction for most visitors is the terminus of Tarr Inlet where the Margerie and Grand Pacific glaciers are visible. In this survey, 44.7% of all day-boat visitors (57.8% of those who said they visited Margerie/Grand Pacific glaciers) reported seeing or hearing large cruise ships at that location. A smaller number of day-boat visitors (27.4% of all and 35.5% of those who said they visited Margerie/Grand Pacific glaciers) reported seeing motorized watercraft other than large cruise ships. (For more detail regarding encounters at Margerie and Grand Pacific glaciers see Section IV.)

These results suggested that if every encounter with another cruise ship had a negative effect on day-boat visitors (which it did not), 88.8% of day-boat visitors could potentially experience such negative effects at some point during their trip, and 44.7% could be negatively affected by encounters at Margerie/Grand

¹⁰ Chapter XIV discusses how cruise ships could detract from some visitors' experiences even when they did not encounter cruise ships. The mechanism for this indirect effect is social values conflict.

Pacific glacier. The actual effects of encounters with cruise ships reported by day-boat visitors are discussed in the following section.

General and specific effects of cruise ships

The survey was designed to measure a wide range of effects that encounters with cruise ships might have on day-boat visitors' experiences. Some of these effects were very general whereas others were much more specific. For example, the question asking day-boat visitors how seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper was an extremely general measure. More specific measures asked about effects of encounters on visitor enjoyment of Margerie/Grand Pacific glaciers, effects of encounters on particular trip experiences, and effects of particular aspects of encounters (e.g., engine sounds, public address system sound, and haze) with cruise ships.

The more specific measures were included for two different reasons. First, past studies found that general measures tend to be less sensitive to trip experiences (e.g., seeing or hearing cruise ships) than more specific measures. And second, more specific information about the aspects of encounters that have the greatest effects on trip experiences (e.g., location, engine sounds, public address system sound, and haze) has the potential to help managers set policy that mitigates negative effects.

Throughout earlier sections of this report, percentages were often calculated and reported for various sub-populations of day-boat visitors. For example, the percentage of passengers reporting that cruise ships detracted from their general enjoyment of Glacier Bay was calculated based on the sub-population of day-boat visitors who saw or heard cruise ships. In this section, results are generally reported as percentages of all day-boat visitors. This approach allows direct comparison between the results of different questions, thus enabling readers to better judge the magnitude of the various effects of cruise ships and effects of other motorized craft.

Detraction from general enjoyment and from particular trip experiences

Figure D-72 shows the percentage of day-boat visitors who reported that encounters with large cruise ships detracted from their experiences in any of a number of ways. The largest reported detraction (47.6%) was from day-boat visitors' general enjoyment of Glacier Bay. Slightly smaller percentages (between 43.4% and 44.7%) reported detraction from particular trip experiences that were related to wilderness experience as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). If we consider encounter rates, then approximately half of the day-boat visitors who saw or heard cruise ships felt that the cruise ships did not detract from particular trip experiences or from their general enjoyment.

These quantitative findings were consistent with the findings of the qualitative interviews with Glacier Bay visitors conducted in both 2007 and 2008. For example, the most common effects of cruise ships mentioned by interviewed visitors were disruptions of "the wilderness experience" or a "sense of solitude." At the same time, many day-boat visitors reported no detraction due to cruise ships. Up to half of them may have felt similar to the private vessel passenger interviewed in 2008 who said, "There's a lot of water, it's a big country, and the cruise boats here are spread out. It's not like other places where they go by day in and day out. It's actually a reprieve."

Although the qualitative report concluded that nearly all participants felt that other vessels (including cruise ships) had no significant effects on their experiences, the mail survey found that almost half of day-boat visitors reported that encounters with cruise ships detracted from their general enjoyment of Glacier Bay. Further examination of the mail survey data, reported below under "Measures of overall trip satisfaction", suggests that the results of the two surveys were not as discrepant as this reported incidence of detraction would indicate.

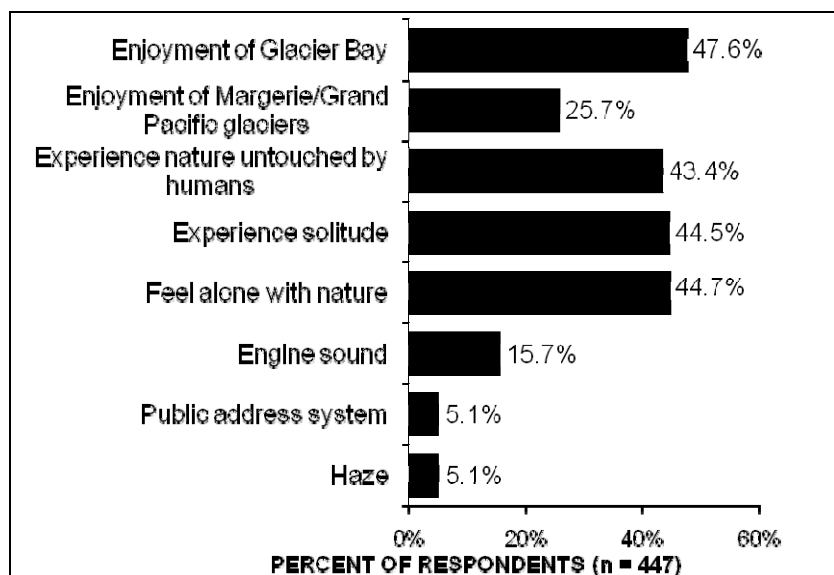


Figure D-72. Percent of all day-boat respondents who reported detraction effects due to large cruise ships

Figure D-73 shows that 20.2% of day-boat visitors reported that seeing or hearing motorized craft other than cruise ships detracted from their general enjoyment of Glacier Bay. This percentage was less than half of the 47.6% who reported detraction due to seeing or hearing cruise ships. In addition, two findings suggested that encounters with cruise ships were perceived more negatively than other motorized watercraft. First, for those day-boat visitors who encountered each of the different types of craft, detraction rates were higher for cruise ships than for motorized craft other than cruise ships (51.2% vs. 25.7%, respectively). Second, of visitors seeing or hearing the craft, 10.6% reported that seeing or hearing cruise ships “detracted greatly” from their enjoyment whereas only 2.3% of passengers reported that motorized craft other than cruise ships “detracted greatly”.

Figure D-74 reports the findings for helicopters and propeller-driven aircraft. The overall percentages of passengers reporting detraction due to each type of aircraft were lower than the percentages for cruise ships or motorized watercraft other than cruise ships. These overall percentages were low because encounters with aircraft were relatively rare. Detraction rates for passengers who saw aircraft were 31.8% for propeller-driven airplanes and 43.3% for helicopters—falling between the detraction rates for motorized watercraft other than large cruise ships (25.7%) and those for large cruise ships (51.2%).

Day-Boat Visitor Survey

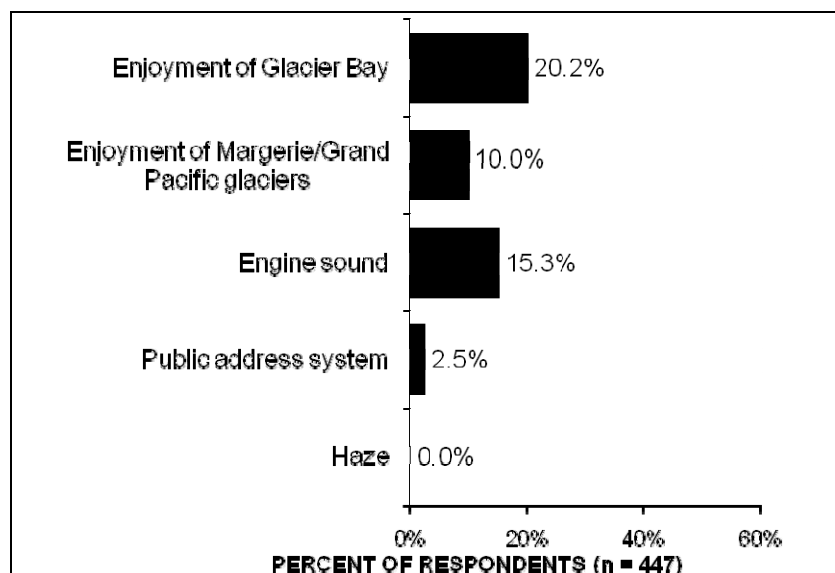


Figure D-73. Percent of all day-boat respondents who reported detraction effects due to motorized water craft other than large cruise ships

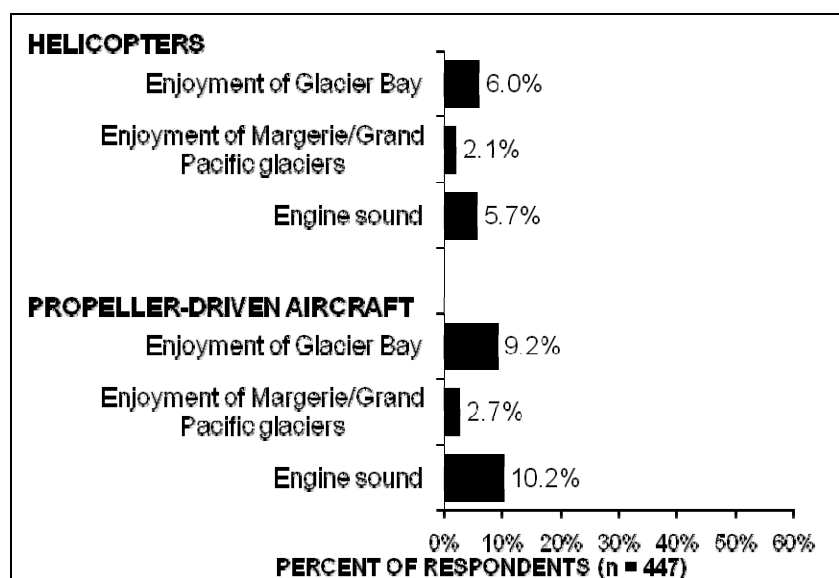


Figure D-74. Percent of all day-boat respondents who reported detraction effects due to aircraft

Detraction at particular sites

A considerably smaller percentage of day-boat visitors reported that cruise ships detracted from their experiences at Margerie/Grand Pacific Glacier (25.7%; see Figure D-72) than reported detraction from their general enjoyment of Glacier Bay (47.6%; see Figure D-72). However, fewer day-boat visitors encountered large cruise ships at Margerie and Grand Pacific glaciers than during the course of their entire trip (44.7% vs. 88.8%, respectively). Comparing the detraction rate for day-boat visitors who encountered cruise ships at Margerie and Grand Pacific glaciers with that for day-boat visitors who encountered cruise ships anywhere in Glacier Bay proper reveals similar detraction rates (57.7% vs. 51.2%, respectively). In other words, when day-boat visitors did encounter cruise ships at Margerie/Grand Pacific glaciers, those encounters were only slightly more likely to detract from their experiences than were encounters anywhere in Glacier Bay.

Seeing or hearing large cruise ships at Margerie and Grand Pacific glaciers detracted from more than twice as many day-boat visitors' trips as seeing or hearing motorized craft other than cruise ships (25.7% vs. 10.0%). Two additional findings also suggest that encounters with cruise ships were perceived more negatively. First, for those day-boat visitors who encountered each of the different types of craft, detraction rates were higher for cruise ships than for motorized craft other than cruise ships (57.7% vs. 33.1%, respectively). Second, of day-boat visitors seeing or hearing the craft at Margerie and Grand Pacific glaciers, 19.4% reported that seeing or hearing cruise ships “detracted greatly” from their enjoyment whereas only 3.8% of day-boat visitors reported that motorized craft other than cruise ships “detracted greatly”.

Figure D-74 reports the findings for helicopters and propeller-driven aircraft. The overall percentages of day-boat visitors reporting general detraction due to helicopters and propeller-driven aircraft (2.1% and 2.7%, respectively) were substantially lower than the percentages for cruise ships or motorized water craft other than cruise ships, most likely because encounters with aircraft were relatively rare – at Margerie and Grand Pacific glaciers helicopters were seen or heard by only 3.6% of day-boat visitors and 5.4% saw or heard propeller-driven aircraft. However, aircraft, particularly helicopters, were nearly as likely as cruise ships to detract from the experiences of visitors who heard or saw them. For those day-boat visitors who encountered each of the different types of craft, detraction rates for cruise ships, propeller-driven aircraft, and helicopters were 57.7%, 50.0%, and 56.2%, respectively. Helicopters were also relatively likely to “detract greatly” from day-boat visitors’ experiences. The percentage of day-boat visitors who said helicopters “detracted greatly” was 25.0% (compared to 19.4% for cruise ships).

Detraction due to specific aspects of encounters

Although engine sound was the aspect of encounters with other craft most likely to detract from the general trip experiences of day-boat visitors, only 15.7% of day-boat visitors reported detraction due to the sound of cruise ship engines. The engine sounds from motorized water craft other than cruise ships were just as likely to detract from experiences (detracted from 15.3% of trips). The sound of helicopter and propeller-driven aircraft engines detracted from fewer day-boat visitors' experiences (5.7% and 10.2%, respectively), partly because they were heard less often, and also because the rates of detraction among those who heard engine sounds from propeller-driven aircraft or helicopters (43.6% and 44.1%, respectively), were lower than the rates of detraction among those who heard engine sounds from cruise ships or motorized watercraft other than cruise ships (76.1% and 56.5%, respectively).

The sound of public address systems (PA) from cruise ships detracted from the general trip experiences of 5.1% of day-boat visitors. Detraction due to the PA systems of motorized water craft other than cruise ships was reported about half as often (2.5%). Relatively few day-boat visitors heard PA systems from cruise ships or from motorized water craft other than cruise ships (6.7% and 7.6%, respectively). Of the day-boat visitors who heard PA systems from both types of vessels, detraction rates were higher for cruise ships (75.9%) than for motorized water craft other than cruise ships (33.4%).

Haze from large cruise ship exhaust was reported to detract from general trip experiences by 5.1% of day-boat visitors. Few passengers (6.9%) said they saw such haze, but of those who did, 73.3% reported detraction from their experience. None of the sampled day-boat visitors reported that they saw haze from the exhaust of motorized water craft other than cruise ships.

These findings regarding engine sounds, PA sounds, and haze were generally consistent with the findings of the qualitative interviews with Glacier Bay visitors. The feature of cruise ships that elicited the most comments from interviewed visitors was their vast size, not sounds or haze. Accordingly, the effects of sounds and haze were considerably smaller in magnitude than the general levels of detraction associated with cruise ships.

Measures of overall trip satisfaction

In the mail survey of day-boat visitors, the most general measures that could have been affected by seeing or hearing other cruise ships were two questions assessing passengers' overall ratings of their trip experiences (see Section VIII). On the simplest of these measures, 91.0% of passengers rated their time in Glacier Bay as "Extremely good" or "Very good". Only two (out of 441) respondents rated their time as "Poor" or "Extremely poor". The second question showed that 83.4% of day-boat visitors said they were very likely to recommend that others visit Glacier Bay on the day-boat. Less than 5% of day-boat visitors said they would be somewhat or very unlikely to recommend visiting Glacier Bay on the day-boat.

Neither of these general measures of day-boat respondents' experience quality was affected by the number of cruise ships in the bay on the day when respondents visited. When asked specifically how their experiences with cruise ships (or lack thereof) affected their recommendations to others, more than half of day-boat visitors (60.8%) said that there was no effect. One quarter of day-boat visitors (28.1%) reported that their likelihood of recommending a visit was decreased by their experiences with cruise ships, but those reports were not more common on days when two cruise ships were in the bay, and most of those day-boat visitors still said that they would recommend that others visit Glacier Bay on the day-boat.

These results were consistent with established findings that general measures of satisfaction are insensitive to the effects of specific visitor experiences. Visitors commonly rationalize specific negative aspects of their experiences when making more global assessments. Thus, it should not be surprising that 45% of day-boat visitors reported that cruise ships detracted from their general trip enjoyment while over 90% of the same visitors rated their time in Glacier Bay as very or extremely good.

The qualitative report suggested similar discrepancies when asking visitors about their trip experiences at different levels of specificity. In the qualitative report, nearly all the interviewed visitors reported that other vessels (including cruise ships) did not have "significant" effects on their experiences. However, the most commonly reported effects of cruise ships were disruptions of the "wilderness experience", and a closely-related feeling of surreal incongruity when encountering a ship. Thus, the findings of the qualitative report were relatively consistent with the mail survey results. Perhaps the effects of similar rationalizing processes were present in both the qualitative and mail survey results.

Rated detraction due to cruise ships and encounters with other craft

Prior research in Glacier Bay (Johnson, 1990) suggested that the rated effects of cruise ships on visitor experiences were affected by encounters with other forms of transport. The exploratory analyses conducted on the mail survey of day-boat visitors were consistent with this prior research, showing that in some cases, the detracting effects of encounters with different kinds of craft were intertwined. For example, the detraction due to cruise ships was related to encounters with other motorized watercraft but not to encounters with cruise ships, while conversely, detraction due to other motorized watercraft was related to encounters with cruise ships but not to encounters with other motorized watercraft. Clearly, encounters with each type of craft do not have effects only on the rated detraction due to that specific type of craft.

Because a complete investigation of these relationships was not a focus of the current research, little can be said about the specific ways in which encounters with the various forms of transport affect visitor ratings of detraction. Based on this limited understanding, some might argue that visitor ratings of the detracting effect of cruise ships should not be used in formulating vessel management policy. A complete understanding of the visitor experience would be ideal. However, it is important to remember that no matter what factors actually led some visitors to report that cruise ships detracted from their experiences, there is every reason to believe that those visitors thought that cruise ships did detract from their experiences. Measuring the prevalence of such detraction is a necessary first step in determining whether it is an issue that merits further study or management action.

Implications

The findings from the mail survey of day-boat visitors do not lead to a set of simple implications for management. While general measures of trip satisfaction suggested little to no evidence that cruise ships affected day-boat visitors' trips, measures asking about the effect of cruise ships on specific aspects of trip experiences indicated that cruise ships affected day-boat visitors' trips in a variety of ways. Inconsistent findings between general and specific measures have been found in other visitor research. Such findings suggest that events can have meaningful and significant effects on specific aspects of visitors' trips and yet, visitors can still report minimal effects when considering their trip more generally.

When both general and specific measures find comparable effects, implications for management policy are relatively simple compared to the inconsistent results found in this survey. Questions of policy cannot be settled by simply asking whether most day-boat visitors were generally satisfied with their trips. Managers must also consider whether all the measured effects of cruise ship encounters are acceptable in light of the conditions they seek to provide day-boat visitors. In order to make this decision, managers must have a clear understanding of the type of experience(s) that they wish to (and are in some cases required to) provide. While researchers can provide data and visitors can provide opinions, it is up to managers to decide whether or not the effects of cruise ships described in this report are appropriate and acceptable.

Objective 2: What are estimated effects for park visitors under the Record of Decision maximum use level of 2 cruise ships per day, every day?

Analyses were conducted to examine whether day-boat visitors' experiences differed by the number of cruise ships in the bay (i.e., 1 or 2) on the day they visited. When significant differences were found for a measured variable, the findings for 2-cruise ships in the bay were the best estimates for that measure under the maximum use level of 2-cruise ships in the bay every day. However, because under current conditions 2/3 of the days are 2-cruise ships in the bay days, the change from current conditions to maximum allowed conditions was smaller than the observed difference between 1- and 2-cruise ships in the bay days. To address objective 2, responses that differed for 1 vs. 2 cruise ships in the bay are summarized below. All data represent the differences expected due to a move from current conditions to the maximum allowed condition. Five effects would be expected based on these analyses.

The first two effects involve measures of cruise ship encounters that would be expected to increase if current conditions were changed to 2-cruise ships in the bay every day. First, the average number of hours that day-boat visitors would be expected to hear or see cruise ships would rise from 1.5 to 1.7 hours. Second, on the day when passengers saw the most cruise ships, the average number of hours that cruise ships are heard or seen would be expected to rise from 1.1 to 1.2 hours.

A third effect involves encounters with helicopters. If current conditions were changed to 2-cruise ships in the bay every day, the average number of times day-boat visitors hear or see helicopters would be expected to rise from 1.6 to 1.8. It is unlikely that this increase is due to an actual increase in the number of helicopters. It seems more likely that increased traffic in general could sensitize visitors and make them more prone to notice and report helicopters.

Fourth, if current conditions were changed to 2-cruise ships in the bay every day, the rated effects of kayaks seen at Margerie/Grand Pacific glaciers would be expected to drop from an average of 3.6 to 3.5 on a scale where 3 = "No effect" and 4 = "Added somewhat". It is not clear why the positive effect of kayaks should decrease.

Finally, the percentage of day-boat visitors who report visiting tidewater glaciers other than Margerie, Reid, McBride, Lamplugh, and Johns Hopkins would be expected to fall from 5.6% to 3.5%. This effect was difficult to interpret both because it was not clear what other glaciers might be visited by the day-boat and because a change from current conditions to 2-cruise ships in the bay every day seems more likely to increase displacement of the day-boat to other tidewater glaciers than to produce the observed decrease.

Implications

In sum, the results of this survey suggest that increasing cruise ship use to two ships per day would produce relatively few changes in the experiences of day-boat visitors, and none of those changes would be expected to increase the proportion of all day-boat visitors who report negative effects of cruise ships.

Report 3
A Survey of Tour-Boat Visitors

Jane E. Swanson
Mark E. Vande Kamp

VOLUME GUIDE

Volume 1

Executive Summary

General Introduction

A Survey of Cruise Ship Passengers

A Survey of Day-Boat Visitors

You are here → A Survey of Tour-Boat Visitors

A Survey of Backcountry Visitors

Volume 2

A Survey of Private Vessel Visitors

A Survey of Charter-Boat Visitors

Qualitative Interviews with Park Visitors: Summer 2008

Qualitative Interviews with Experience Gatekeepers

Appendices (includes questionnaires and general comments)

TABLE OF CONTENTS

LIST OF FIGURES.....	IV
LIST OF TABLES.....	VII
I. INTRODUCTION AND METHOD.....	1
GOALS OF THE OTHER TOUR BOAT MAIL SURVEY	1
SURVEY DESIGN AND QUESTIONNAIRE DEVELOPMENT.....	1
SAMPLING AND VISITOR CONTACT PROCEDURES.....	2
<i>American Safari contacts</i>	4
<i>Cruise West contacts</i>	4
<i>Lindblad Expedition contacts</i>	4
ADMINISTRATION OF MAILINGS	5
STATISTICAL CONSIDERATIONS.....	5
LIMITATIONS.....	5
<i>Non-response</i>	6
ACCURACY OF THE SAMPLE	9
ESTIMATES FOR CURRENT AND MAXIMUM ALLOWED SEASONAL USE DAYS	10
CONVENTIONS FOLLOWED IN THIS REPORT	10
II. VISITOR PROFILE	12
HIGHLIGHTS.....	12
GENDER AND AGE	13
EDUCATION	14
RESIDENCE	14
ETHNICITY AND RACE	15
NUMBER OF TRIPS TO GLACIER BAY NATIONAL PARK IN LAST 10 YEARS.....	17
III. TRIP CHARACTERISTICS	18
HIGHLIGHTS.....	18
PARTY SIZE	19
PARTY TYPE	19
VISITED GLACIER BAY BEFORE OR AFTER CONTACT.....	20
LENGTH OF STAY	21
ACTIVITIES ENGAGED IN ON TRIP TO GLACIER BAY NATIONAL PARK	24
SEE OR HEAR LARGE CRUISE SHIPS.....	25
PLANNED TRIP TO MINIMIZE SEEING OR HEARING OTHER VESSELS.....	26
IMPORTANCE OF DIFFERENT TRIP EXPERIENCES	27
OTHER TIDEWATER GLACIER VISITED	31
WEATHER	32
IV. ASSESSING EFFECTS OF PRESENCE OF 2-CRUISE SHIPS IN THE BAY.....	35
V. ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS	37
HIGHLIGHTS.....	37
VISITED MARGERIE AND GRAND PACIFIC GLACIERS	38
SAW OTHER CRAFT AT MARGERIE AND GRAND PACIFIC GLACIERS	39
NUMBER OF DIFFERENT TYPES OF CRAFT SEEN AT MARGERIE AND GRAND PACIFIC GLACIERS	40
VI. ENCOUNTERS: ENTIRE TRIP.....	45
HIGHLIGHTS.....	45
SAW OR HEARD LARGE CRUISE SHIPS	48
NUMBER OF DAYS SAW OR HEARD LARGE CRUISE SHIPS	48
TOTAL LENGTH OF TIME SAW OR HEARD LARGE CRUISE SHIPS	48

Tour-Boat Visitor Survey

LENGTH OF TIME SAW OR HEARD LARGE CRUISE SHIPS ON DAY SAW OR HEARD MOST CRUISE SHIPS	49
COMPARISON OF LARGE CRUISE SHIP AND OTHER MOTORIZED CRAFT ENCOUNTERS	51
MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS: LENGTH OF TIME AND NUMBER HEARD OR SEEN.....	52
PROPELLER-DRIVEN AIRPLANES: LENGTH OF TIME AND NUMBER HEARD OR SEEN	53
HELICOPTERS: LENGTH OF TIME AND NUMBER HEARD OR SEEN	54
VII. EXPERIENCES WITH HAZE, PUBLIC ADDRESS SYSTEMS, AND ENGINE SOUNDS.....	55
HIGHLIGHTS	55
EXPERIENCES WITH HAZE	58
EXPERIENCES WITH PUBLIC ADDRESS SYSTEMS	59
EXPERIENCES WITH ENGINE SOUNDS	60
VIII. EFFECTS OF ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS	64
HIGHLIGHTS	64
PRESENCE OF DIFFERENT TYPES OF CRAFT AFFECTED ENJOYMENT OF MARGERIE AND GRAND PACIFIC GLACIERS ..	65
IX. EFFECTS OF ENCOUNTERS: ENTIRE TRIP	70
HIGHLIGHTS	70
EFFECT OF ENCOUNTERS OF DIFFERENT TYPES OF CRAFT ON ENJOYMENT OF GLACIER BAY PROPER	71
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON DIFFERENT TRIP EXPERIENCES.....	72
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON VIEWING LAND ANIMALS.....	77
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON VIEWING MARINE ANIMALS	78
FUTURE RECOMMENDATIONS TO VISIT GLACIER BAY	79
OVERALL RATING OF TIME SPENT BOATING/CRUISING IN GLACIER BAY PROPER.....	82
X. OPINIONS REGARDING CRUISE SHIPS IN GLACIER BAY PROPER	83
HIGHLIGHTS	83
AGREEMENT WITH “LARGE CRUISE SHIPS IN GLACIER BAY PROPER ARE MAJESTIC.”	85
AGREEMENT WITH “LARGE CRUISE SHIPS PROVIDED A SENSE OF SCALE WHEN VIEWING SCENERY IN GLACIER BAY.”	85
AGREEMENT WITH “LARGE CRUISE SHIPS ARE A GOOD WAY FOR A LARGE NUMBER OF PEOPLE TO VISIT GLACIER BAY PROPER.	87
AGREEMENT WITH “IT IS INAPPROPRIATE FOR LARGE CRUISE SHIPS TO BE IN GLACIER BAY PROPER.”	87
OPINION SCALE	89
XI. LENGTH OF EXPOSURE EFFECTS ON VISITOR EXPERIENCE	91
XII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS	92
CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS MEASURED	92
MEASURES OF EFFECT OF CRUISE SHIPS ON VISITOR EXPERIENCE	92
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF CRUISE SHIP ENCOUNTERS AND THE EFFECT OF CRUISE SHIPS.....	93
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF CRUISE SHIP ENCOUNTERS AND THE LIKELIHOOD THAT CRUISE SHIPS DETRACT FROM TRIP ENJOYMENT.....	95
<i>Predicting for whom cruise ships detracted from trip enjoyment.....</i>	<i>96</i>
SUMMARY	96
XIII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM VISITOR CHARATERISTICS.....	97
CHARACTERISTICS OF OTHER TOUR BOAT PASSENGERS MEASURED.....	97
MEASURES OF EFFECT OF CRUISE SHIPS ON VISITOR EXPERIENCE	97
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF OTHER TOUR BOAT PASSENGERS AND THE EFFECT OF CRUISE SHIPS	98
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF OTHER TOUR BOAT PASSENGERS AND THE LIKELIHOOD THAT CRUISE SHIPS DETRACT FROM TRIP ENJOYMENT	99

<i>Predicting for whom cruise ships detracted from trip enjoyment.....</i>	<i>100</i>
SUMMARY.....	104
XIII. EXPERIENCES WITH DIFFERENT FORMS OF TRANSPORT.....	105
EFFECTS OF CRUISE SHIPS RELATIVE TO OTHER FORMS OF TRANSPORT.....	105
DOES THE NUMBER OF CRUISE SHIPS AFFECT ENCOUNTERS WITH OTHER FORMS OF TRANSPORT AND RATINGS OF THEIR DETRACTION?	106
DO ENCOUNTERS WITH ONE TYPE OF CRAFT AFFECT EXPERIENCES WITH OTHER TYPES OF CRAFT?	106
XV. SOCIAL VALUE CONFLICT	110
RECREATIONAL CONFLICT OVERVIEW.....	110
APPLYING THE CONFLICT FRAMEWORK TO CURRENT RESEARCH	111
<i>Measure of problem/conflict.....</i>	<i>111</i>
<i>Measure of social value conflict</i>	<i>111</i>
ANALYSES	112
<i>Source of conflict for those who saw/heard cruise ships.....</i>	<i>112</i>
<i>Estimating additional detraction effects due to social value conflict</i>	<i>113</i>
DISCUSSION	113
XVI. SUMMARY AND IMPLICATIONS.....	115
OBJECTIVE 1: HOW DO CRUISE SHIPS AFFECT, IF AT ALL, TOUR BOAT VISITORS' EXPERIENCES IN GLACIER BAY PROPER?.....	115
<i>Recalled encounters with cruise ships</i>	<i>115</i>
<i>General and specific effects of cruise ships</i>	<i>116</i>
<i>Measures of overall trip satisfaction</i>	<i>120</i>
<i>Rated detraction due to cruise ships and encounters with other craft.....</i>	<i>120</i>
<i>Implications</i>	<i>121</i>
OBJECTIVE 2: WHAT ARE ESTIMATED EFFECTS FOR TOUR BOAT VISITORS UNDER THE RECORD OF DECISION MAXIMUM USE LEVEL OF 2 CRUISE SHIPS PER DAY, EVERY DAY?	121
<i>Implications</i>	<i>122</i>

List of Figures

Figure T-1. Respondent's Age.....	13
Figure T-2. Respondent's Gender.....	13
Figure T-3. Highest level of formal education completed by respondents.....	14
Figure T-4. Residence location.....	15
Figure T-5. Ethnicity and Race of Respondents	16
Figure T-6. First trip to GLBA	17
Figure T-7. Number of trips to GLBA in last 10 years.....	17
Figure T-8. Party size	19
Figure T-9. Type of party	20
Figure T-10. Contacted before or after visiting GLBA	20
Figure T-11. Stayed overnight within park boundaries	21
Figure T-12. Number of nights stayed overnight in the park.....	22
Figure T-13. Number of days visited by those who did not stay overnight.....	22
Figure T-14. Number of hours spent in park by those visiting only one day	23
Figure T-15. Number of hours spent in park by those who visited multiple days.....	23
Figure T-16. Activities engaged in on trip to Glacier Bay National Park.....	24
Figure T-17. See or hear large cruise ships.....	25
Figure T-18. Planned trip to minimize seeing or hearing other vessels.....	26
Figure T-19. Planned trip to minimize encounters with different types of vessels.....	27
Figure T-20. Percent of respondents who visited Margerie and Grand Pacific glaciers.....	31
Figure T-21. Other tidewater glaciers visited	32
Figure T-22. Percent of respondents who experienced different kinds of weather	33
Figure T-23. Trip weather experience categories based on responses to each kind of weather experienced by a visitor	34
Figure T-24. Percent of respondents who visited Margerie and Grand Pacific glaciers.....	38
Figure T-25. Percent of respondents who saw other craft at Margerie and Grand Pacific glaciers by number of cruise ships in the bay per day.....	39
Figure T-26. Percent of respondents who saw other craft at Margerie and Grand Pacific glaciers: Current conditions versus maximum allowed.....	40
Figure T-27. Number of large cruise ships seen at Margerie and Grand Pacific glaciers by average number of large cruise ships in the bay.....	40
Figure T-28. Number of large cruise ships seen at Margerie and Grand Pacific glaciers: Current conditions versus maximum allowed	41

Figure T-29. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers by average number of cruise ships in the bay per day.	42
Figure T-30. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers: Current conditions versus maximum allowed.....	42
Figure T-31. Number of kayaks seen at Margerie and Grand Pacific glaciers.....	43
Figure T-32. Number of propeller-driven airplanes seen at Margerie and Grand Pacific glaciers	43
Figure T-33. Number of helicopters seen at Margerie and Grand Pacific glaciers	44
Figure T-34. Percent of respondents who saw or heard large cruise ships.....	48
Figure T-35. Number of days respondents saw or heard large cruise ships in Glacier Bay proper	48
Figure T-36. Total number of hours saw or heard large cruise ships in Glacier Bay proper	49
Figure T-37. Number of hours saw or heard large cruise ships on day saw or heard most cruise ships	50
Figure T-38. Number of hours motorized craft other than large cruise ships were heard or seen	52
Figure T-39. Number of motorized craft other than large cruise ships heard or seen	52
Figure T-40. Length of time propeller-driven airplanes were heard or seen.....	53
Figure T-41. Number of propeller-driven airplanes heard or seen.....	53
Figure T-42. Number of hours helicopters were heard or seen	54
Figure T-43. Number of helicopters heard or seen.....	54
Figure T-44. Percent of respondents who experienced haze from different types of vessels.....	58
Figure T-45. Effect of experience of haze from large cruise ships on trip enjoyment	58
Figure T-46. Percent of respondents who experiences public address systems from different types of vessels.....	59
Figure T-47. Effect of large cruise ship public address systems on trip enjoyment.....	59
Figure T-48. Effect of small cruise ship or tour boat public address systems on trip enjoyment.....	60
Figure T-49. Experiences with engine sounds from watercraft.....	60
Figure T-50. Experience with engine sounds from aircraft.....	61
Figure T-51. Effect of hearing large cruise ship engines on trip enjoyment	61
Figure T-52. Effect of hearing small cruise ship or tour boat engines on trip enjoyment.....	62
Figure T-53. Effect of hearing propeller-driven airplane engines on trip enjoyment.....	62
Figure T-54. Effect of helicopter engines on trip enjoyment	63
Figure T-55. Effect of seeing large cruise ships at Margerie and Grand Pacific glaciers	67
Figure T-56. Effect of seeing motorized water craft other than large cruise ships at Margerie and Grand Pacific glaciers	67
Figure T-57. Effect of seeing kayaks at Margerie and Grand Pacific glaciers.....	68
Figure T-58. Effect of seeing propeller-driven airplanes at Margerie and Grand Pacific glaciers.....	68
Figure T-59. Effect of seeing helicopters at Margerie and Grand Pacific glaciers	69
Figure T-60. Average importance ratings by average effect ratings for each type of trip experience	76

Tour-Boat Visitor Survey

Figure T-61. Average importance ratings by average effect ratings for each trip experience dimension ...	77
Figure T-62. Effect of large cruise ships on viewing land animals	78
Figure T-63. Effect of large cruise ships on viewing land animals	79
Figure T-64. Likelihood of recommending a friend or family member visit Glacier Bay on other tour boats	81
Figure T-65. Overall rating of time spent boating/cruising in Glacier Bay proper.....	82
Figure T-66. Agreement with “Large cruise ships in Glacier Bay proper are majestic”	85
Figure T-67. Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay”	86
Figure T-68. Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay”	86
Figure T-69. Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper”	87
Figure T-70. Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper”: 1 vs. 2 cruise ship days.....	88
Figure T-71. Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper”: Current vs. maximum allowed conditions	88
Figure T-72. Distribution of opinion scale scores by average number of ships in bay per day	90
Figure T-73. Distribution of opinion scale scores: Current conditions vs. Maximum allowed.....	90
Figure T-74. Probability of cruise ships detracting for different ages of respondents.....	103
Figure T-75. Probability of cruise ships detracting for different agreement levels with large cruise ships being in Glacier Bay proper.....	103
Figure T-76. Probability of cruise ships detracting for different agreement levels with large cruise ships being in Glacier Bay proper.....	104
Figure T-77. Percent of all tour boat respondents who reported detraction effects due to large cruise ships	117
Figure T-78. Percent of all tour boat respondents who reported detraction effects due to motorized water craft other than large cruise ships	118
Figure T-79. Percent of all tour boat respondents who reported detraction effects due to aircraft.....	118

List of Tables

Table T-1. Percent of other tour boat passengers by vessel	3
Table T-2. Percent of tour boat passengers entering Glacier Bay proper on one- and two-cruise ship days ..	3
Table T-3. Summary of non-response analyses for Other Tour boat Passenger Mail Survey.	8
Table T-4. Weighted and unweighted findings of key variables.....	9
Table T-5. Internal consistency measure (Cronbach's alpha) for each importance dimension.....	29
Table T-6. Importance ratings for trip experience scales	30
Table T-7. Trip weather experience categories	33
Table T-8. Effects of number of cruise ships in bay per day: Alone and when controlling for days spent in bay	36
Table T-9. Percent of respondents who encountered different kinds of craft.....	51
Table T-10. Number of hours different kinds of craft were heard or seen	51
Table T-11. Effects of different types of craft for respondents who visited Margerie and Grand Pacific glaciers.....	66
Table T-12. Effects of different types of craft for respondents who saw/heard craft at Margerie and Grand Pacific glaciers	66
Table T-13. Effect of different craft on enjoyment of Glacier Bay proper: Percent of all respondents	72
Table T-14. Effect of different craft on enjoyment of Glacier Bay proper: Percent who saw craft	72
Table T-15. Internal consistency measure (Cronbach's alpha) for each dimension.....	74
Table T-16. Mail Survey, Q-8, Effects of large cruise ships on trip experiences.....	75
Table T-17. Effect of experience with different craft on future recommendations	81
Table T-18. Correlations among agreement with opinion statements	88
Table T-19. Significant correlations between total number of hours heard or saw cruise ships and different measures of effects of cruise ships	91
Table T-20. Characteristics of cruise ships used as predictors in regression analyses	92
Table T-21. Characteristics of cruise ships that were significant predictors of effects of cruise ships	94
Table T-22. Summary of model for effects of cruise ships measured by cruise ship effect score for other tour boat passengers	94
Table T-23. Model summaries for predicting likelihood that cruise ships detracted from trip enjoyment ..	96
Table T-24. Visitor characteristics used as predictors in regression analyses.....	97
Table T-25. Other tour boat passenger characteristics that were significant predictors of effects of cruise ships.....	98
Table T-26. Summary of model for effects of cruise ships measured by cruise ship effect score for other tour boat passengers	98
Table T-27. Predicted cruise ship effect score for potential scenarios	99

Tour-Boat Visitor Survey

Table T-28. Model summaries for predicting likelihood that cruise ships detracted from trip enjoyment based on other tour boat visitor characteristics	101
Table T-29. Summary of Model with Three Predictor Variables	102
Table T-30. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip.....	105
Table T-31. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip.....	105
Table T-32. Measures used in analysis of relationships between encounters with various forms of transport and ratings of their detraction	107
Table T-33. Significant relationships between encounters with one type of craft and detraction measures for a different type of craft: Results of correlation and logistic regression analyses.....	108
Table T-34. Summary of variables related to social value conflict	111
Table T-35. Source of conflict for other tour boat respondents.....	113

I. INTRODUCTION AND METHOD

Glacier Bay National Park and Preserve (GLBA) is a large park and most visitors experience the park in watercraft. The managers of GLBA are pursuing a research initiative arising from the vessel management planning process designed to assess whether cruise ships in Glacier Bay are affecting the environment or visitor experiences (See General Introduction for more background). This study is part of the research program that examined whether cruise ships affect visitor experiences.

Tour boat passengers are the next largest group of visitors to GLBA after cruise ship passengers. These visitors travel on vessels less than 150 feet in length whereas most cruise ships are over 700 feet long. The tour boat category is set by the vessel management plan and is based on size rather than activity. In fact, some tour boats provide smaller cruise experiences (including single and multi-day visits) whereas the Glacier Bay Lodge day-boat that leaves out of Bartlett Cove is a more typical one-day tour boat experience.

The Glacier Bay Lodge operates a day tour boat (referred to as the day-boat) out of Bartlett Cove. Because day-boat passengers are a substantial portion of tour boat passengers (approximately 30%) and they are often in close proximity to cruise ships, a separate sample was drawn for them (see A Survey of Day-Boat Visitors). Approximately 8,600 people visit Glacier Bay proper aboard the remaining tour boats that depart from Juneau or Auke Bay and may or may not stop at Bartlett Cove. Passengers on these “other tour boats” spend multiple days on board with one of those days in GLBA, specifically Glacier Bay proper. Whereas these boats’ size classifies them as tour boats for vessel management purposes, the passenger experience is more akin to a cruise on a smaller boat. Because these boats generally spend a full-day in Glacier Bay proper, encounters with cruise ships are likely at some point during their visits to Glacier Bay proper. To determine the effects, if any, of other cruise ships in Glacier Bay on the quality of visitor experience, a mail survey of visitors who visited aboard other tour boats was conducted.

Goals of the other tour boat mail survey

The Other Tour Boat Mail Survey was designed to address the research questions identified for the research program as a whole.

1. How do cruise ships affect, if at all, other tour boat passengers’ experiences in Glacier Bay proper?
 - a. Which dimensions of other tour boat passengers’ experiences in Glacier Bay proper, if any, do cruise ships affect?
 - b. If cruise ships affect other tour boat passengers’ experiences in Glacier Bay proper, which features of cruise ships have effects?
2. What are estimated effects for other tour boat passengers under the Record of Decision maximum use level of 2 cruise ships per day, every day?
3. How do the effects of cruise ships on other tour boat passengers’ experiences in Glacier Bay proper compare to the effects of other forms of mechanized transport?

Survey design and questionnaire development

The survey procedures and questionnaires were developed in conjunction with staff at GLBA. Survey questions were written based upon through discussions with NPS staff, review of related literature, and qualitative interviews with park visitors during the summer of 2007 (see General Intro for details). To the

Tour-Boat Visitor Survey

extent possible, the questionnaires for each park user group included the same questions to allow comparison among the different groups.

The survey included an on-site questionnaire and a mail questionnaire (See Appendices E and H). The on-site questionnaire consisted of seven questions that asked about general demographics, travelling party characteristics, and if they had already visited Glacier Bay proper during this trip. (Additionally, visitors were asked to provide their name and address to receive the mail questionnaire.) This descriptive information was used in determining whether the final sample of completed mail surveys was representative of passengers aboard other tour boats (i.e., whether non-response had biased the sample).

The mail questionnaire included questions about trip experiences, encounters with cruise ships and other motorized craft (in all areas of Glacier Bay, and specifically, at Margerie and Grand Pacific Glaciers), effects of cruise ships and other motorized craft on different aspects of the trip, attitudes about cruise ships in GLBA, and general demographics.

Drafts of these questionnaires were peer-reviewed and revised based on feedback. The revised questionnaires were reviewed and approved by the Office of Management and Budgeting under the full review process.

Sampling and visitor contact procedures

The results of the Other Tour boat Passenger Mail Survey represent the population of all people visiting Glacier Bay proper aboard tour boats excluding the park day-boat between June 27, 2008 and August 31, 2008 who are over the age of 17.

In addition to the park day-boat, four companies were permitted to offer tour boat experiences in GLBA during the 2008 peak season: Cruise West, Lindblad Expeditions, American Safari Cruises, and American West Steamboat Company. Cruise West's, Lindblad Expedition's, and American Safari Cruises' concession contracts allocate them use days throughout the season, and each offers several itineraries that include Glacier Bay proper as a destination. Cruise West's and Lindblad's itineraries also include Juneau as the starting or ending point of the cruise and so their passengers were contacted in Juneau at the start or end of their cruise. American Safari operates out of Auke Bay and passengers were contacted during their vessels stop at Bartlett Cove.

American West Steamboat Company's contract does not allocate them use days and their vessels may only enter the bay when other operators relinquish their use days. During the 2008 peak season, no American West Steamboat Company's vessels entered Glacier Bay proper.

The total number of contacts was originally distributed among each vessel based on the proportion of visitors entering the park in 2007 and to reflect the 1:2 mix of one- versus two-cruise ships in the bay days. However, during the course of data collection several unforeseen events occurred that required a re-distribution among vessels in order to maximize the likelihood of reaching the desired sample size. The unforeseen events included 1) the grounding of the Spirit of Glacier Bay which resulted in damage that took it out of service for the remainder of the peak season, 2) learning in the midst of fieldwork that the Spirit of Yorktown is sub-leased to Tauck tours and thus, we required approval from another set of people prior to contacting passengers, and 3) Lindblad Expeditions deciding to withdraw from the study after contacting the first vessel. Each of these events is described in more detail in the contact procedures by tour boat company.

Table T-1 summarizes the percent of other tour boat passengers that visit Glacier Bay proper during the peak season on each vessel. The first column shows the original break-out based on 2007 visitation. The second column shows how visitors were distributed across vessel during the 2008 peak season. The third

column shows the break-out of contacts by vessel and the fourth column shows the break-out of returned mail surveys by vessel. The unforeseen events had the effect of resulting in a greater percentage of other tour boat passengers being contacted on Cruise West vessels. Approximately 70% of other tour boat passengers in 2008 visited Glacier Bay proper aboard Cruise West vessels whereas 86.7% of the sample of returned mail surveys consisted of passengers aboard Cruise West vessels. There was no a priori reason to believe that people's experience with cruise ships in the bay would vary by the vessel on which they travelled. Furthermore, for some vessels, the samples were small, limited to a very small portion of the sampling period, and/or reflected only one- or two- cruise ship in the bay days (not both). Therefore, no adjustments were made to the sample data to more accurately reflect actual visitation by vessel.

Table T-1. Percent of other tour boat passengers by vessel

Vessel	Based on actual 2007 visits	Based on actual 2008 visits	Contacts	Returned mail surveys
Safari Explorer	4.1%	4.2%	4.9%	4.1%
Safari Quest	2.3%	3.4%	4.9%	4.8%
Sea Bird	6.6%	10.8%	4.0%	4.1%
Sea Lion	6.0%	11.1%	0.2%	0.3%
SGB	23.5%	3.0%	6.6%	8.0%
SOA	9.0%	11.1%	18.1%	20.1%
SOD	9.7%	12.9%	16.2%	17.2%
SOE	12.7%	14.6%	12.2%	11.5%
SON	10.2%	12.2%	18.1%	19.4%
YORK	15.9%	16.9%	11.7%	10.5%

The changes in the sampling plan and procedures also resulted in a sample that did not reflect the actual breakout of passengers entering on one- and two-cruise ship days. Per actual visits reported by the park, 31% of other tour boat passengers entered Glacier Bay proper on one-cruise ship days (see Table T-2). In comparison, 48.6% of tour boat passengers agreeing to participate and 48.6% of tour boat passengers returning their mail surveys were contacted on one-cruise ship days. Thus, simple aggregation of the sample data would not represent current conditions. In order to represent current conditions, the data were weighted to reflect the actual percentage of other tour boat passengers entering on one- and two-cruise ships days (31% versus 69%, respectively).

Table T-2. Percent of tour boat passengers entering Glacier Bay proper on one- and two-cruise ship days

	Entered Glacier Bay on	
	1 cruise ship in bay day	2 cruise ships in bay day
Actual 2008 visitation for sampling period	31.1%	68.9%
Contacts (n = 426)	45.7%	54.3%
Participate (n = 375)	48.6%	51.4%
Mail survey (n = 314)	48.6%	51.4%

Of the 426 other tour boat passengers contacted, 370 (88.0%) agreed to participate in the mail survey. Because the refusal rate exceeded 10%, analyses were conducted to determine if those who refused to participate in the mail survey differed systematically from those who agreed to participate. These analyses are reported below in the Non-response section.

American Safari contacts.

The survey worker contacted passengers aboard the Safari Explorer and the Safari Quest when the vessels docked in Bartlett Cove. Contacts were made for six different voyages. Face-to-face contacts were made by project personnel to increase participation in the survey. When the vessel docked, the survey worker boarded the vessel, introduced the survey, and asked all passengers over the age of 17 to participate.

When a passenger refused to participate, the survey worker logged the time, party size, and gender of the refusing individual. The on-site questionnaire took approximately 3 minutes to complete (see Appendix E). Respondents completed the on-site questionnaire and returned it to the survey worker. The survey worker thanked the person for his or her participation.

Cruise West contacts

Procedures to contact Cruise West passengers were developed in conjunction with Cruise West staff. Originally, some passengers were to be contacted as they disembarked. However, in practice, the rate of departure was so quick there was not sufficient time to contact every *n*th passenger. Other factors including poor weather and some people having tour obligations resulted in this being a challenging time to make contacts with Cruise West passengers. Because of these difficulties it was decided to contact Cruise West passengers at the start of their trips.

Cruises on The Spirit of Ninety-Eight were one-way trips between Juneau and Ketchikan and the reverse. By contacting people as they boarded the ships in Juneau, only people going from Juneau to Ketchikan were sampled from the Spirit of Ninety-Eight and these trips visited the park on one-cruise ship days.

Cruise West passengers were contacted in the hospitality suite located at the Goldmark Hotel. People would congregate there during the hour or so prior to boarding the vessel for departure. The survey worker would contact passengers as they arrived in the hospitality suite. Contacts were distributed to reflect that fewer people arrived earlier and more people arrived the closer it got to departure time. Selected individuals were over age 17. The survey worker introduced the survey and asked the person to participate. When a passenger refused to participate, the survey worker logged the time, party size, and gender of the refusing individual. The on-site questionnaire took approximately 3 minutes to complete (see Appendix E). Respondents completed the on-site questionnaire and returned it to the survey worker. The survey worker thanked the person for his or her participation.

Although the Spirit of Yorktown is owned by Cruise West, it was sub-leased to Tauck Tours during the peak season. Unfortunately, this information was not brought to project personnel's attention until it was time to make contacts and no passengers were at the Goldbelt Hotel (Tauck Tours operates out of a different hotel). The appropriate staff of Tauck Tours was contacted about the project and permission requested to make contacts on the remaining Spirit of Yorktown cruises. Permission was granted and passengers were contacted at the Baranof Hotel prior to departure using the same contact procedures as used with Cruise West passengers.

Lindblad Expedition contacts

Procedures to contact passengers on the Lindblad Expeditions vessels, the Sea Bird and Sea Lion, were developed in conjunction with these ships' crew prior to the start of data collection. The procedures consisted of a brief (2 minute) introduction of the project by the survey worker to the passengers in the dining room at the first meal on-board. Passengers were then selected based on the layout of the dining room with specific seats randomly selected beforehand (these seats will be different for each voyage). Visitors in those seats were to be contacted directly and asked to participate. If they were under age 18 or refused, the visitor in the next seat would then be contacted.

The first evening our survey worker was to make contacts, the Sea Lion crew indicated they did not want to follow the agreed upon procedures. Instead, they wanted interested people to pick up a contact sheet at the bar. This method resulted in only one contact that was mailed back later in the season. The next evening on the Sea Bird, the agreed upon procedure was done and the desired number of contacts were made plus two additional people requested to participate. The following week, staff at Lindblad forwarded emails from the ships' captains indicating that the agreed upon survey procedures did not fit well into their schedule. The principal investigator responded with the survey worker's perspective and indicated the methodological issues with having the Lindblad crew distribute the survey (their preference). Lindblad staff responded that they would no longer participate in the survey. The principal investigator forwarded the series of communication to park staff and efforts by park staff to contact the owner of Lindblad to seek a solution went unanswered. With no further contacts possible, only 1 of 40 planned contacts for the Sea Lion was made and only 17 out of 30 planned contacts for the Sea Bird were made.

Administration of mailings

Mailings were administered by employees of the Protected Area Social Research Unit (PASRU) in Seattle, Washington. The names and addresses from the contact sheets were entered by the survey worker and sent electronically to the PASRU where they were compiled into a database. This database served as the basis for administering the mailings. All visitors who provided a name and address were mailed a questionnaire, a map of GLBA, and a cover letter from the PASRU. Respondents were instructed to complete the questionnaire and return it by mail in the postage-paid envelopes. As a follow-up, all respondents were sent a thank you/reminder letter about one week after they received the questionnaire. Non-respondents received a second reminder letter and an additional copy of the questionnaire about 14 days after the first reminder letter. For those who did not respond after the second reminder, a third reminder letter was sent about 14 days after the second reminder letter. This multi-phased approach is the recommended technique to maximize response rates (Dillman 2000). Of the 375 questionnaires mailed, 5 were returned due to incorrect or out-of-date addresses. The final response rate was 84.9%, with 314 of 370 questionnaires completed and entered in the data file.

Statistical considerations

Consistent with convention, statistical significance was set at the **.05 level** for analyses included in this report. Statistical tests with p -values equal to or less than .05 are interpreted as indicating effects that are reliable or real (there is a probability of 5 percent or less that the observed effects are due to chance alone). Although the analyses highlight statistically significant effects, they do not reveal whether effects have important practical implications. Some effects that fall just short of the .05 significance level may have large practical implications while other effects with high statistical significance may have no practical implications. Thus, it is important to consider both the statistical significance and the practical implications of these data.

Limitations

The Other Tour boat Passenger Mail Survey has several general limitations that should be kept in mind when interpreting the data. 1) In all surveys, it is assumed that respondents provide accurate and honest answers to the questions asked. 2) The data represent visitor attitudes, opinions, and evaluations of their experience at a particular point in time (i.e., the time of the survey) and people's attitudes, opinions, and experience evaluations are dynamic so changes can occur at any time. 3) Statistical inferences can only be made for the subset of GLBA visitors who were passengers on other tour boats. 4) Lindblad Expedition passengers are minimally represented given the company's decision to withdraw from participation in the study. In addition, there are other limitations noted in the body of the report that are due to the manner in which individual questions were interpreted. Finally, there are limitations that revolve around the issue of non-response (i.e., possible bias in the sample due to differences between the visitors who completed the

questionnaires and those who didn't). Potential limitations associated with non-response are discussed below.

Non-response

There were two points at which visitors could elect not to participate in the survey. The first point was when the fieldworker approached them, introduced the study, and asked them to participate. The second point was when visitors who received the mail survey chose whether to complete and return it. Because decisions whether to participate are unlikely to be random, the survey responses of visitors who agree to participate may differ from those who do not. In that case, the sample data will not accurately represent the population. Such inaccuracy is said to be the result of non-response bias.

Potential non-response bias is generally assessed by comparing respondents to non-respondents for all known characteristics. In this survey, visitors who completed the on-site questionnaire but failed to return the mail questionnaire were more fully described than visitors who refused to participate on-site (and provided no information beyond what the survey worker could observe). However, the rate of on-site refusals was higher than anticipated (12.1% vs. 10.0%) -- high enough to create the potential for non-response bias. Accordingly, two sets of non-response analyses were conducted, one to determine if visitors who refused to participate on-site differed from those who agreed to participate when initially contacted, and the second to determine whether visitors who were sent the mail questionnaire and failed to return in differed from visitors who returned the questionnaire. Each set of analyses is described below.

It should be noted that although the rate of on-site refusals was higher than anticipated, that increase may have been partially or entirely offset if those visitors who did agree to participate were more likely to return their mail questionnaires. Results from prior surveys suggest that such an offsetting effect is possible. The scenario that explains such an effect is: a) some portion of any target population is made up of individuals who are relatively unwilling to participate in surveys, b) when the circumstances of the initial contact make it awkward for such persons to refuse participation, they are likely to become non-respondents at a later time, therefore c) changes in the rate of on-site refusal are often offset by changes in the mail survey response because the unwilling individuals simply drop out of the sample at different times.

Refusal non-response analyses

To determine if people who refused to participate in the survey at all differed from those who agreed to participate, a series of statistical tests were done to identify differences between participants and refusals. Specifically, possible differences were assessed using Chi-square tests for independence or *t*-tests to determine whether response rates were independent of a particular characteristic (using a .05 significance level). The characteristics that were used in assessing possible refusal non-response bias were gender, party size, fieldworker, and vessel. For these characteristics, statistically significant differences in response rates were found for three of the four variables. Each of these will be discussed below.

Refusal rates differed significantly by the fieldworker making the contacts, $\chi^2(2, 426) = 12.50, p = .002$. Compared to the primary fieldworker's refusal rate, the temporary fieldworker's refusal rate was significantly lower (15.0% versus 0.0%). Even though the rates of refusal differed by fieldworker, if the people who agreed to participate were similar for the two fieldworkers, then refusal non-response bias was unlikely. To determine if the people contacted by the two fieldworkers differed significantly, statistical tests were done comparing the respondents contacted by the primary fieldworker with those contacted by the temporary fieldworkers on the following variables¹: age, gender, residence, party size, party type, and the order in which they visited Juneau and GLBA. People contacted by the two fieldworkers did not differ

¹ These variables corresponded to the questions asked in the on-site contact sheet.

significantly on any of these characteristics suggesting no refusal bias due to fieldworker making the contact.

Refusal rates were significantly higher for males (15.4%) than females (8.8%), $\chi^2(1, 415) = 4.20, p = .040$. Because the information of greatest interest was collected in the mail survey, the issue of greatest concern is not whether the visitors who refused differed from those who agreed to participate, but whether the final sample of visitors who completed the mail questionnaire represents the target population. In order to assess the representativeness of the final sample, further analyses compared visitors who participated fully in the study (i.e., completed the on-site contact sheet and the mail survey) with those who did not participate fully (i.e., refused to participate or only completed the contact sheet). These analyses of full participation found no significant differences between male and female visitors (75.2% and 77.2%, respectively), $\chi^2(1, 411) = 0.22, p = .640$.

Because there were no significant gender differences in participation rates for the complete survey, non-response bias of the mail survey due to gender was unlikely. However, because more men refused to participate in the on-site contact sheet, analyses were done to determine if there were gender differences on the other contact sheet variables. The only significant gender difference was for party type, $\chi^2(3, 357) = 10.27, p = .016$. Compared to males, females were less likely to travel with family (74.7% vs. 86.3%, respectively) and more likely to travel alone (6.3% vs. 2.2%) or with friends (12.6% vs. 5.5%). This finding was reported in the body of the report as well.

Refusal rates differed significantly for people travelling on different vessels, $\chi^2(5, 385) = 23.16, p < .001$.² The Spirit of Endeavor (23.1%) and the Spirit of Yorktown (24.0%) had higher refusal rates than the other vessels (rest 14.3 % to 0.0%). There was no apparent reason why these vessels would have these higher refusal rates. Participation rates for the complete survey did not differ significantly by vessel, $\chi^2(6, 412) = 10.18, p = .117$. Thus, non-response bias associated with differences in vessels on key variables in the mail survey was unlikely. Analyses looking at potential refusal bias on the data collected on the contact sheet found no significant differences due to vessel.

Mail survey non-response analyses

A variety of data from the on-site questionnaire provided an opportunity for the use of statistical tests to identify differences between respondents and non-respondents to the mail questionnaire. Specifically, possible differences were assessed using Chi-square tests for independence or *t*-tests that determined whether response rates were independent of a particular visitor characteristic (using a .05 significance level). The visitor characteristics that were used in assessing possible non-response bias were party size, type of personal group, gender, age, location of residence, whether they visited GLBA before they were contacted, and which survey worker contacted them to participate in the study.

Statistically significant differences in response rates were found for three of the seven characteristics listed above. These findings are reported in Table T-3.

² Because some vessels had fewer people sampled, it was necessary to combine contacts for the two Linblad ships (Sea Lion and Sea Bird) with those of American Safari (Safari Quest and Safari Explorer). This aggregation did not distort the analyses as each of these vessels had the same refusal rate (0%). Furthermore, this analysis excluded the Spirit of Glacier Bay to eliminate expected frequencies less than 5. The refusal rate for Spirit of Glacier Bay was 3.6%.

Tour-Boat Visitor Survey

Table T-3. Summary of non-response analyses for Other Tour boat Passenger Mail Survey.

Characteristic	Statistical Result	Description of finding
Age	$t(349) = -2.88, p = .004$	Respondents who returned the mail questionnaire were older than respondents who did not return the mail questionnaire.
Residence	$\chi^2(1, 375) = 6.2, p = .013$	Non-U.S. residents were less likely to return the mail questionnaire than non-Alaskan U.S. residents.
Survey worker making contact	$\chi^2(2, 375) = 10.56, p = .005$	Respondents contacted by the Bartlett Cove survey worker were less likely to return the mail questionnaire than those contacted by the Juneau workers.

Because it was possible that people's experiences of Glacier Bay proper differed based on these characteristics, key dependent measures of people's experiences with cruise ships were selected and a comparison of actual findings with those weighted to correct for the non-response were made. The key dependent measures were 1) whether they saw large cruise ships during their trip, 2) how seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper, 3) how the presence of large cruise ships affected their enjoyment of Margerie/Grand Pacific glaciers, and 4) Overall rating of time spent boating in Glacier Bay proper.

Table T-4 summarizes the unweighted and weighted findings for these variables. As can be seen, most weighted findings differed minimally from the unweighted findings. One exception was the findings weighted for age for effect of large cruise ship on enjoyment of Margerie/Grand Pacific glaciers. Compared to the unweighted findings of 31%, the weighted findings indicated that 36% of other tour boat passengers would report large cruise ships "detracted somewhat" from their enjoyment of Margerie/Grand Pacific glaciers. Given the size of this difference, these weighted findings were reported in the body of the report. Given that the remaining differences on these key variables were small, the differences in response rates observed were unlikely to bias the findings and conclusions of the other tour boat survey.

Table T-4. Weighted and unweighted findings of key variables.

Variable/ Response option	Findings (not weighted)	Weighted for ...		
		Age	Residence	Survey Worker
Saw large cruise ships				
No	20.4	18.8	20.3	20.0
Don't Know	3.8	3.3	3.7	3.7
Yes	75.9	77.9	76.0	76.4
How seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper				
Did not see	23.6	22.0	23.5	23.1
Detracted greatly	10.0	10.9	10.0	10.0
Detracted somewhat	26.9	30.3	26.9	27.4
No effect	38.5	35.7	38.7	38.5
Added somewhat	1.0	1.0	1.0	1.0
Added greatly	0.0	0.0	0.0	0.0
How the presence of large cruise ships affected their enjoyment of Margerie/Grand Pacific glaciers				
Did not see	21.3	15.7	21.1	20.6
Detracted greatly	18.1	20.9	18.2	18.0
Detracted somewhat	30.9	36.0	31.0	31.2
No effect	28.7	27.4	28.7	29.1
Added somewhat	1.1	0.0	1.1	1.0
Added greatly	0.0	0.0	0.0	0.0
Overall rating of time spent boating in Glacier Bay proper				
Extremely poor	0.0	0.0	0.0	0.0
Very poor	0.3	0.0	0.3	0.3
Poor	1.3	0.6	0.3	0.4
Good	5.7	7.8	5.6	5.7
Very good	23.5	22.8	23.6	23.6
Extremely good	70.2	68.8	70.2	70.0

Accuracy of the sample

Assuming a random sample and questions of the yes/no type in which the true occurrences of these values in the population are 50%/50%, the data from the larger sample from the contact sheet (i.e., 375 respondents) can be generalized to the population with a 95 percent assurance that the obtained or observed percentages to any item will vary no more than $\pm 4.8\%$. Assuming a random sample and questions of the yes/no type in which the true occurrences of these values in the population are 50%/50%, the data from the smaller sample from the mail survey (i.e., 314 respondents) can be generalized to the population of other tour boat passengers (excluding Lindblad Expeditions) with a 95 percent assurance that the obtained or observed percentages to any item will vary no more than $\pm 5.3\%$.

Subject to the limitations stated previously, the authors generally believe that the data are representative of persons over the age of 17 who visited Glacier Bay proper and were passengers on other tour boats (excluding Lindblad Expeditions) during the time of the survey. This confidence is based on the large sample size, the fact that deviations from the sampling plan were relatively minor, and that corrections for differences in response rates were extremely small for key questions.

Estimates for current and maximum allowed seasonal use days

Cruise ship use level during the 2008 peak season was 153 seasonal use days (a.k.a. current conditions). This level of use corresponds to a 1:2 ratio of 1-cruise-ship in the bay days and 2-cruise-ships in the bay days. This ratio held true during the 2008 sampling period. As the other tour boat sample was weighted to be representative of visitors during the 2008 peak season, the best estimates for current conditions (153 seasonal use days) were observed effects for all respondents to the survey.

The maximum allowed under the Record of Decision is two cruise ships entering the bay every day. Other tour boat visitors are typically single day visitors with a few being two-day visitors resulting in other tour boat visitors experiencing on average, 1-, 1.5- or 2-cruise ships in the bay per day over the course of their stays. Thus, under the maximum-allowed conditions, other tour boat passengers should experience conditions comparable to current other tour boat passengers who experienced an average of 2-cruise ships in the bay during their stay. If analyses examining differences in average number of cruise ships in the bay during other tour boat passengers' visits were statistically significant, then the best estimates of future effects of other tour boat visitors are observed effects for other tour boat passengers who experienced only 2-cruise ships in the bay days. However, if analyses showed no significant difference in other tour boat visitors' responses due to average number of cruise ships in the bay during their stay, then it was assumed that there would be no significant change when increasing cruise ship use levels to the maximum-allowed conditions of all 2-cruise ships in the bay days. The maximum allowed estimate in these cases was the observed effect for all respondents (i.e., same as current conditions).

Comparisons between current conditions and the maximum allowed were made on key variables. It should be noted that differences, if any, between current conditions (66% are 2-cruise ship days) and the maximum allowed (100% 2-cruise ship days) will be smaller than observed significant differences between 1- and 2-cruise ships in the bay days (0% and 100% 2-cruise ship days, respectively). Be that as it may, park managers will need to assess whether the observed differences in rates are 1) practically meaningful and 2) acceptable.

Conventions followed in this report

As mentioned previously, an on-site questionnaire and a mail questionnaire were used to collect the data presented in this report. These questionnaires are included in this report (see Appendices E and H), and it is recommended that they be reviewed before reading the body of this report.

As noted above, the data were weighted to reflect the current mix of other tour boat passengers who visit on one- and two-cruise ship in the bay days. The only charts that do not contain weighted data are those that present the data by number of cruise ships in the bay (either one versus two-cruise ship in the bay days, or one versus two-staggered entries versus two concurrent entries). The numbers of respondents (n) reported in all charts are unweighted n's.

In the body of this report, each question is presented as it appeared on the questionnaire, and corresponding graphs, tables, or analyses follow it. The specific survey instrument and question used to collect the data reported in each chart are noted in the chart titles. The number of respondents (n) whose data are represented in each chart is also reported, generally at the bottom of the chart.

When a chart reports data for a subset of respondents (*c.f. Figure T-12. Number of nights stayed overnight in the park*), a note describes the sub-sample included in the chart.

Missing data for up to 10 percent of respondents to a particular question are generally not considered likely to alter the interpretation of that question. Throughout this report, few questions had more than 10 percent missing data. Exceptions are noted in the text and charts.

It is neither possible nor desirable that this report describes all possible analyses of the data collected by the survey, or even all analyses that are potentially of interest to park managers. However, some analyses that may be of interest are briefly noted throughout this report, and described as potential future analyses.

II. VISITOR PROFILE

Other tour boat passengers were asked a variety of demographic questions that are used here to describe or provide a profile of such visitors. In this section, each question is presented along with the findings in chart format. Highlights of this section are below.

Highlights

- The majority of other tour boat passengers were between age 60 and 89 (69.6%) and only 5.0% of other tour boat passengers were under age 45. The average age of other tour boat passengers was 63.6 years. Other tour boat passengers were equally likely to be male (50.1%) as female (49.9%).
- Other tour boat passengers were highly educated with 55.9% of passengers having graduate or professional training and the average highest number of years of education being 17.6 (18 years is equivalent to a master's degree).
- Most other tour boat passengers were non-Alaskan U.S. residents (88.9%). No other tour boat passengers were Alaskan residents.
- The vast majority of other tour boat passengers reported being White (98.5%) followed by Asian (0.7%). Hispanic ethnicity was reported by 0.7% of other tour boat passengers.
- For 91.4% of other tour boat passengers, this trip was their first to Glacier Bay National Park.

Gender and age

Contact Sheet

3. What year were you born? 19 ____

7. Are you: ☐ FEMALE ☐ MALE

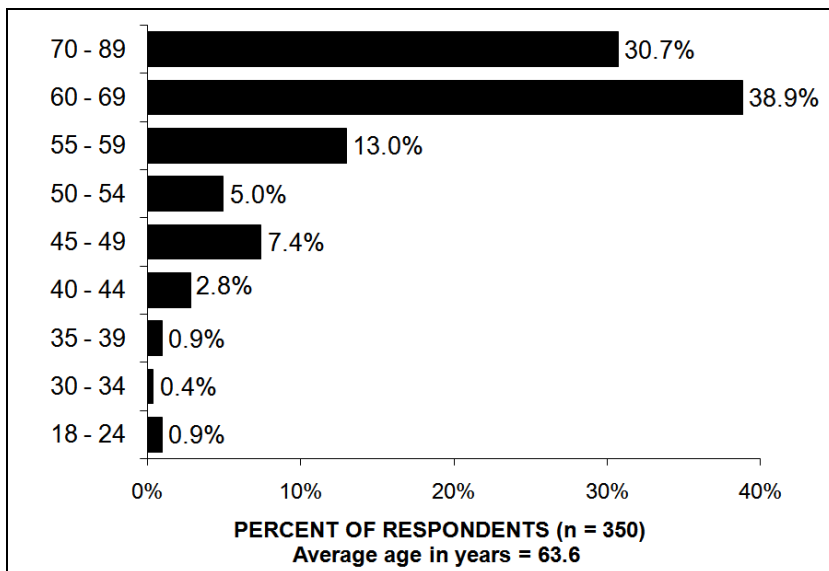


Figure T-1. Respondent's Age

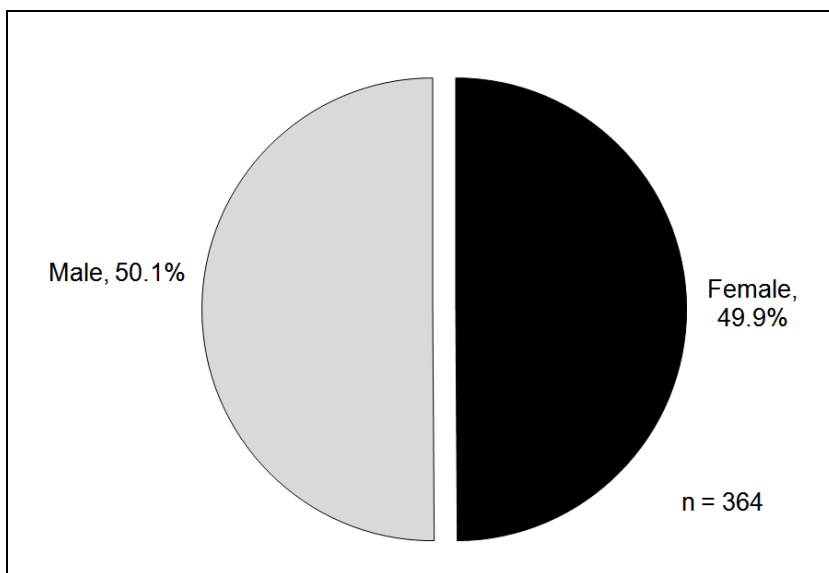


Figure T-2. Respondent's Gender

Education

Mail questionnaire

23. What is the highest level of formal schooling you have completed? *(Circle the appropriate number.)*

1 2 3 4 5 6 7 8 9 10 11 12

13 14 15 16

17 18 19 20 21 22 23 24+

(Elementary thru High School)

(College/Vocational)

(Graduate/Professional)

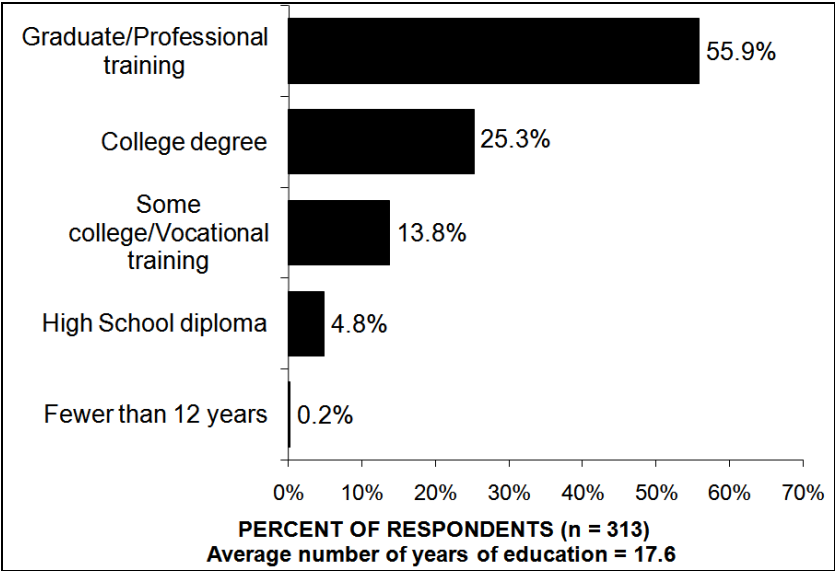


Figure T-3. Highest level of formal education completed by respondents

Residence

Contact Sheet

8. What is your home Zip or Postal Code? *(If you live outside of the United States, please write the name of your country.)*

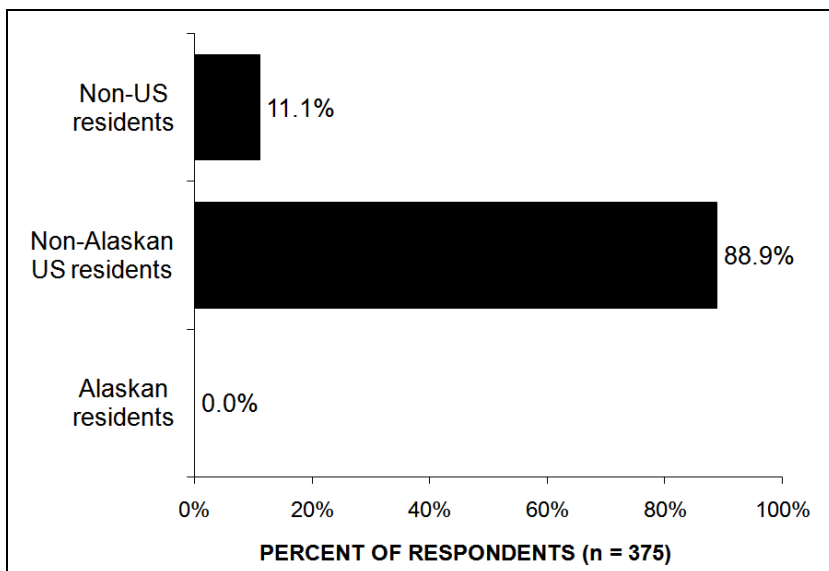


Figure T-4. Residence location

Ethnicity and race

Mail Survey

24. Are you Hispanic or Latino?

- ☐ YES – Hispanic or Latino
- ☐ NO – Not Hispanic or Latino

25. What is your race? (Check one or more races to indicate what you consider yourself to be)

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or other Pacific Islander
- ☐ White

Tour-Boat Visitor Survey

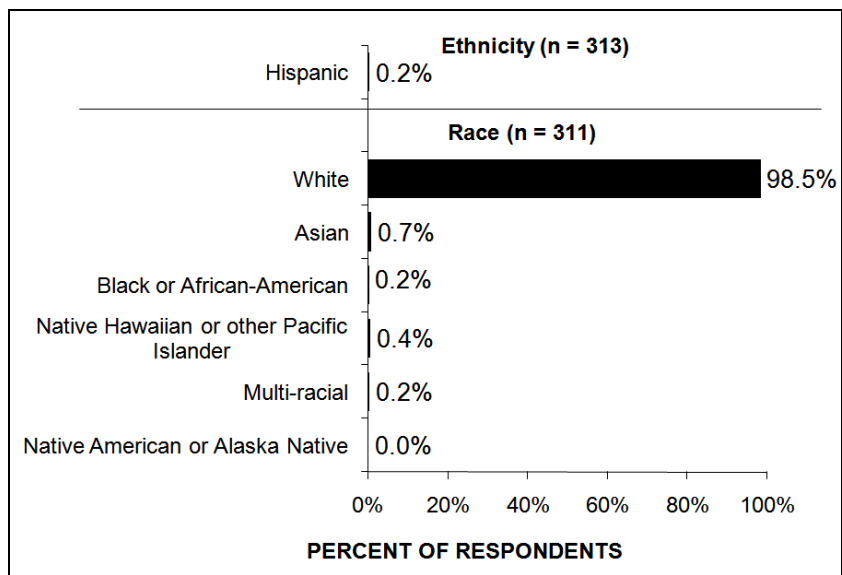


Figure T-5. Ethnicity and Race of Respondents

Number of trips to Glacier Bay National Park in last 10 years

Mail Survey

1. Was the trip during which you were contacted your first trip to Glacier Bay National Park and Preserve?

- ☐ Yes → GO TO QUESTION 2
- ☐ No → 1a. **Including the trip during which you were contacted**, how many times have you visited Glacier Bay National Park and Preserve in the last 10 years?

_____ NUMBER OF VISITS TO GLACIER BAY NPP IN LAST 10 YEARS

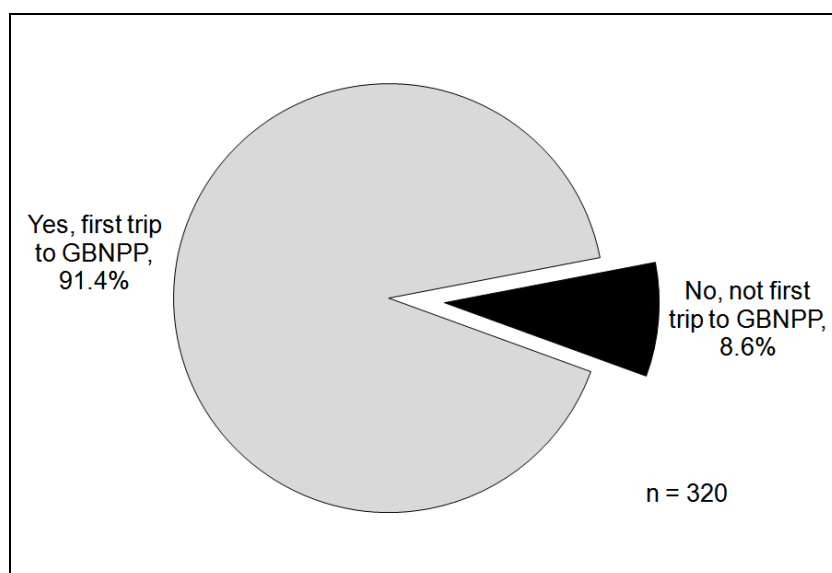


Figure T-6. First trip to GLBA

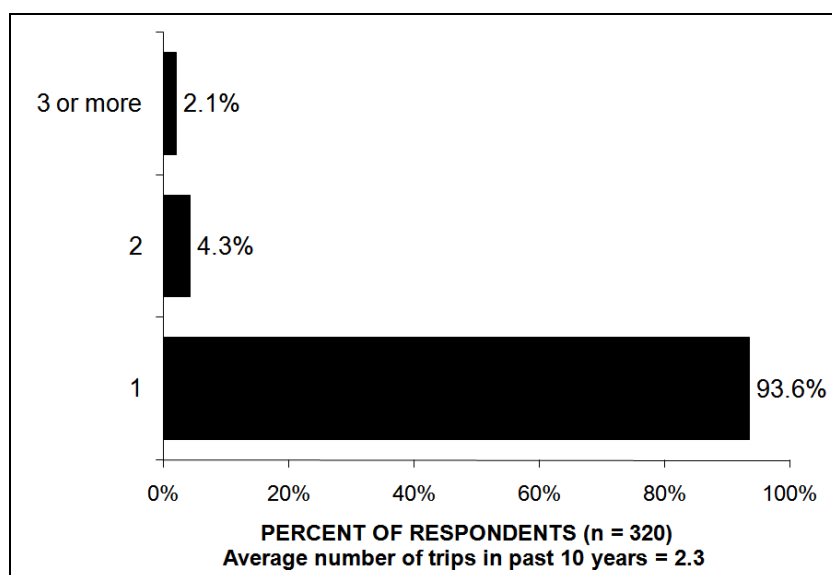


Figure T-7. Number of trips to GLBA in last 10 years

III. TRIP CHARACTERISTICS

Other tour boat passengers were asked a variety of questions about their trips that are used here to describe or provide a profile of such visitors. In this section, each question is presented along with the findings in chart format. Highlights of this section are below.

Highlights

- Although 70% of other tour boat passengers' parties consisted of two people, there were 9.4% of parties that had 6 or more members. The average party size was 3.4 people. Most (80.7%) other tour boat parties consisted of family.
- Less than one-fourth (21.5%) of other tour boat passengers stayed overnight within park boundaries. Of those who stayed overnight, 51.0% spent one night. Of the 77.6% of other tour boat respondents that did not stay overnight within park boundaries, 91% visited on one day.
- The length of stay data suggested that some other tour boat passengers may have believed that they were within park boundaries when actually they were not. If other tour boat passengers provided responses that were inconsistent with reports of other tour boat activities by park staff are tallied, then a total of 42 out of 301 other tour boat respondents may have classified some of their time outside the park as part of their visit to Glacier Bay National Park. Because the park limits vessel use, people would be more likely to see vessels outside the park boundaries and their reports of effects of other vessels may be slightly overstated.
- Almost every other tour boat passenger engaged in four activities: 1) Viewing general scenery, 2) Viewing wildlife, 3) Viewing tidewater glaciers, and 4) Taking photographs. Almost one-fourth (22.7%) of other tour boat respondents hiked and 9% kayaked during their visits.
- More than half (56.9%) of other tour boat passengers visited Margerie and Grand Pacific tidewater glaciers. The other tidewater glacier most frequently visited was Johns Hopkins (70.9%) followed by Lamplugh (29.8%). About one-fifth (19.3%) of other tour boat passengers did not know/remember if they visited other tidewater glaciers and 9.5% did not know/remember if they visited Margerie and Grand Pacific glaciers..
- The majority (68.4%) of other tour boat passengers did not plan their trip to minimize seeing or hearing other vessels and this did not differ for other tour boat respondents visiting on one- or two-cruise ship days. Of those who did plan their trips to minimize seeing or hearing other vessels, cruise ships (77.3%) and small cruise ships, tour boats, or large private vessels (27.9%) were the vessels that other tour boat respondents were most likely planning to avoid. The primary means of avoiding other vessels was by taking small cruise ships that are able to go where the large cruise ships cannot.
- Other tour boat passengers reported experiencing a variety of weather conditions during their trip to Glacier Bay proper. The most common weather reported was "Sunny and/or partly cloudy" (64.7%) followed by "Cloudy without fog" (49.9%) and "Rain with or without fog" (33.8%). Overall weather during other tour boat passengers' trips was most likely to be a mix that included sunny and/or partly cloudy (19.6%) or a mix that had no fog or rain (23.7%).
- Other tour boat passengers were asked the importance of 8 different possible trip experiences (rated on a five-point scale from 1 = not at all important to 5 = extremely important) and none of these differed for other tour boat respondents visiting on one- or two-cruise ships days. Four trip experience dimensions had average importance ratings between "very important" and "extremely

important”: 1) Experience the scenic beauty, 2) Experiencing the wonder of nature, 3) View wildlife, and 4) Pristine environment. The trip experience with the lowest average importance rating was “Solitude.” It was rated on average as slightly more important ($M = 3.22$) than “moderately important” (3 on the rating scale) and for 70% of other tour boat respondents solitude was at least moderately important. Solitude is difficult to have in Glacier Bay without kayaking or being on a smaller boat (e.g., charter or private vessel), both of which can be costly and/or require physical skills.

Party size

Contact sheet

1. How many people are in your personal traveling party?

_____ Number of people

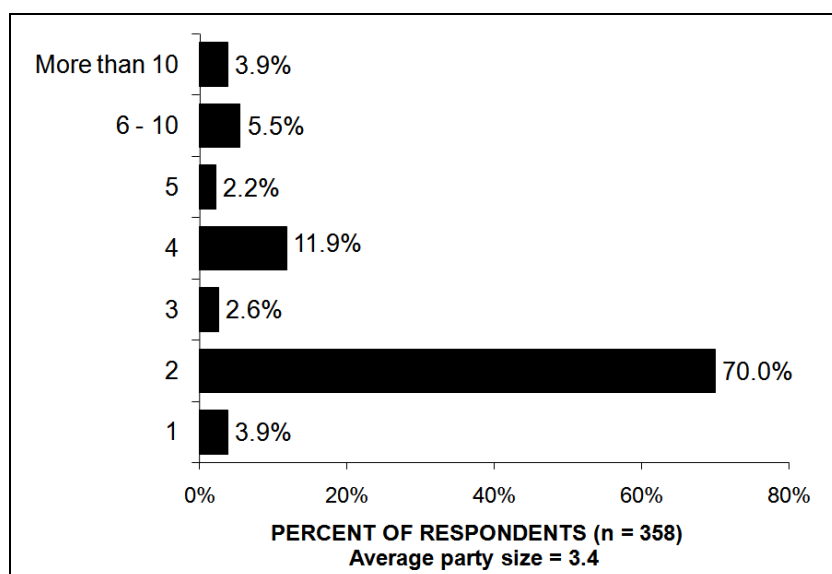


Figure T-8. Party size

Party type

Contact sheet

2. Please check the makeup of your personal traveling party:

- ☐ Individual
- ☐ Family
- ☐ Friends
- ☐ Family and friends
- ☐ Other _____
(please specify)

Tour-Boat Visitor Survey

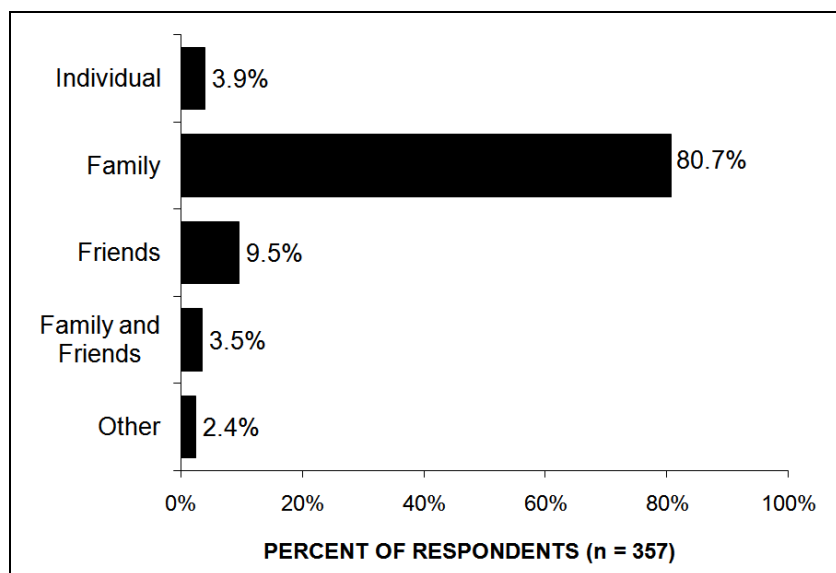


Figure T-9. Type of party

Visited Glacier Bay before or after contact

Contact Sheet

5. During this trip, have you already visited Glacier Bay National Park and Preserve?

- ☐ Yes
- ☐ No
- ☐ Don't know

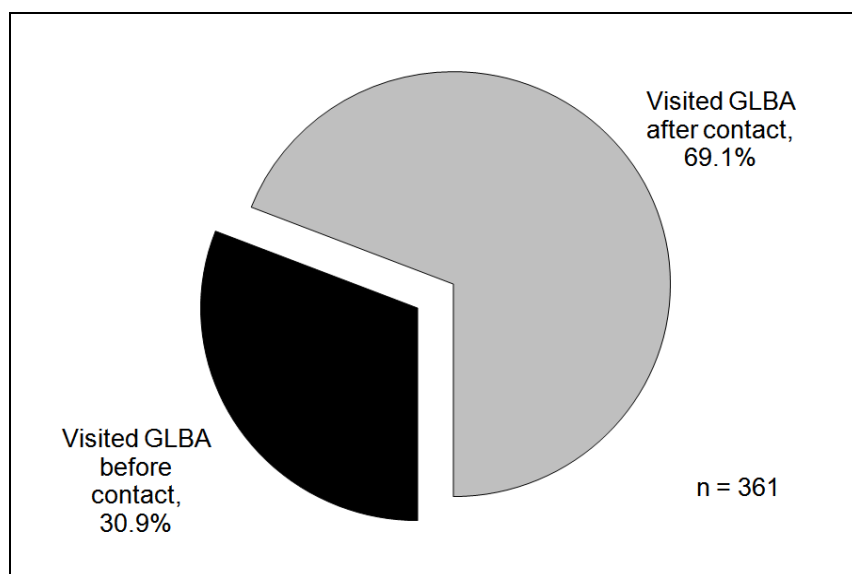


Figure T-10. Contacted before or after visiting GLBA

Length of stay

A series of questions were asked about how long respondents spent in the park and whether they stayed overnight inside the park.

Mail Survey

2. On the trip during which you were contacted, did you stay overnight inside the park? (*Glacier Bay Lodge is within park boundaries, but lodging in Gustavus is outside the park*).

- ☐ Yes → How many nights did you stay overnight within park boundaries? ____ Nights OR ____ Don't know
- ☐ Don't remember → GO TO QUESTION 3
- ☐ No → Did you visit Glacier Bay NPP on more than one day during your trip?
 - ☐ No → How many hours did you spend in the park? ____ Hours OR ____ Don't know
 - ☐ Yes → a. How many days did you visit the park? ____ Days OR ____ Don't know
b. How many hours total did you spend in the park? ____ Hours OR ____ Don't know

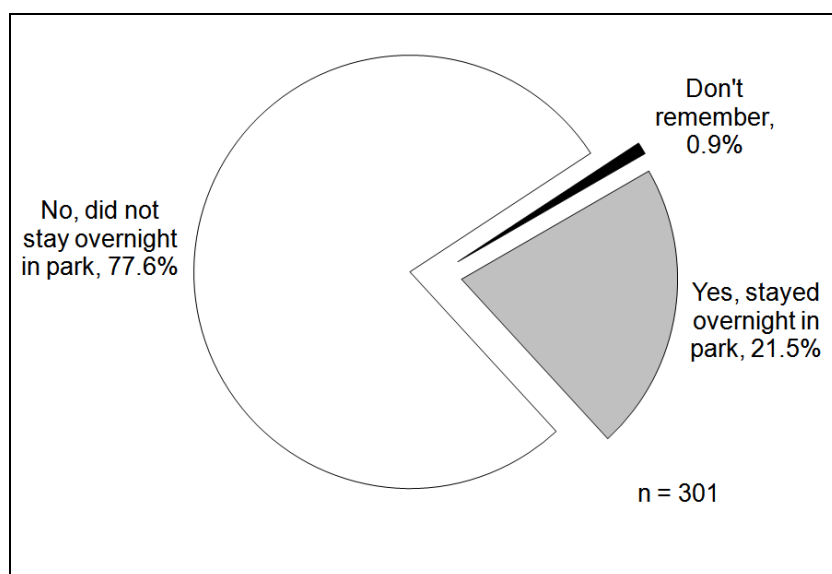


Figure T-11. Stayed overnight within park boundaries

As can be seen in Figure T-11, most other tour boat passengers did not stay overnight within park boundaries. This finding is consistent with only American Safari cruises and a limited number of Cruise West cruises spending the night within park boundaries. Per discussions with park staff, none of the other tour boats spent more than one night within park boundaries (in or out of Glacier Bay proper). Thus, for those who reported staying overnight within park boundaries, all should have answered one to the follow-up question asking how many nights they spent in the park. However, as can be seen in Figure T-12, 42.4% of respondents reported staying 2 or more nights in the park. These 24 individuals may have been mistaken about the location of the park boundaries and/or the part of the trip the question was referring to.

Tour-Boat Visitor Survey

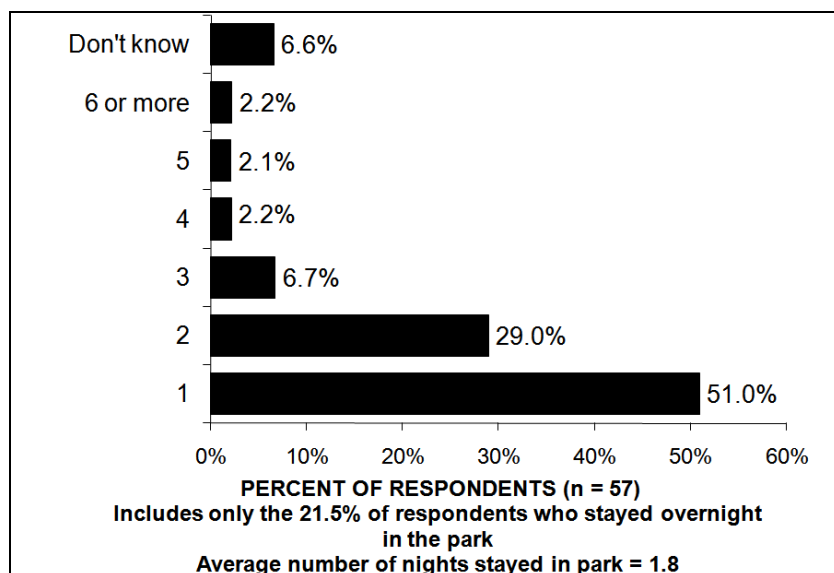


Figure T-12. Number of nights stayed overnight in the park

Per park staff the majority of other tour boat passengers who reported not staying overnight in the park would have spent a single day in the park. As can be seen in Figure T-12, the majority of respondents reported visiting the park one day. A small number of respondents reported visiting 2 or 3 days and these 18 individuals may have been on cruises that spent additional time in park waters outside Glacier Bay proper or may be individuals who were mistaken about park boundaries.

For those other tour boat passengers who did not stay overnight in the park, the number of days spent in the park depended on the average number of cruise ships in the bay per day, $F(2, 202) = 4.85$, $p = .009$ (see Figure T-13). People who experienced an average of 1.5 cruise ships in the bay per day were more likely to spend two or more days in the park than people who experienced an average of one or two cruise ships in the bay.

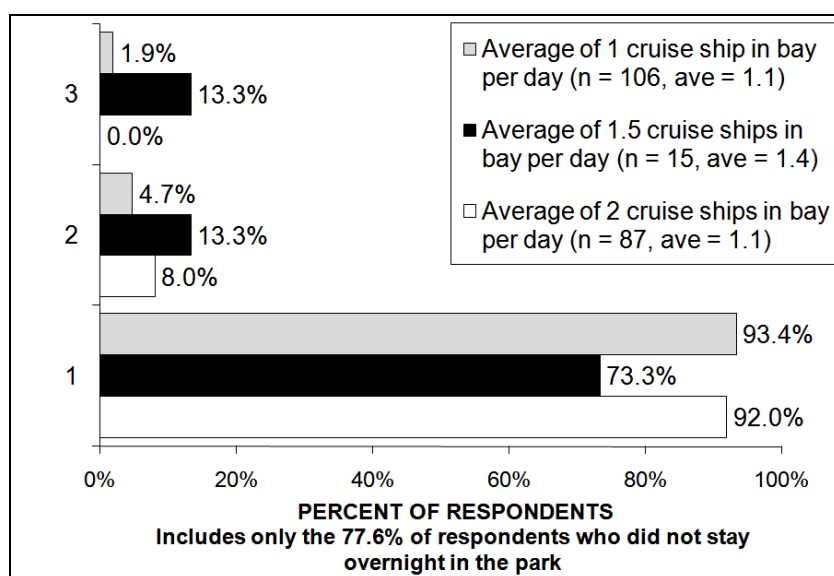


Figure T-13. Number of days visited by those who did not stay overnight

The data asking about number of hours spent in the park for those who spent one day (Figure T-14) and for those who spent multiple days (Figure T-15) also revealed some issues about whether some respondents were aware when they were within park boundaries. Thus, the data presented in Figure T-14 and Figure T-15 should be viewed with caution.

The length of stay data suggested that some other tour boat passengers may have believed that they were within park boundaries when actually they were not. If other tour boat passengers provided responses that were inconsistent with reports of other tour boat activities by park staff are tallied, then a total of 42 out of 301 other tour boat respondents may have classified some of their time outside the park as part of their visit to Glacier Bay National Park. Because the park limits vessel use, people would be more likely to see vessels outside the park boundaries and their reports of effects of other vessels may be slightly overstated.

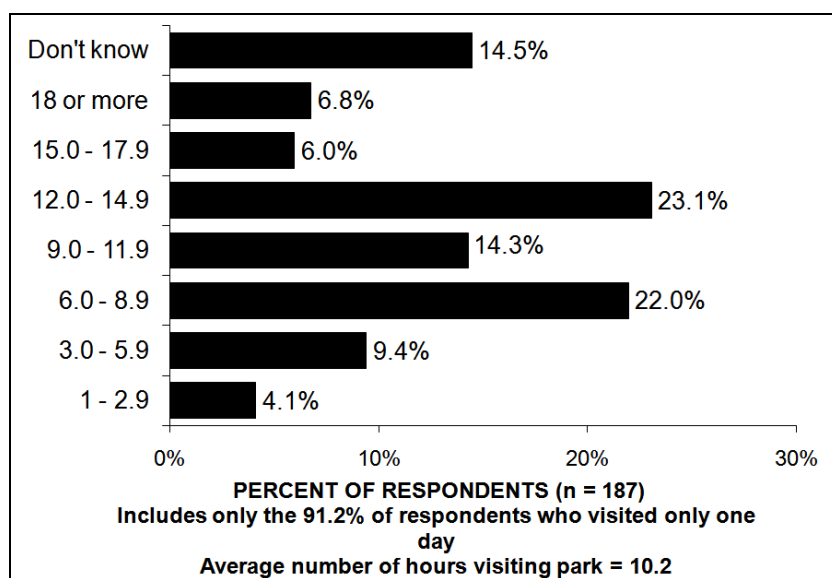


Figure T-14. Number of hours spent in park by those visiting only one day

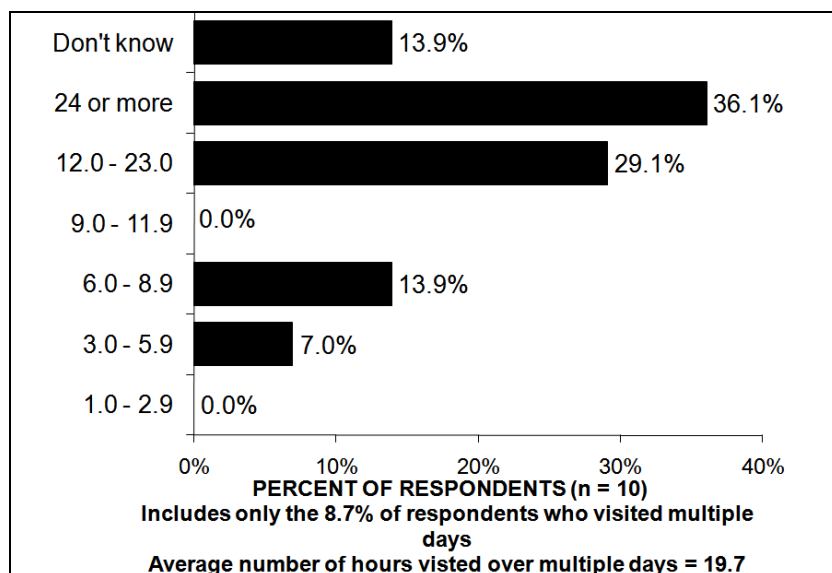


Figure T-15. Number of hours spent in park by those who visited multiple days

Activities engaged in on trip to Glacier Bay National Park

Mail Survey

3. On the trip to Glacier Bay National Park and Preserve during which you were contacted for this survey, which of the following activities did you engage in? *(Circle as many numbers as apply.)*

- 1 Viewing tidewater glaciers
- 2 Viewing wildlife
- 3 Viewing general scenery
- 4 Kayaking or canoeing
- 5 Hiking
- 6 Fishing
- 7 Taking photographs
- 8 Staying at Glacier Bay Lodge (in park)
- 9 Staying at Bartlett Cove campground
- 10 Camping in backcountry
- 11 Other(*please specify*) _____

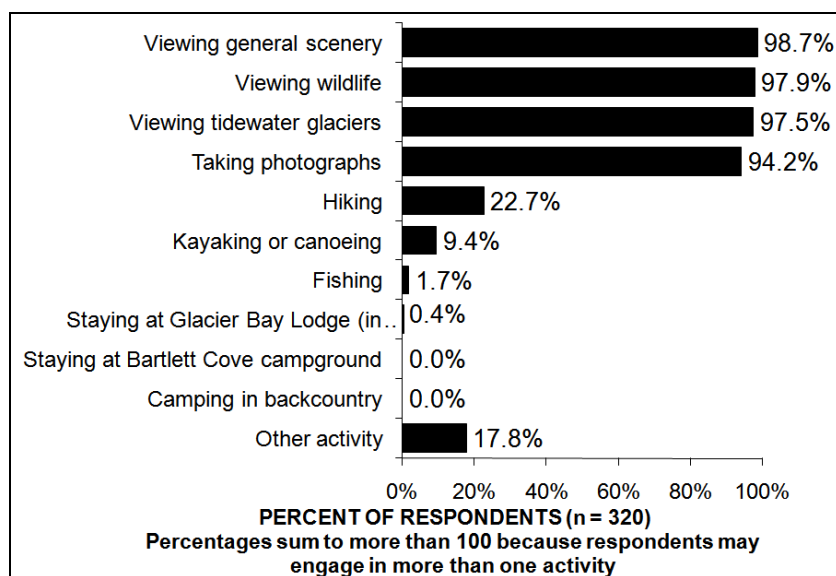


Figure T-16. Activities engaged in on trip to Glacier Bay National Park

Other activities listed by tour boat respondents were reviewed for similar activities and tallied. Of the 49 other activity responses, 65.3% indicated that they were aboard a tour boat, 12.2% indicated they engaged in the park ranger and Tlingit presentations, 10.2% visited a park facility, 8% walked, and the remaining 12.2% of activities listed were miscellaneous.

See or hear large cruise ships

Mail Survey

7. During your time in Glacier Bay proper, did you see or hear large cruise ships (other than the one you were on)?
- ☐ No→GO TO QUESTION 9
 - ☐ Don't know→GO TO QUESTION 9
 - ☐ Yes

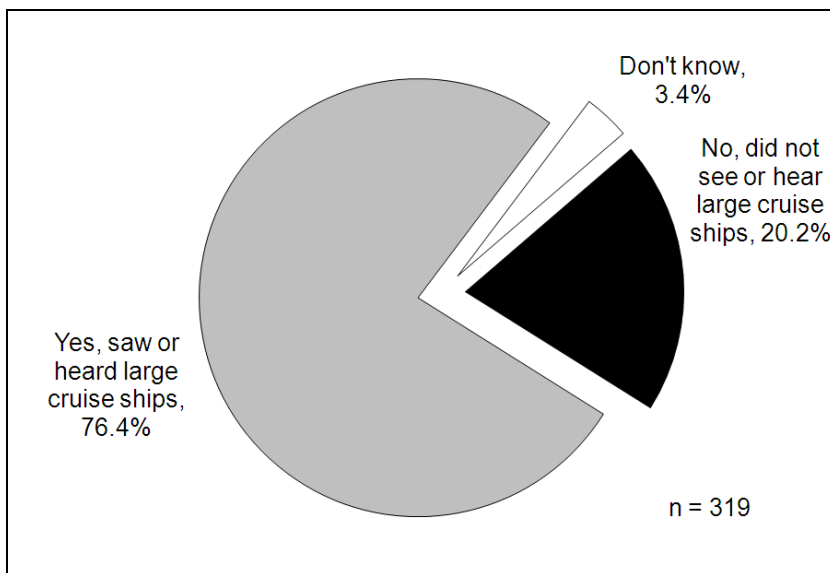


Figure T-17. See or hear large cruise ships

Planned trip to minimize seeing or hearing other vessels

Mail Survey

17. Did you plan your trip to minimize seeing or hearing other vessels?

- ☐ No → GO TO QUESTION 18
- ☐ Yes

17a. Which types of vessels did you plan your trip to minimize seeing or hearing? *(Please check all that apply.)*

- ☐ Large cruise ships
- ☐ Small cruise ships, tour boats, or large private vessels
- ☐ Small motor boats or sailboats
- ☐ Kayaks

17b. Please describe briefly how you planned your trip to minimize seeing or hearing other vessels.

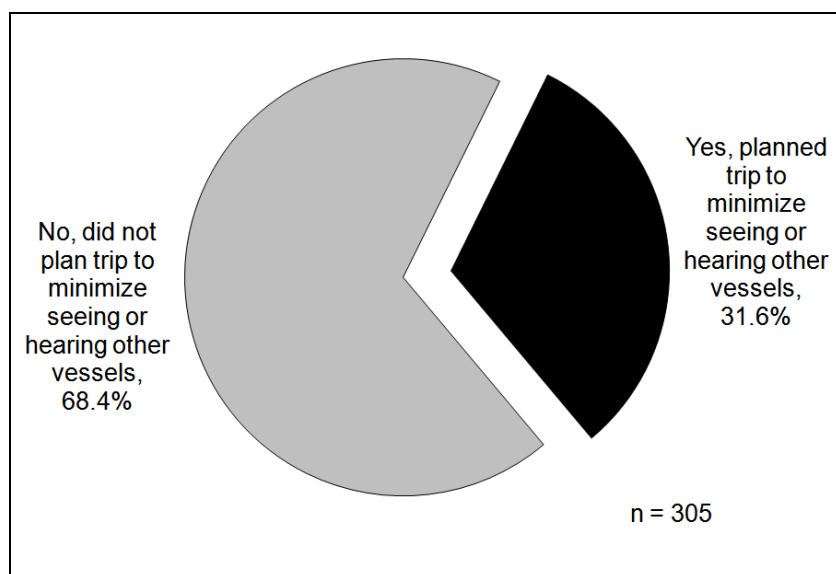


Figure T-18. Planned trip to minimize seeing or hearing other vessels

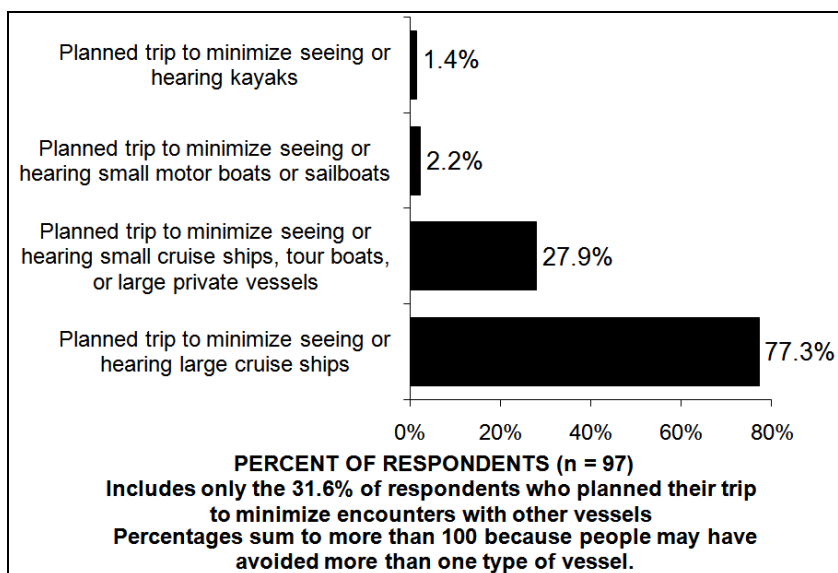


Figure T-19. Planned trip to minimize encounters with different types of vessels

Other tour boat passengers were asked to briefly describe how they planned to minimize seeing or hearing other vessels. Their responses were coded for similar themes. The two themes that emerged were 1) choosing to be on a small cruise ship (55.4% of responses) and 2) visiting areas of the park that large cruise ships cannot (43.5% of responses). For a number of respondents, these two themes were evident in their descriptions. Small cruise ships have increased accessibility relative to the large cruise ships and it allows them to visit areas of the park where large cruise ships cannot. For some respondents, the selection of a small cruise ship to avoid encountering other ships was based on marketing materials of the small cruise lines and their efforts to avoid other vessels.

Importance of different trip experiences

The qualitative interviews conducted during Summer 2007 revealed seven dimensions of visitor experience that were affected by cruise ships. These identified dimensions of visitor experience had significant overlap with dimensions of visitor experience measured by the list of Recreational Experience Preference (REP) items. To have two items for each dimension, 9 REP items were selected and 5 new items were constructed using the REP format (see general Introduction for more detail). Other tour boat respondents were asked the importance of each of these experiences during their visit to Glacier Bay. Additionally other tour boat respondents were asked how hearing or seeing a large cruise ship affected each possible trip experience (see Section VIII).

Tour-Boat Visitor Survey

Mail Survey

6. Some possible experiences of people who visit recreation areas are listed below. How important to you was each of the following experiences during the visit to Glacier Bay proper in which you were contacted?
(Circle one response for each reason.)

	How important to you was each experience during this visit to Glacier Bay proper?				
	not important	slightly important	moderately important	very important	extremely important
A. EXPERIENCE THE SCENIC BEAUTY					
B. EXPERIENCE TRANQUILITY					
C. BE AMAZED BY NATURE					
D. EXPERIENCE A PRISTINE SETTING					
E. ENJOY THE SOUNDS OF NATURE					
F. EXPERIENCE SOLITUDE					
G. EXPERIENCE NATURE UNTOUCHED BY HUMANS					
H. HAVE PERSONAL EXPERIENCES WITH NATURE					
I. VIEW WILDLIFE					
J. EXPERIENCE NATURE'S WONDERS					
K. BE CLOSE TO NATURE					
L. FEEL ALONE WITH NATURE					
M. EXPERIENCE PEACE AND CALM					
N. EXPERIENCE THE NATURAL					

SOUNDS

important important important important important

Cronbach's alpha was calculated for each of the seven dimensions to assess the internal consistency of the two scale items selected to measure the effect of cruise ships on each dimension. George and Mallery (2003) provide the following rules of thumb: “ $\alpha > .9$ – Excellent, $\alpha > .8$ – Good, $\alpha > .7$ – Acceptable, $\alpha > .6$ – Questionable, $\alpha > .5$ – Poor, and $\alpha < .5$ – Unacceptable” (p. 231). As can be seen in Table T-5, Cronbach's alpha was over 0.7 for 6 of the 7 scales indicating acceptable or better reliability of those scales. The Cronbach's alpha for the scale for “Seeing nature” was 0.521 indicating poor reliability. Because it was unlikely that the same latent variable underlies these two items for other tour boat passengers, these two items were treated as two separate scales measuring different dimensions. Thus, a total of 8 scales representing 8 dimensions were used in subsequent analyses. It should be noted that this pattern of findings is analogous to that found for the 14 items measuring detractor of cruise ships on these visitor experience dimensions.

Table T-5. Internal consistency measure (Cronbach's alpha) for each importance dimension

Scale	Items	Cronbach's alpha
Seeing nature		0.521
	View wildlife	
	Experience the scenic beauty	
Experiencing the wonder of nature		0.747
	Be amazed by nature	
	Experience nature's wonders	
Intimate experience with nature		0.728
	Have personal experiences with nature	
	Be close to nature	
Hear the sounds of nature		0.860
	Enjoy the sounds of nature	
	Experience the natural sounds	
Tranquility		0.831
	Experience tranquility	
	Experience peace and calm	
Solitude		0.881
	Experience solitude	
	Feel alone with nature	
Pristine environment		0.751
	Experience a pristine setting	
	Experience nature untouched by humans	

The importance of these 8 trip experience dimensions did not differ for other tour boat respondents visiting on one- or two-cruise ship days. Table T-6 presents the percent of respondents with each scale score and the average importance rating for that trip experience dimension. Four trip experience dimensions had average importance ratings between “4 = very important” and “5 = extremely important”: 1) Experience the scenic beauty, 2) Experiencing the wonder of nature, 3) View wildlife, and 4) Pristine environment. The trip experience with the lowest average importance rating was “Solitude.” It was rated on average as slightly more important ($M = 3.22$) than “moderately important” (3 on the rating scale) and for almost three-fourths of respondents solitude was at least moderately important (70.1% of respondents scored 3 or

Tour-Boat Visitor Survey

higher on the Solitude scale). Solitude is difficult to have in Glacier Bay without kayaking or being on a smaller boat (e.g., charter or private vessel), both of which can be costly and/or require physical skills.

Table T-6. Importance ratings for trip experience scales

Trip Experiences	N	Mean	Percent of people rating how important each dimension was to their trip experience in Glacier Bay proper ¹								
			1	1.5	2	2.5	3	3.5	4	4.5	5
Experience the scenic beauty	309	4.65	0.0		0.0		0.9		33.4		65.7
Experiencing the wonder of nature	310	4.52	0.0	0.4	0.2	0.4	2.7	4.2	24.1	18.3	49.7
View wildlife	311	4.43	0.4		1.5		9.7		30.9		57.4
Pristine environment	309	4.30	0.4	0.9	0.0	1.8	4.2	11.7	25.0	19.7	36.3
Intimate experience with nature	300	3.94	0.5	1.1	3.2	5.2	12.6	13.0	24.6	15.4	24.4
Hear the sounds of nature	306	3.81	1.4	1.6	3.8	6.9	13.1	12.2	31.2	8.2	21.7
Tranquility	306	3.72	1.6	2.0	5.8	8.9	12.2	15.2	22.9	10.4	20.9
Solitude	300	3.22	7.8	3.2	13.5	5.4	22.7	10.4	18.1	5.3	13.6

¹The rating scale included for each item was: 1 = Not at all important, 2 = Slightly important, 3 = Moderately important, 4 = Very important, 5 = Extremely important. Scale values that fall between the 5 points on the rating scale are due to averaging the ratings for the two scale items for a dimension.

Visited Margerie and Grand Pacific glaciers

11. During your trip to Glacier Bay proper, did you visit Margerie/Grand Pacific tidewater glaciers?

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes

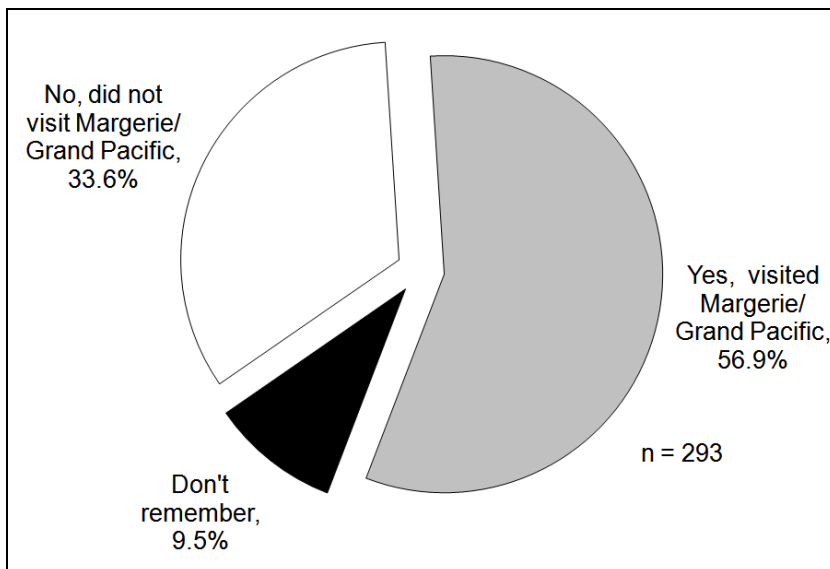


Figure T-20. Percent of respondents who visited Margerie and Grand Pacific glaciers

Other tidewater glacier visited

Mail survey

12. During your trip to Glacier Bay proper, which of the other tidewater glaciers, if any, did you visit?

- ☐ Did not visit any other tidewater glaciers.
- ☐ Johns Hopkins
- ☐ Lamplugh
- ☐ McBride
- ☐ Reid
- ☐ Other (please specify) _____
- ☐ Don't know/Don't remember

Tour-Boat Visitor Survey

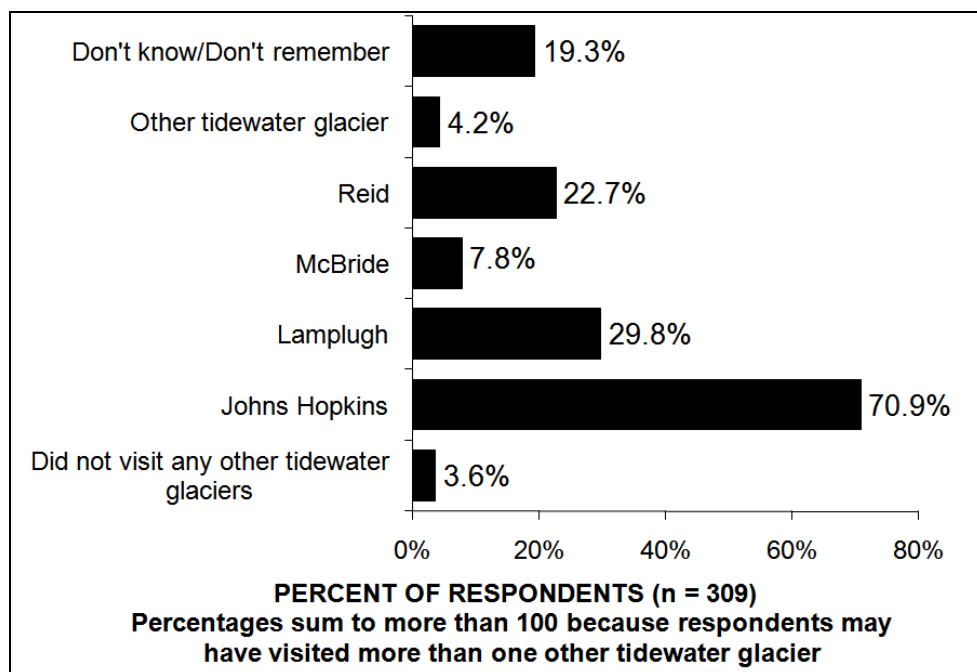


Figure T-21. Other tidewater glaciers visited

Weather

Mail Survey

4. We are interested in the kinds of weather you experienced during your trip in Glacier Bay proper. Please indicate each type of weather you experienced and then estimate the number of hours that weather was present. (*Check as many as apply.*)

- ☐ Sunny and/or partly cloudy → About _____ hours OR Don't remember _____
- ☐ Cloudy without fog → About _____ hours OR Don't remember _____
- ☐ Cloudy with fog → About _____ hours OR Don't remember _____
- ☐ Rain with or without fog → About _____ hours OR Don't remember _____

Respondents were asked to report about the kinds of weather they experience during their time in Glacier Bay proper. Figure T-22 shows the percent of respondents who experienced each type of weather at some point during their visit.

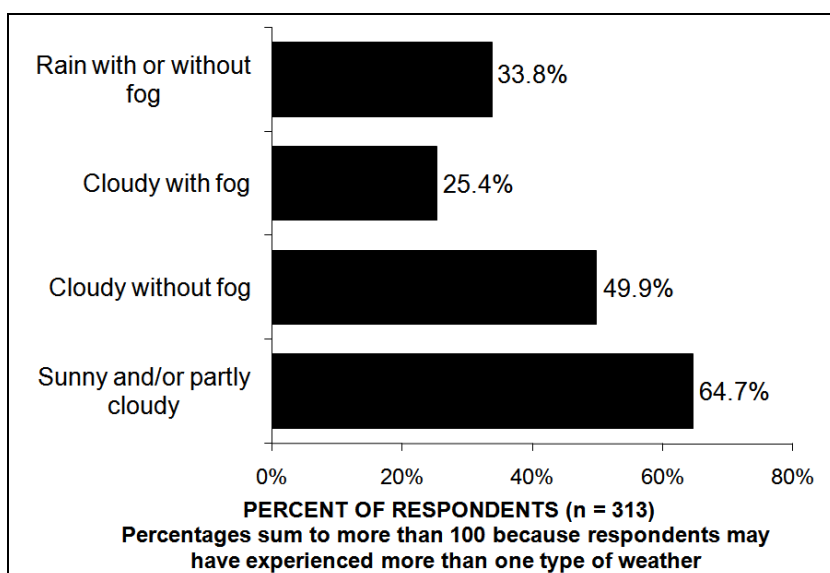


Figure T-22. Percent of respondents who experienced different kinds of weather

Question 4 also asked respondents to report about how many hours they experienced each type of weather during their trip in Glacier Bay proper. It was thought that for most respondents their time in Glacier Bay proper would correspond primarily to their time spent in the bay proper. However, review of the hour data indicated for many respondents significantly longer time frames. Thus, there is uncertainty as to the extent to which the weather data reported correspond to time actually spent in Glacier Bay proper. Because of this uncertainty and the increased difficulty of accurately recalling times over longer time frames (often multiple days), the hour data are not reported. Instead, a series of mutually exclusive trip weather experience categories were created that generally reflect an ordinal scale of weather experienced during visitors' trips (e.g., mostly sunny to all rain). People were assigned to these categories based on their responses to having experienced each kind of weather listed in Question 4 (see Table T-7). Figure T-23 presents the findings for the weather experience categories.

Table T-7. Trip weather experience categories

Trip weather experience category	Kinds of weather checked in Question 4
Only sunny and/or partly cloudy	Only "Sunny and/or partly cloudy" checked
No fog or rain	"Cloudy without fog" checked, "Sunny and/or partly cloudy" may or may not be checked
Some fog, but no rain	"Cloudy with fog" must be checked, "Sunny and/or partly cloudy" and/or "Cloudy without fog" must also be checked
Some rain	"Rain with or without fog" must be checked and at least one other kind of weather
All fog with or without rain	"Cloudy with fog" must be checked and "Rain with or without fog" may or may not be checked
All rain	Only "Rain with or without fog" checked

Tour-Boat Visitor Survey

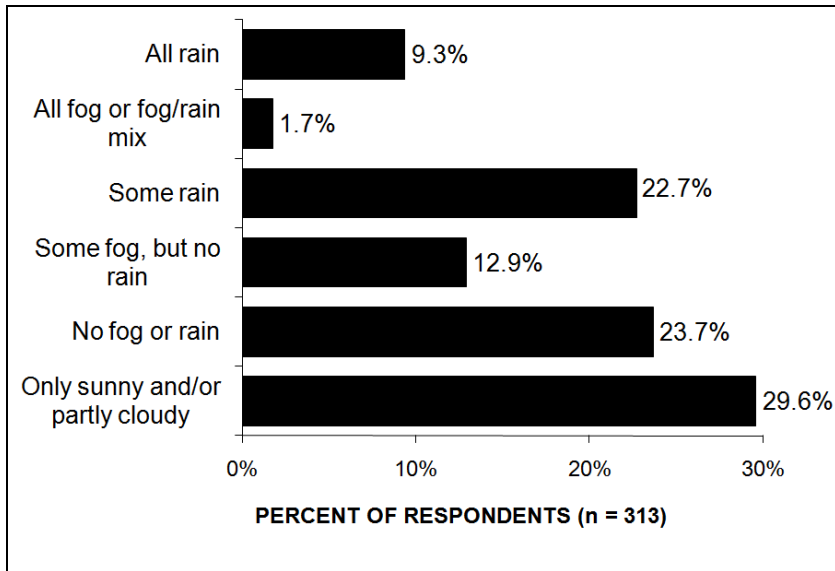


Figure T-23. Trip weather experience categories based on responses to each kind of weather experienced by a visitor

IV. ASSESSING EFFECTS OF PRESENCE OF 2-CRUISE SHIPS IN THE BAY

A 1:2 ratio of 1- to 2-cruise ship in the bay days was fairly evenly spread over the 2008 peak season (June 1 to August 31). Because some other tour boat passengers spent multiple days visiting Glacier Bay proper that spanned a mix of 1- and 2-cruise ships in the bay days, a simple comparison of one- versus two-cruise ships in the bay days was not appropriate. Computing the average number of cruise ships in the bay per day was calculated for each respondent. This measure resulted in only three values (1, 1.5, and 2 cruise ships) so a comparison between these three groups were done to examine effects of the presence of 2-cruise ships in the bay. It should be noted that all respondents who experienced 1.5 cruise ships in the bay per day spent multiple days in the bay whereas the majority of respondents who averaged 1 or 2 cruise ships in the bay spent a single day in the bay.

Analyses assessed whether presence of 2-cruise ships in the bay (as measured by average number of cruise ships in the bay per day) affected the different measures of encounters and the effects of encounters for the different craft. Because the average number of cruise ships in the bay did not take into account the time respondents spent in the bay, when significant results were found for it, additional analyses were done that included the number of days spent in Glacier Bay proper. These analyses allowed a way to determine if the observed effect was due to differences in the number of cruise ships in the bay each day or whether it was due to simply spending more time in the bay.

Table T-8 summarizes the variables that had significant effects of average number of cruise ships in the bay per day and whether those results remained significant when taking into account the number of days other tour boat passengers spent in the bay. Of the 8 observed significant effects for average number of cruise ships in the bay per day, five remained significant when number of days spent in the bay was included in the analyses to take into account the effect due to length of stay in the bay. These five effects were reported with the results for their respective questions in the following sections because they suggested an effect due to differences in the number of cruise ships in the bay.

The focus on presenting results related to the number of cruise ships in the bay each day rather than for time spent in Glacier Bay proper is because park managers are more likely to control the number of cruise ships in the bay each day than to strictly regulate the number of days people can visit the backcountry.

Table T-8. Effects of number of cruise ships in bay per day: Alone and when controlling for days spent in bay

Variable	Average number of cruise ships in bay <i>p</i> -value	Analyses with a) Average number of cruise ships in bay and b) Days spent in bay	
		<i>p</i> -value for average number of cruise ships in bay	<i>p</i> -value of days spent in bay
Hours saw or heard cruise ship	.026	.780	.001
Days saw or heard cruise ships	.043	.147	<.001
Hours saw or heard cruise ships on day saw or heard the most cruise ships	.012	.313	.032
Saw craft when visiting Margerie/Grand Pacific glaciers	.011	.002	.013
Number of large cruise ships when visiting Margerie/Grand Pacific glaciers	.041	.023	.258
Number of motorized watercraft other than large cruise ships when visiting Margerie/Grand Pacific glaciers	.028	.005	.006
Agreement with "Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay."	.042	.027	.775
Agreement with "It is inappropriate for large cruise ships to be in Glacier Bay proper."	.036	.033	.047
Opinion scale re: large cruise ships in Glacier Bay	.022	.029	.195

V. ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS

Other tour boat passengers were asked about encounters with cruise ships and other motorized craft. Some questions asked about seeing or hearing different kinds of craft for their trip as a whole and other questions focused on seeing or hearing different kinds of craft while they were at Margerie and Grand Pacific glaciers. This section reports the findings about encounters during their time at Margerie and Grand Pacific glaciers.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 10).

Highlights

- Over half (56.9%) of other tour boat passengers visited Margerie and Grand Pacific glaciers. The percent of other tour boat respondents who reported seeing other craft when at the glaciers depended on the average number of cruise ships in the bay per day. Other tour boat respondents who experienced an average of 2-cruise ships in the bay per day were the most likely to see other craft at Margerie and Grand Pacific glaciers (70.6% versus 48.5% and 34.5% for 1 and 1.5 cruise ships in bay per day, respectively). A comparison of current conditions with the maximum allowed of 2-cruise ships in the bay everyday revealed an increase from 57.3% to 70.6% of other tour boat passengers who would see other craft at Margerie and Grand Pacific glaciers.
- The number of large cruise ships seen at Margerie and Grand Pacific glacier depended on the average number of cruise ships in the bay per day. Other tour boat respondents who visited when there was an average of 1.5 cruise ships in the bay saw the fewest large cruise ships at the glaciers ($M = 0.29$) whereas those other tour boat respondents who experienced an average of 1- or 2-cruise ships in the bay saw more large cruise ships at the glaciers ($M = 0.43$ and $M = 0.61$, respectively). Allowing two cruise ships in the bay everyday (the maximum allowed under the EIS) will increase the average number of large cruise ships seen from 0.49 (current conditions) to 0.61.
- Motorized water craft other than cruise ships were the most frequently type of craft seen at Margerie and Grand Pacific glaciers by other tour boat passengers. The number of motorized water craft other than cruise ships seen also depended on the average number of cruise ships in the bay per day. Other tour boat respondents who averaged 2-cruise ships in the bay saw 0.89 whereas those who averaged 1.5- or 1-cruise ship per day saw on average 0.34 or 0.36 motorized water craft other than cruise ships.
- Kayaks, propeller-driven aircraft and helicopters were all seen at Margerie and Grand Pacific glaciers by less than 15% of other tour boat passengers who visited the glaciers.

Tour-Boat Visitor Survey

Mail Survey

11. During your trip to Glacier Bay proper, did you visit Margerie/Grand Pacific tidewater glaciers?

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes

11a. At any time while you were at the Margerie/Grand Pacific tidewater glaciers, did you see one or more other water or air craft present (besides your own)?

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes

11b. Please indicate how many of each type of craft was present (excluding your own vessel) while you were at the Margerie/Grand Pacific tidewater glaciers.

- _____ Large cruise ships
- _____ Motorized water craft other than large cruise ships (other than the one you were on)
- _____ Kayaks
- _____ Propeller-driven airplanes
- _____ Helicopters

Visited Margerie and Grand Pacific glaciers

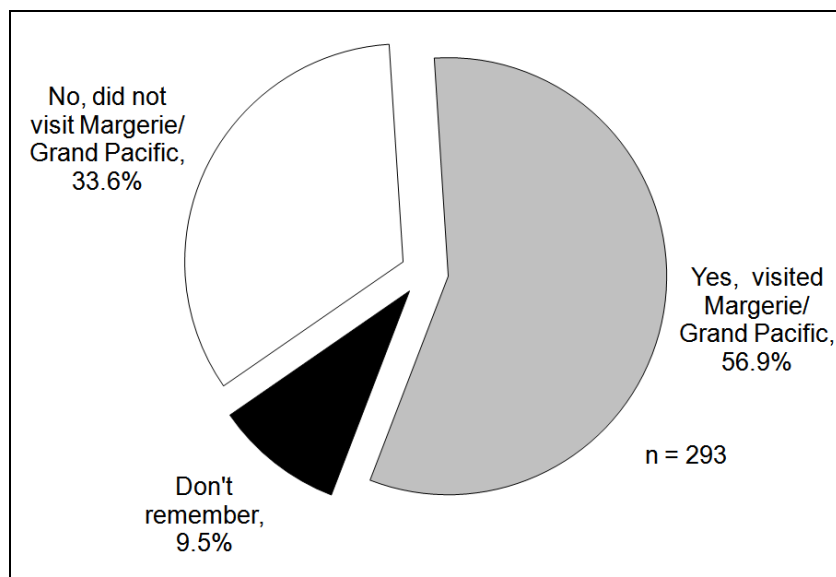


Figure T-24. Percent of respondents who visited Margerie and Grand Pacific glaciers

Saw other craft at Margerie and Grand Pacific glaciers

The likelihood that other tour boat passengers who visited Margerie and Grand Pacific glaciers saw or heard other craft at the glaciers depended on the average number of cruise ships in the bay per day during their trip, $B = 1.34$, Wald Statistic = 9.43, $p = .002$ when controlling for length of stay. As can be seen in Figure T-25, other tour boat passengers who experienced an average of 2-cruise ships in the bay per day were more likely to hear or see other craft (70.6% versus 34.5% and 48.5%).

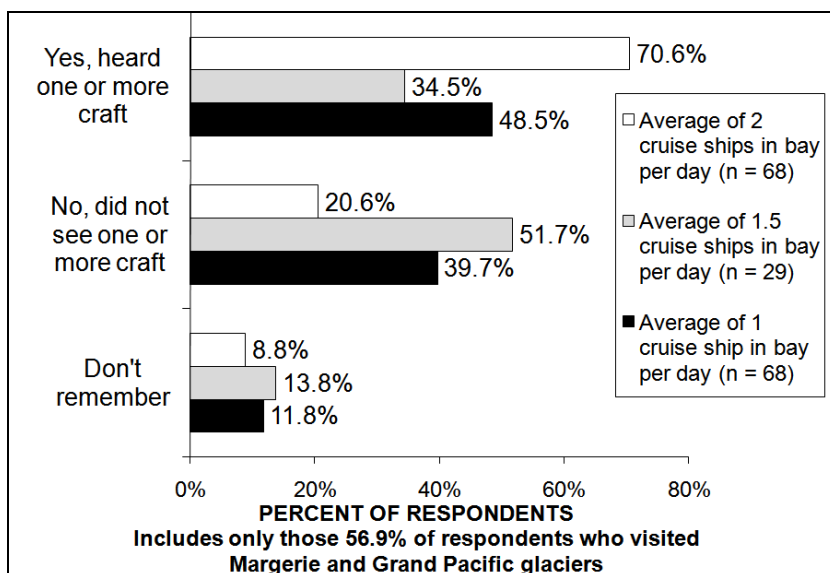


Figure T-25. Percent of respondents who saw other craft at Margerie and Grand Pacific glaciers by number of cruise ships in the bay per day

Current conditions are comprised of a 1:2 ratio of 1- and 2-cruise ships in the bay days. Changing from current conditions to 2-cruise ships in the bay every day (the maximum allowed per the EIS) will increase the percentage of respondents who see or hear other craft at Margerie and Grand Pacific glacier from 57.3% to 70.0%.

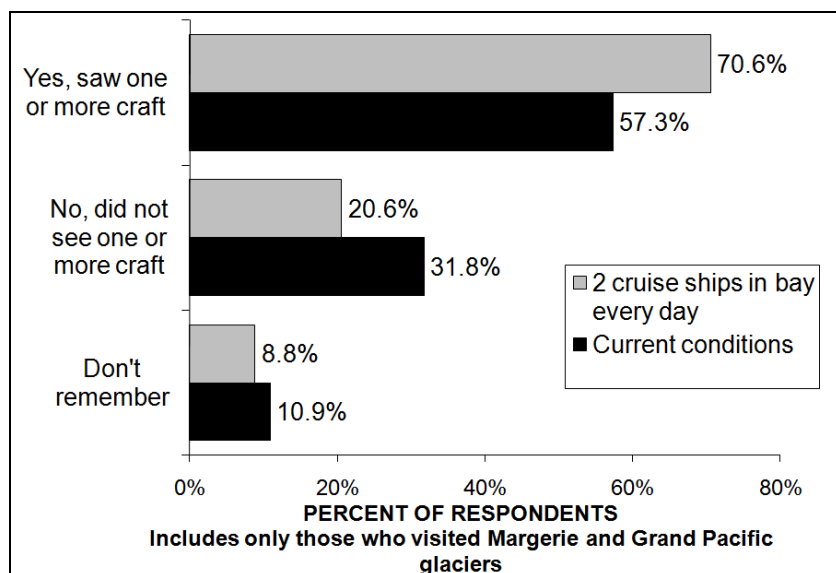


Figure T-26. Percent of respondents who saw other craft at Margerie and Grand Pacific glaciers: Current conditions versus maximum allowed

Number of different types of craft seen at Margerie and Grand Pacific glaciers

The number of large cruise ships seen at Margerie and Grand Pacific glaciers depended on the average number of cruise ships in the bay per day, $F(2, 161) = 3.88, p = .023$. Other tour boat passengers who averaged 2 cruise-ships in the bay per day were more likely to see cruise ships at Margerie and Grand Pacific glaciers.

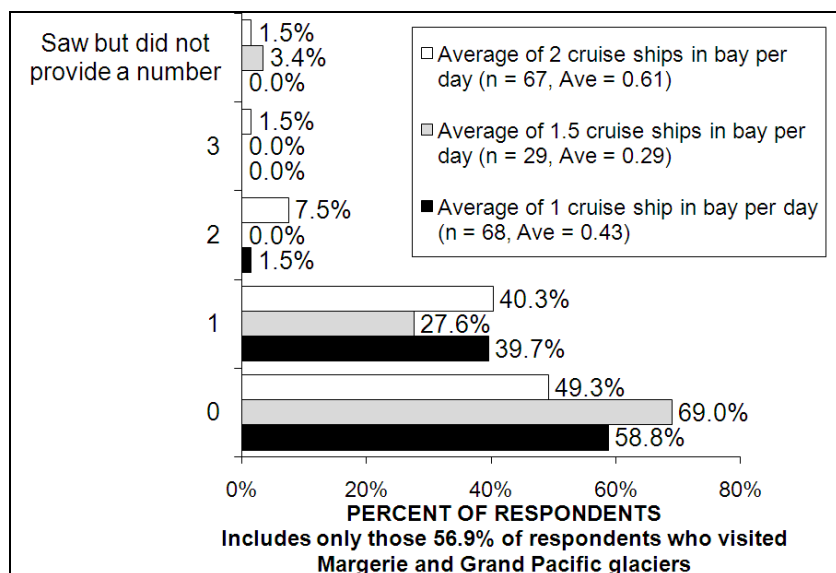


Figure T-27. Number of large cruise ships seen at Margerie and Grand Pacific glaciers by average number of large cruise ships in the bay

Figure T-28 shows that increasing to the maximum allowed of 2-cruise ships in the bay everyday from current conditions increases slightly the number of cruise ships other tour boat passengers see or hear at Margerie and Grand Pacific glaciers.

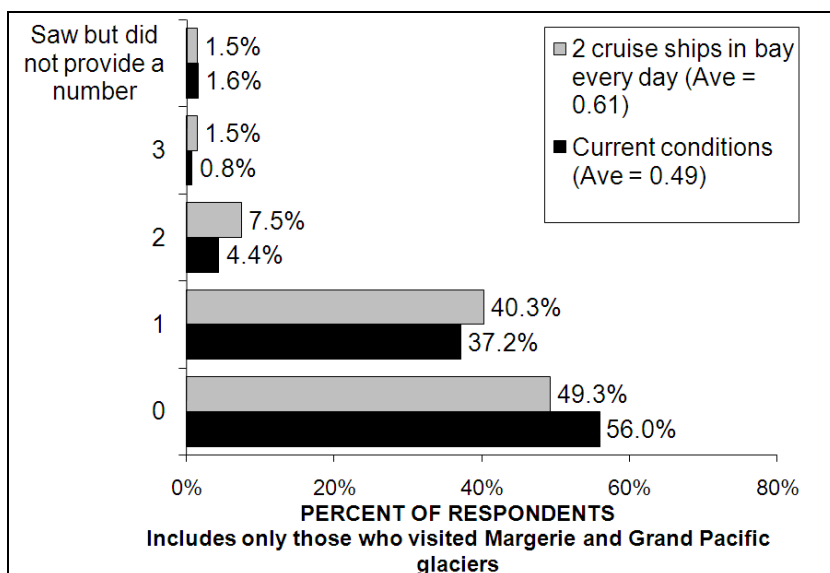


Figure T-28. Number of large cruise ships seen at Margerie and Grand Pacific glaciers: Current conditions versus maximum allowed

The number of motorized craft excluding cruise ships seen at Margerie and Grand Pacific glaciers depended on the average number of cruise ships in the bay per day, $F(2, 155) = 5.48$, $p = .005$. Other tour boat respondents who visited when 2-cruise ships were in the bay on average saw more motorized craft excluding cruise ships at Margerie and Grand Pacific glaciers (see Figure T-29).

Figure T-30 shows that increasing to 2-cruise ships in the bay per day (i.e., maximum conditions allowed) will result in more other tour boat respondents seeing motorized craft excluding cruise ships at the glaciers, although most of these people will likely see only one craft.

Tour-Boat Visitor Survey

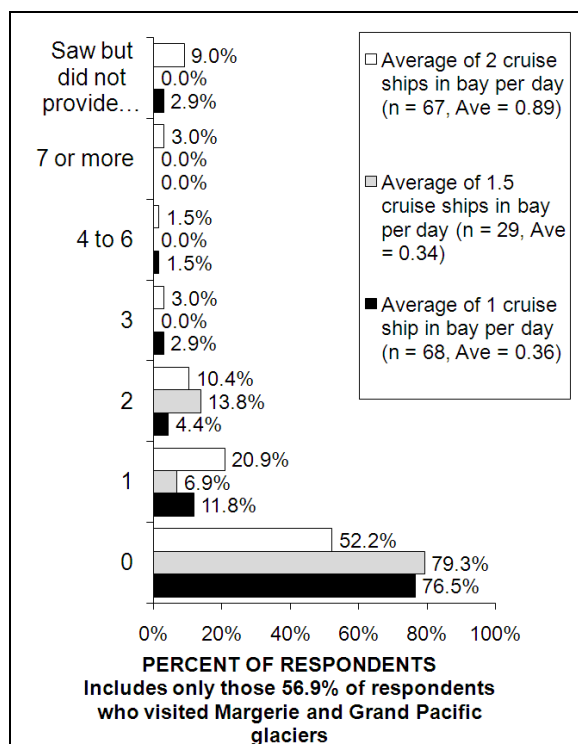


Figure T-29. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers by average number of cruise ships in the bay per day.

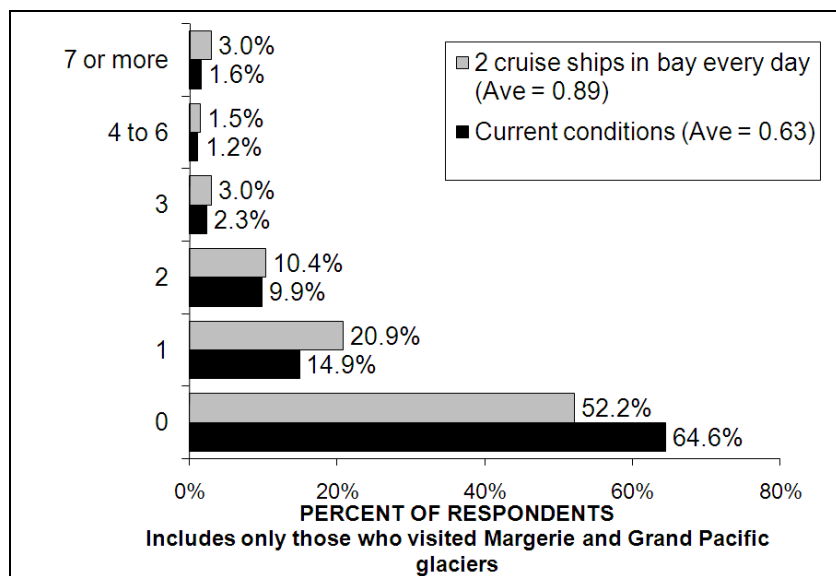


Figure T-30. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers: Current conditions versus maximum allowed

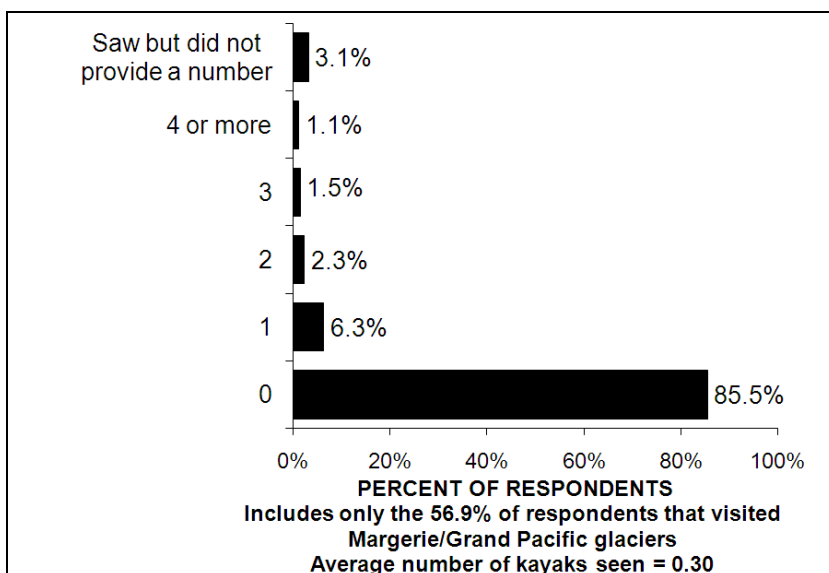


Figure T-31. Number of kayaks seen at Margerie and Grand Pacific glaciers

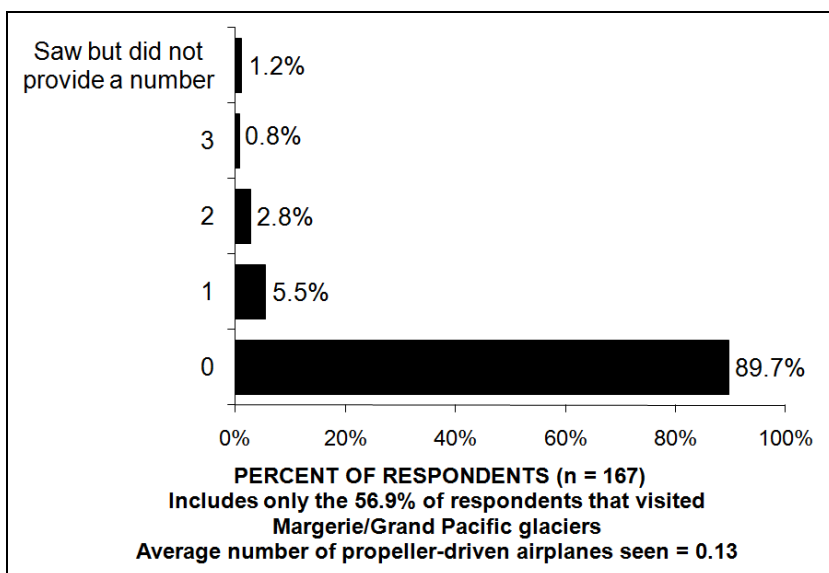


Figure T-32. Number of propeller-driven airplanes seen at Margerie and Grand Pacific glaciers

Tour-Boat Visitor Survey

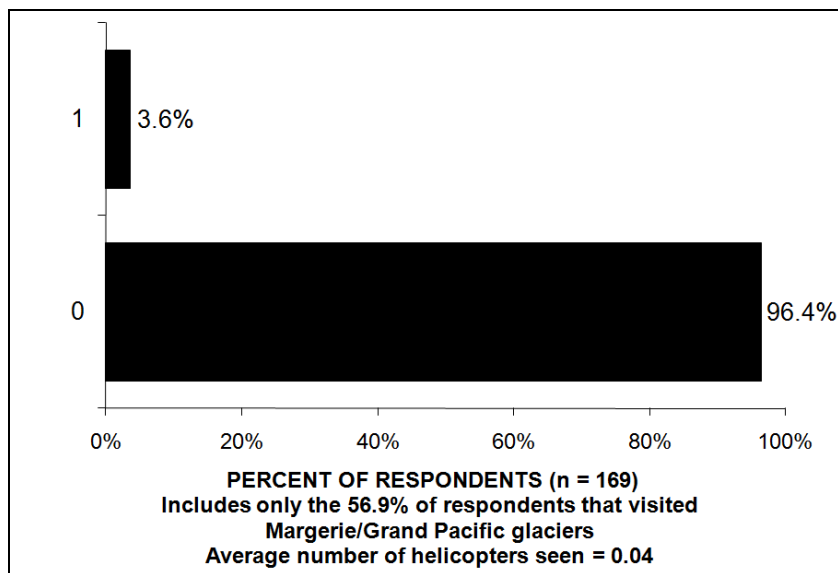


Figure T-33. Number of helicopters seen at Margerie and Grand Pacific glaciers

VI. ENCOUNTERS: ENTIRE TRIP

Other tour boat passengers were asked about encounters with cruise ships and other motorized craft. Some questions asked about seeing or hearing different kinds of craft for their trip as a whole and other questions focused on seeing or hearing different kinds of craft while they were at Margerie and Grand Pacific glaciers. This section reports the findings about encounters for the trip as a whole.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 10).

Highlights

- The majority (76.4%) of other tour boat passengers reported seeing or hearing large cruise ships during their trip. Of those who saw or heard large cruise ships, 83.8% saw them one day. This finding is consistent with the finding that 77.6% of other tour boat passengers did not stay overnight in the park.
- The total length of time other tour boat respondents saw or heard large cruise ships in the bay was 1.4 hours. Over half (55.5%) of other tour boat respondents saw or heard large cruise ships between 0.5 and 1.9 hours.
- As most (83.8%) other tour boat passengers saw cruise ships one day, the length of time other tour boat passengers saw or heard large cruise ships on the day they saw or heard the most cruise ships was almost analogous to the total length of time cruise ships were heard or seen. Specifically, cruise ships were seen or heard on average for 1.3 hours and 54.1% of other tour boat passengers hear or saw cruise ships between 0.5 and 1.9 hours.
- On the different types of craft, large cruise ships were seen by the most other tour boat respondents (76.4%) followed closely by motorized water craft other than large cruise ships (71.3%). Motorized water craft other than large cruise ships were seen on average for 1.65 hours compared to 1.42 hours for large cruise ships. Aircraft were seen less than one hour.

Tour-Boat Visitor Survey

Question 7 of the mail survey asked about seeing or hearing large cruise ships while Question 9 asked about hearing and seeing other types of craft (see questions below).

Mail Survey

7. During your time in Glacier Bay proper, did you see or hear large cruise ships?

- ☐ No → GO TO QUESTION 9
- ☐ Don't know → GO TO QUESTION 9
- ☐ Yes

7a. During your time in Glacier Bay proper, how long did you see or hear large cruise ships?

A. _____ NUMBER OF HOURS SAW OR HEARD LARGE CRUISE SHIPS IN GLACIER BAY (*Please list partial hours as ¼, ½, etc.*)

B. DON'T KNOW/DON'T REMEMBER

7b. On how many days did you see or hear large cruise ships?

A. _____ NUMBER OF DAYS SAW OR HEARD LARGE CRUISE SHIPS IN GLACIER BAY

B. DON'T KNOW/DON'T REMEMBER

7c. On the day you saw or heard the **most** large cruise ships in Glacier Bay proper, how long did you see or hear large cruise ships?

_____ NUMBER OF HOURS SAW OR HEARD LARGE CRUISE SHIPS ON DAY HEARD/SAW MOST LARGE CRUISE SHIPS IN GLACIER BAY (*Please list partial hours as ¼, ½, etc.*)

- ☐ I ONLY SAW CRUISE SHIP(S) ONE DAY (SO SAME ANSWER AS QUESTION 7A.).
- ☐ DON'T KNOW/DON'T REMEMBER

Mail Survey

9. During your time in Glacier Bay proper on this trip, you may have seen or heard different kinds of motorized craft. For each type of craft, please indicate if you heard or saw it during your time in Glacier Bay proper. Then, report the total time you heard or saw that type of craft and how many different craft of that type you saw or heard. *(Please do not include your own vehicle.)*

During your time in Glacier Bay proper...			
Type of craft	Did you hear or see? <i>(Circle one for each type)</i>	Total hours heard or seen <i>(Report partial hours as ¼, ½, etc.)</i>	Number of craft heard or seen
A. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	YES→ No DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW
B. PROPELLER-DRIVEN AIRPLANES	YES→ No DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW
C. HELICOPTERS	YES→ No DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW

This section will report the findings in the following order: 1) large cruise ship encounters, 2) comparison of large cruise ship encounters with other motorized craft encounters, and 3) detail of other motorized craft encounters.

Saw or heard large cruise ships

The majority (76.4%) of other tour boat respondents reported seeing or hearing large cruise ships during their trip.

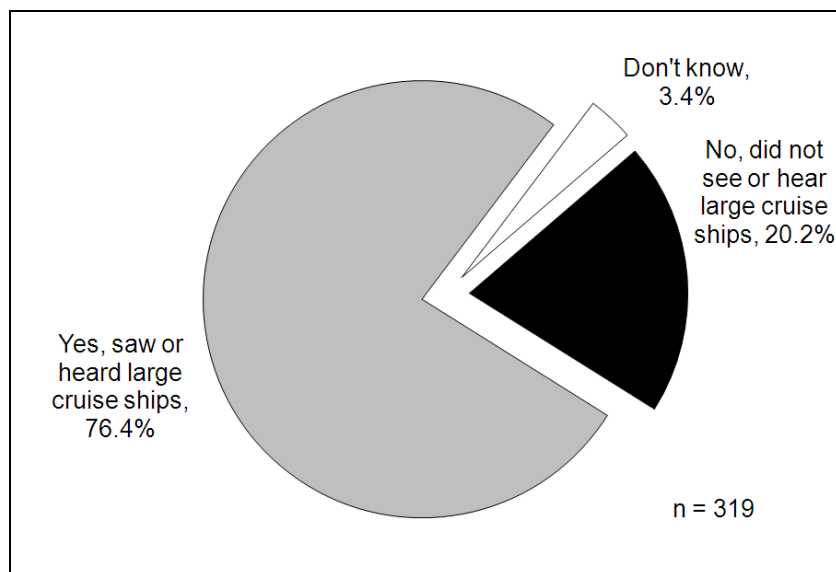


Figure T-34. Percent of respondents who saw or heard large cruise ships

Number of days saw or heard large cruise ships

Of those respondents who saw large large cruise ships, the majority (83.8%) saw them on one day. This finding is consistent with the finding that 77.6% of other tour boat passengers did not stay overnight in the park.

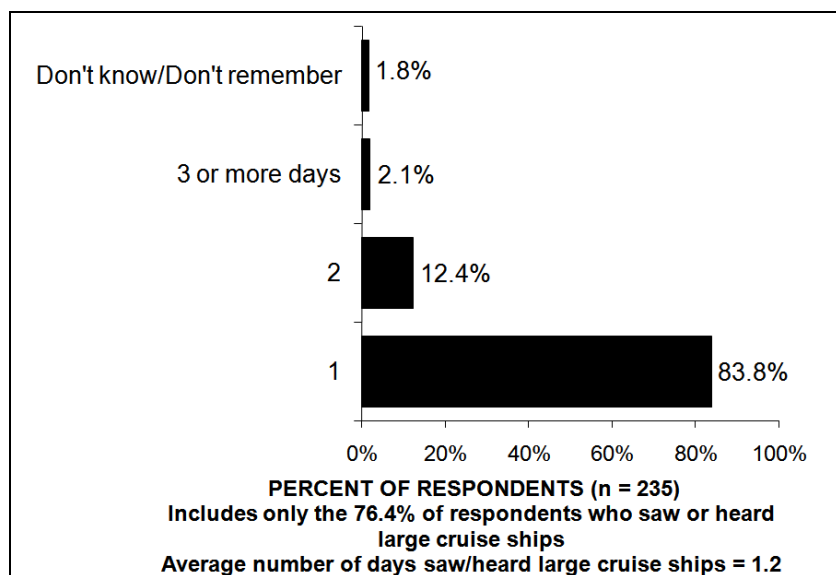


Figure T-35. Number of days respondents saw or heard large cruise ships in Glacier Bay proper

Total length of time saw or heard large cruise ships

Respondents were asked to report the number of hours they saw or heard large cruise ships during their stay in Glacier Bay proper. Although this measure of exposure is more subjective than number of cruise

ships in the bay per day, it provided more detailed information about exposure to cruise ships. Although the number of hours cruise ships were heard or seen did not vary by the number of cruise ships in the bay for other tour boat passengers, it may be that the total amount of time that cruise ships were heard or seen affects other tour boat passengers' experiences regardless of how many ships were in the bay on the days they visited. These analyses are described and reported in Section X.

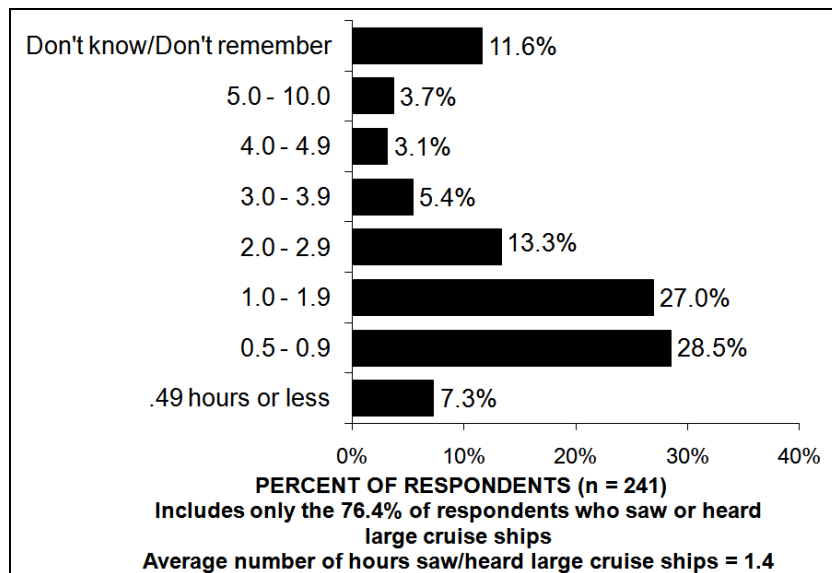


Figure T-36. Total number of hours saw or heard large cruise ships in Glacier Bay proper

Length of time saw or heard large cruise ships on day saw or heard most cruise ships

As most other tour boat passengers saw or heard cruise ships on one day, the distribution for the length of time respondents saw or heard large cruise ships on the day they saw or heard the most was highly similar to that for total length of time saw or heard large cruise ships.

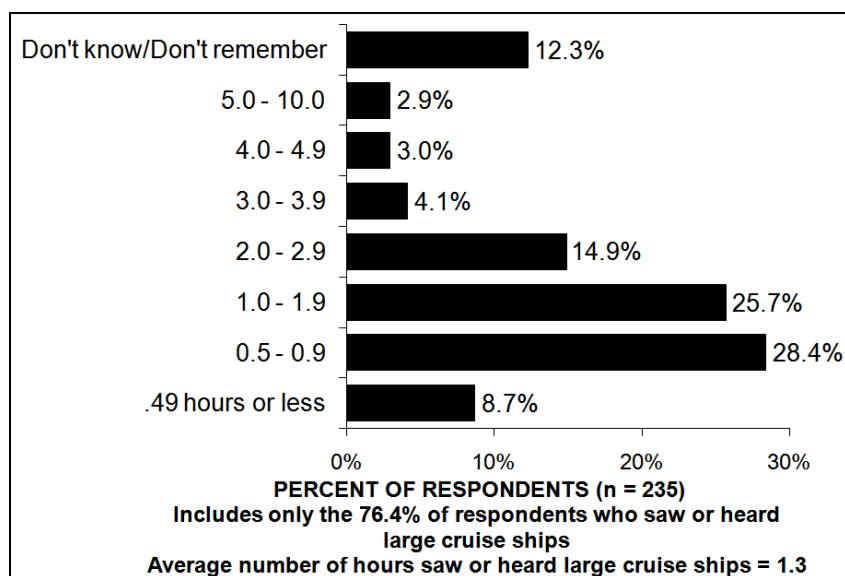


Figure T-37. Number of hours saw or heard large cruise ships on day saw or heard most cruise ships

Comparison of large cruise ship and other motorized craft encounters

Respondents were asked about encounters with other motorized craft to provide a context for the findings regarding large cruise ships. This section compares the findings from large cruise ships with those of other motorized craft. The detail findings including charts for other motorized craft are presented in the following section.

Table T-9 summarizes the percent of respondents who saw or heard the different types of craft. The percent of respondents who saw or heard the different kinds of craft did not differ by the number of cruise ships in the bay. As can be seen in Table T-9, large cruise ships were the most frequently heard or seen type of craft followed closely by motorized water craft excluding large cruise ships. Aircraft were heard by substantially fewer respondents.

Table T-9. Percent of respondents who encountered different kinds of craft.

Type of craft	Heard or saw craft (percent of respondents)		
	Yes	No	Don't know
Large cruise ship (n = 319)	76.4%	20.2%	3.4%
Motorized water craft other than large cruise ships (n = 308)	71.3%	22.6%	6.0%
Propeller-driven airplanes (n = 303)	33.3%	57.8%	8.9%
Helicopters (n = 304)	10.9%	80.9%	8.2%

Although cruise ships were heard or seen by more respondents than other motorized watercraft, the number of hours that cruise ships were heard or seen was less than the number of hours that motorized water craft were heard or seen ($M = 1.42$ vs. $M = 1.65$, respectively; see Table T-10). Propeller-driven airplanes and helicopters were present for less than an hour.

Table T-10. Number of hours different kinds of craft were heard or seen

Type of craft	Average hours
Large cruise ship (n = 241)	1.42
Motorized water craft other than large cruise ships (n = 217)	1.65
Propeller-driven airplanes (n = 97)	0.79
Helicopters (n = 29)	0.66

Motorized water craft other than large cruise ships: Length of time and number heard or seen

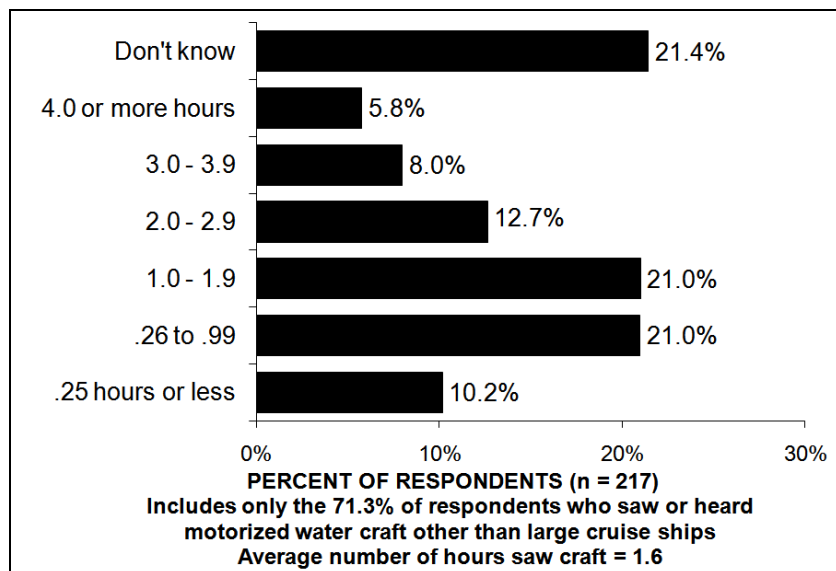


Figure T-38. Number of hours motorized craft other than large cruise ships were heard or seen

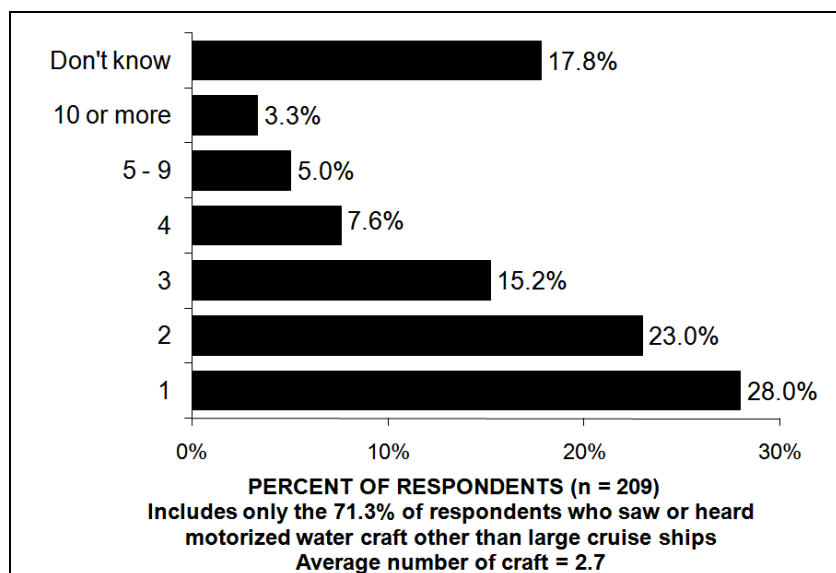


Figure T-39. Number of motorized craft other than large cruise ships heard or seen

Propeller-driven airplanes: Length of time and number heard or seen

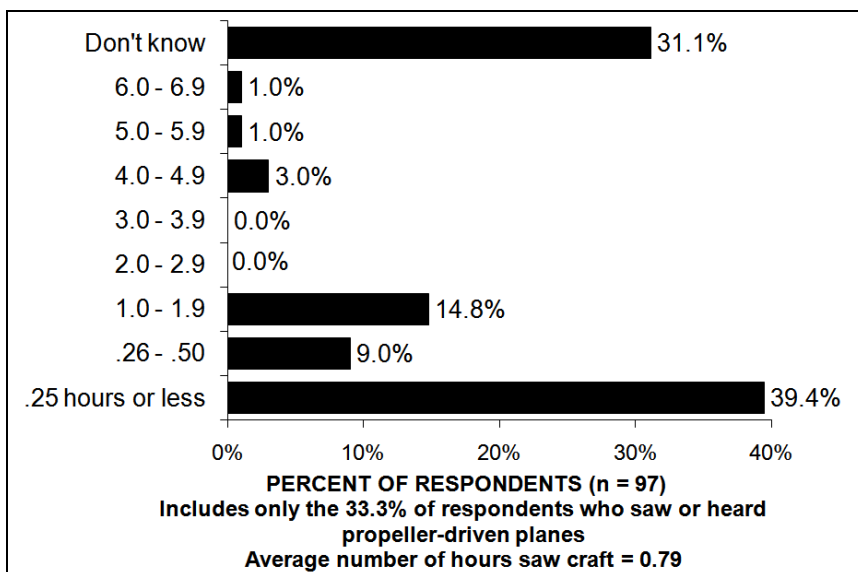


Figure T-40. Length of time propeller-driven airplanes were heard or seen

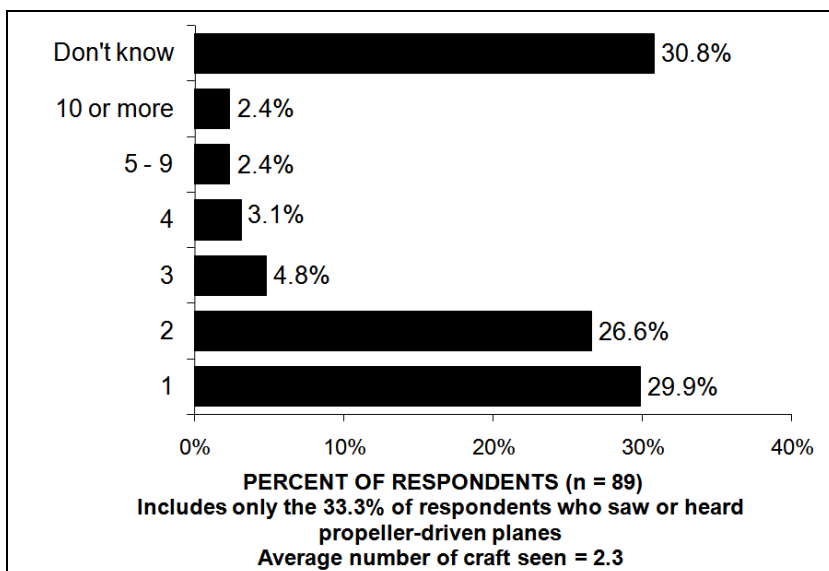


Figure T-41. Number of propeller-driven airplanes heard or seen

Helicopters: Length of time and number heard or seen

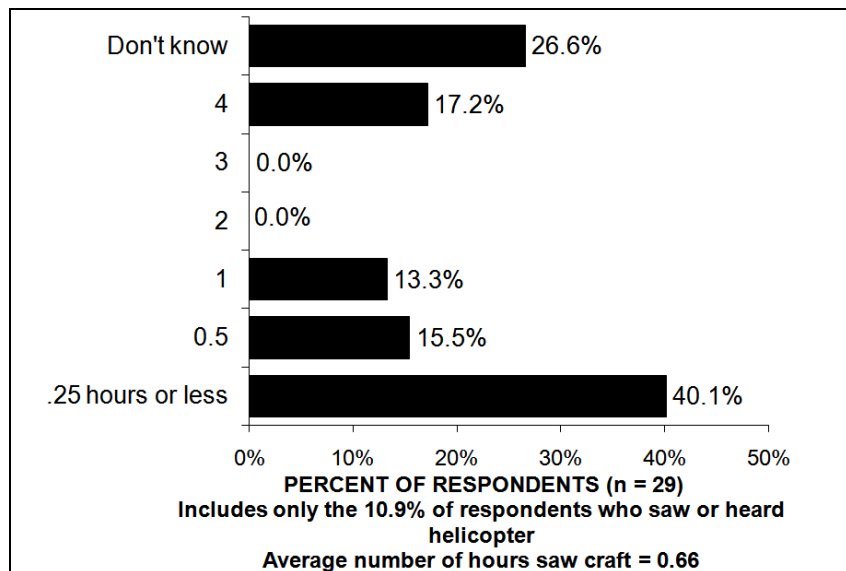


Figure T-42. Number of hours helicopters were heard or seen

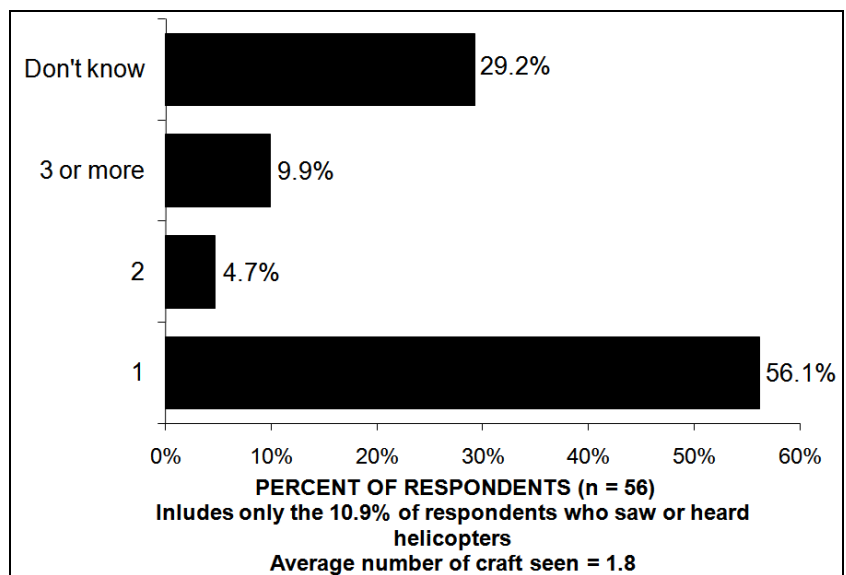


Figure T-43. Number of helicopters heard or seen

VII. EXPERIENCES WITH HAZE, PUBLIC ADDRESS SYSTEMS, AND ENGINE SOUNDS

Some aspects of encounters with different craft that may affect the quality of visitors' trip experiences in Glacier Bay National Park include haze and sounds from public address systems and engines. Other tour boat passengers were asked about whether they experienced these different aspects and the effect these aspects had on their enjoyment of Glacier Bay proper. This section reports the findings related to these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 10).

Highlights

- Most other tour boat passengers did not see haze from any type of vessel (85% or more). Haze from large cruise ships was seen by 5.3% of other tour boat respondents and 1.1% reported seeing haze from unidentified vessels. No one reported seeing haze from small cruise ships or tour boats.
- Haze from large cruise ships had more negative impact on other tour boat passengers' trip enjoyment than haze from unidentified vessels. Of those who saw haze from large cruise ships, 58.4% reported that it detracted somewhat and 29.2% reported that it detracted greatly. Of those who saw haze from unidentified vessels, 66.6% reported no effect and 33.3% reported that it detracted somewhat.
- A small percentage of other tour boat passengers heard public address systems from large cruise ships (4.8%), small cruise ships (4.6%), and unidentified vessels (0.7%).
- Large cruise ships' public address systems were more likely to detract from other tour boat passengers trip enjoyment than public address systems from small cruise ships, tour boats or unidentified vessels. Of those who heard large cruise ships' public address systems, 60.2% reported that they detracted somewhat and 35.0% reported that they detracted greatly. Of those who heard small cruise ships' public address systems, 18.8% reported that they detracted somewhat and 9.6% reported that they detracted greatly. A total of 23.4% reported that these public address systems added to their trip enjoyment. Public address systems from unidentified vessels were heard by two respondents: one reported it detracted somewhat and one reported it detracted greatly.
- Large cruise ship engines were heard by fewer other tour boat respondents (10.1%) than small cruise ship or tour boat engines (21.0%). Propeller-driven aircraft engines were heard by 26.2% of other tour boat respondents and helicopter engines were heard by 13.0% of other tour boat respondents.
- Other tour boat passengers were more likely to report that small cruise ship or tour boat engines detracted from their trip enjoyment than large cruise ship engines. Of those who heard small cruise ship or tour boat engines, 67.5% reported that they detracted somewhat from their trip enjoyment

Tour-Boat Visitor Survey

and 31.5% reported they detracted greatly from their trip enjoyment. In comparison, of those who heard large cruise ship engines, 52.3% reported they detracted somewhat from their trip enjoyment and 17.2% reported they detracted greatly from their trip enjoyment.

- Helicopter engines were less likely to detract from other tour boat passengers' trip enjoyment (total of 55.3% reported detraction) than engines from watercraft whereas engines from propeller-driven airplanes were the least likely to detract from other tour boat passengers' trip enjoyment (total of 34.9% reported detraction).

Mail survey

16. On the trip to Glacier Bay proper during which you were contacted for this survey, a variety of events may have occurred. For each event below, please indicate if it occurred and then circle how it affected your trip enjoyment of Glacier Bay proper.

		Did it occur?	How did the event affect your trip enjoyment of Glacier Bay proper?				
			↓	↓	↓	↓	↓
<u>EXPERIENCES WITH HAZE.</u>							
A.	Haze from large cruise ship exhaust affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
B.	Haze from small cruise ship or tour boat exhaust affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
C.	Haze from unidentified vessel affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
<u>EXPERIENCES WITH PUBLIC ADDRESS SYSTEMS</u>							
D.	Heard sound from large cruise ship public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
E.	Heard sound from small cruise ship or tour boat public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
F.	Heard sound from unidentified public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
<u>EXPERIENCES WITH ENGINE SOUNDS</u>							
G.	Heard large cruise ship engines.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
H.	Heard engines of boats other than large cruise ships.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
I.	Heard propeller-driven airplanes.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
J.	Heard helicopters.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly

Experiences with haze

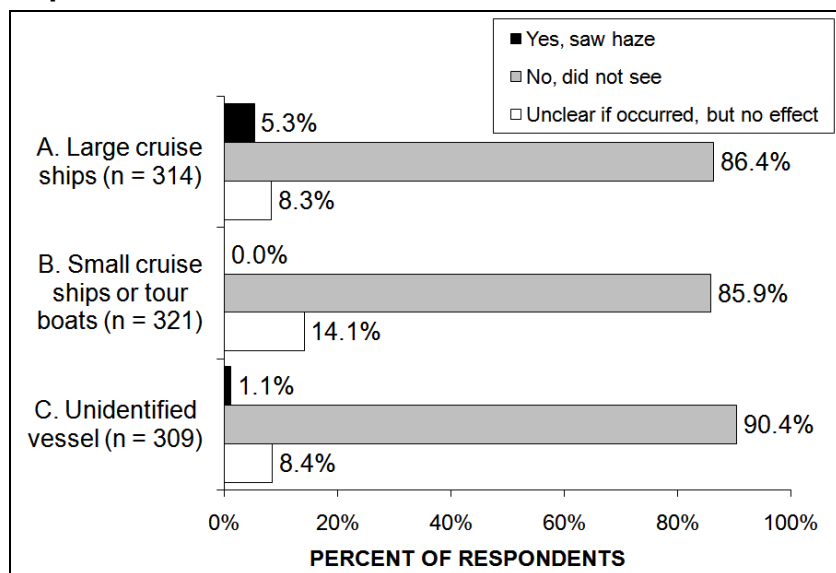


Figure T-44. Percent of respondents who experienced haze from different types of vessels

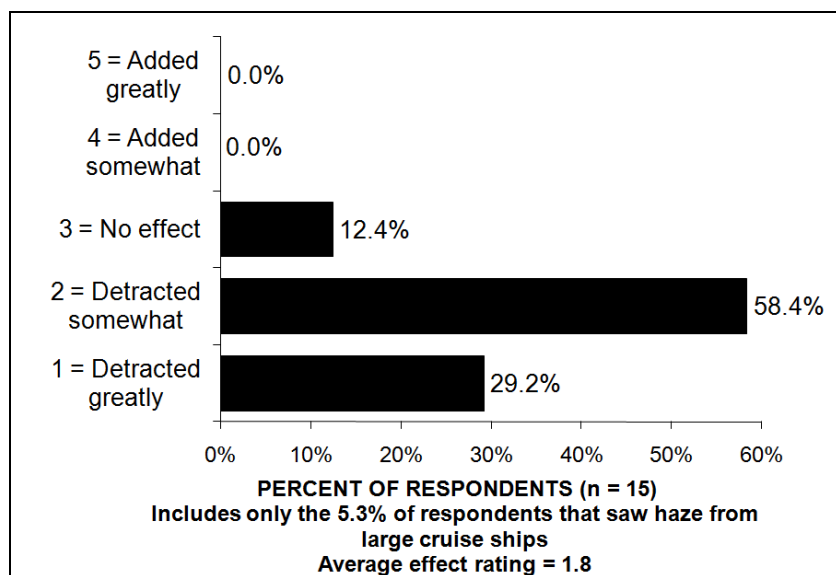


Figure T-45. Effect of experience of haze from large cruise ships on trip enjoyment

Of the 3 other tour boat passengers who saw haze from unidentified craft, 2 reported no effect and 1 reported the haze detracted somewhat.

Experiences with public address systems

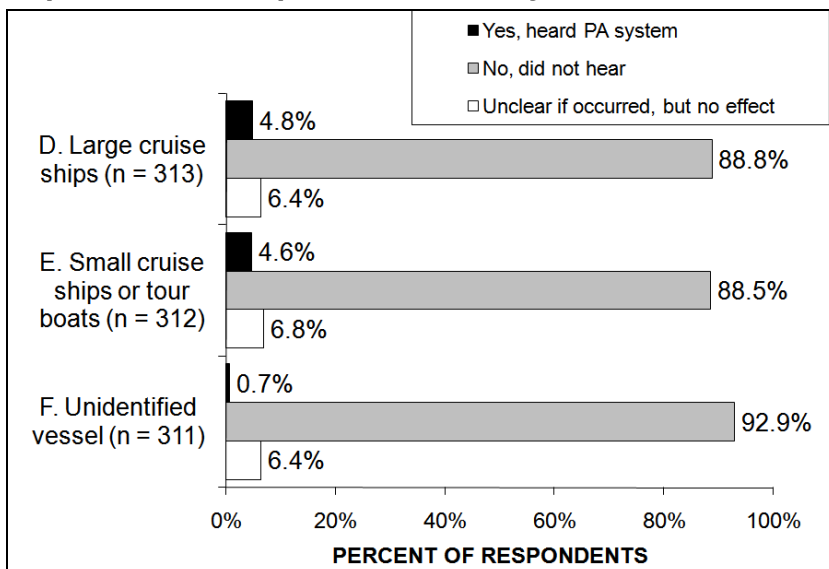


Figure T-46. Percent of respondents who experiences public address systems from different types of vessels

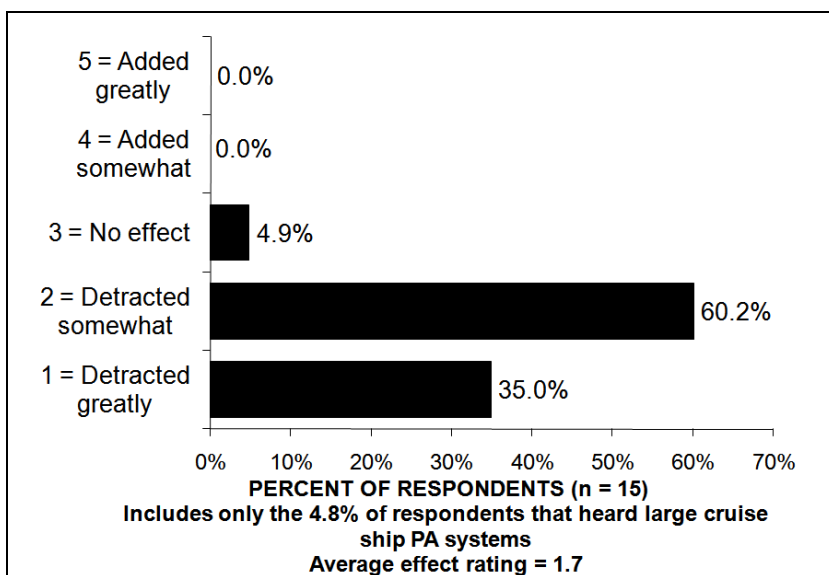


Figure T-47. Effect of large cruise ship public address systems on trip enjoyment

Tour-Boat Visitor Survey

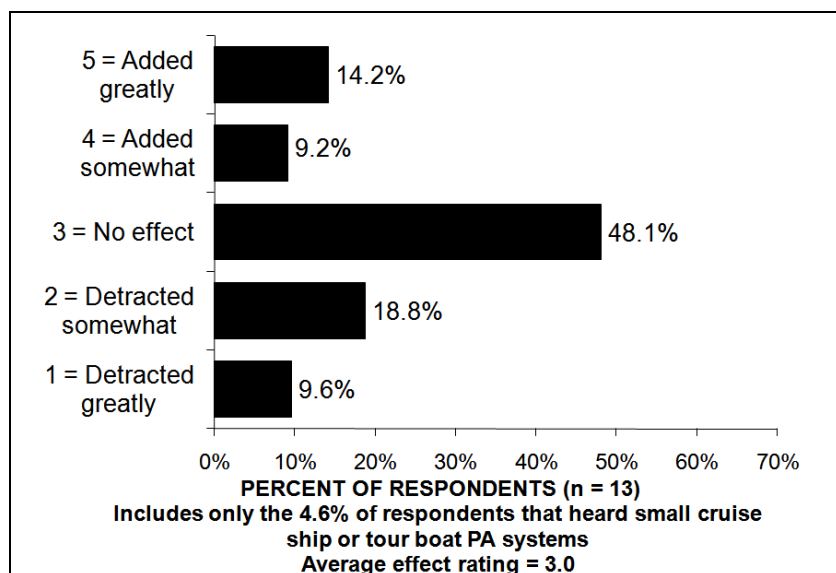


Figure T-48. Effect of small cruise ship or tour boat public address systems on trip enjoyment

Of the two respondents who reported hearing public address systems from unidentified vessels, one reported that the public address system detracted somewhat from their trip enjoyment and one reported that the public address system detracted greatly from their trip enjoyment.

Experiences with engine sounds

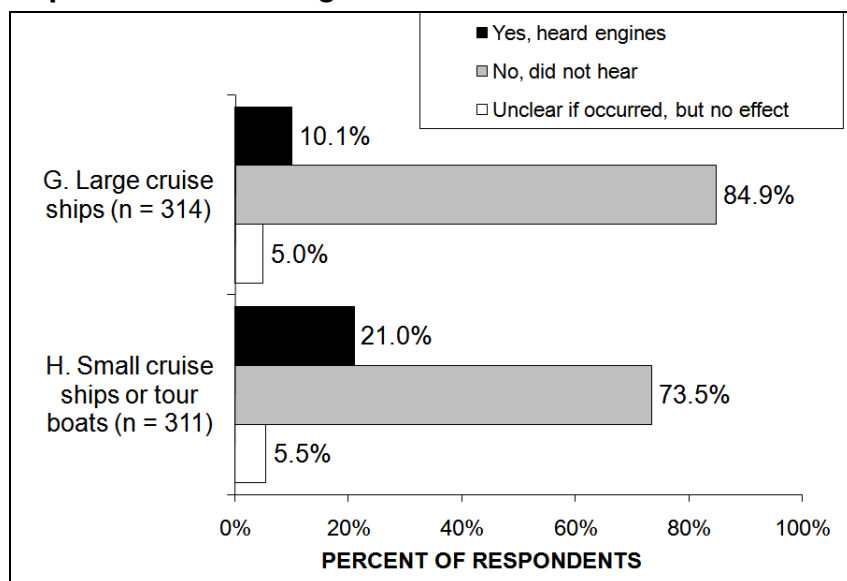


Figure T-49. Experiences with engine sounds from watercraft

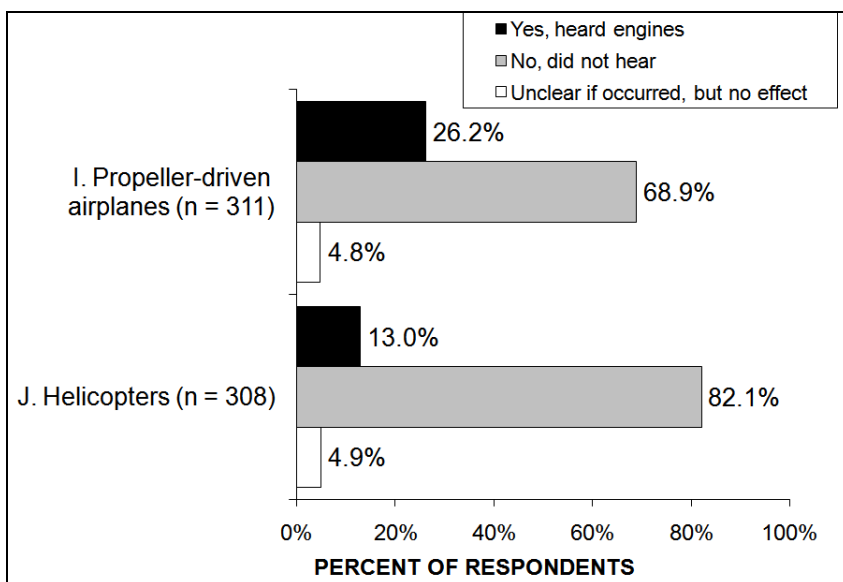


Figure T-50. Experience with engine sounds from aircraft

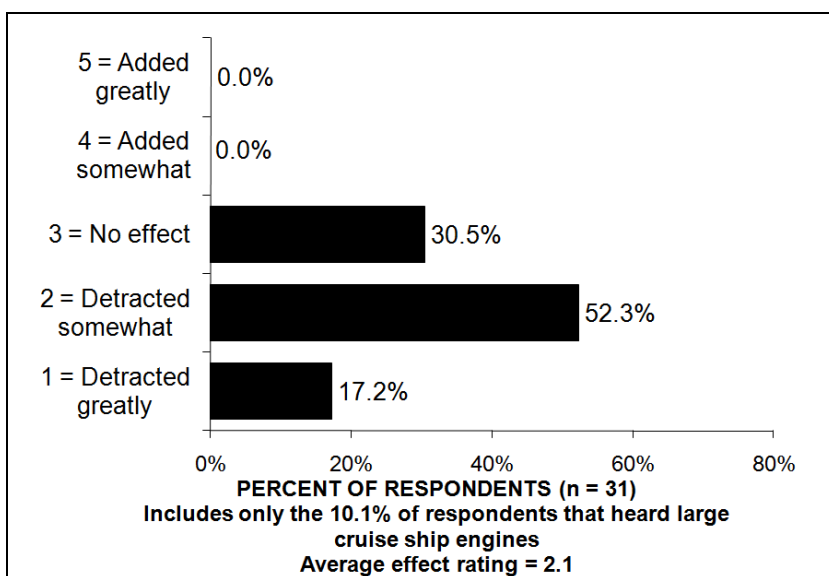


Figure T-51. Effect of hearing large cruise ship engines on trip enjoyment

Tour-Boat Visitor Survey

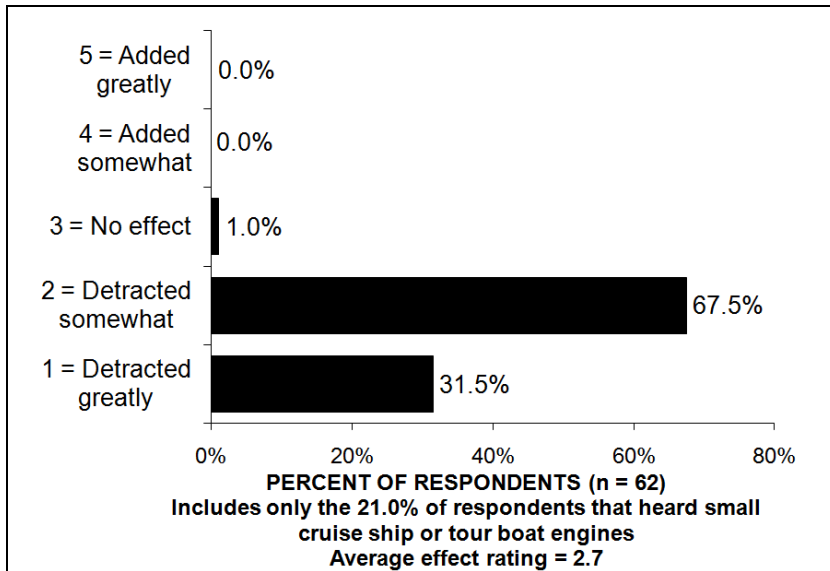


Figure T-52. Effect of hearing small cruise ship or tour boat engines on trip enjoyment

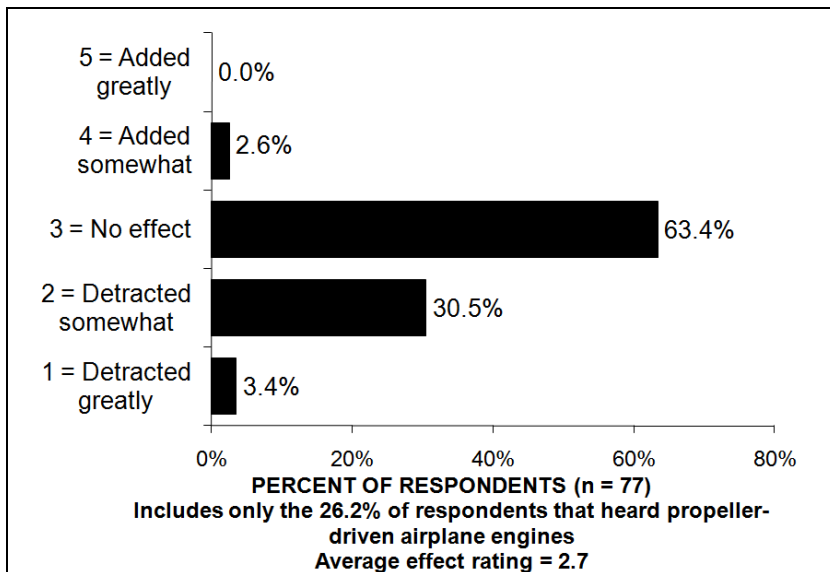


Figure T-53. Effect of hearing propeller-driven airplane engines on trip enjoyment

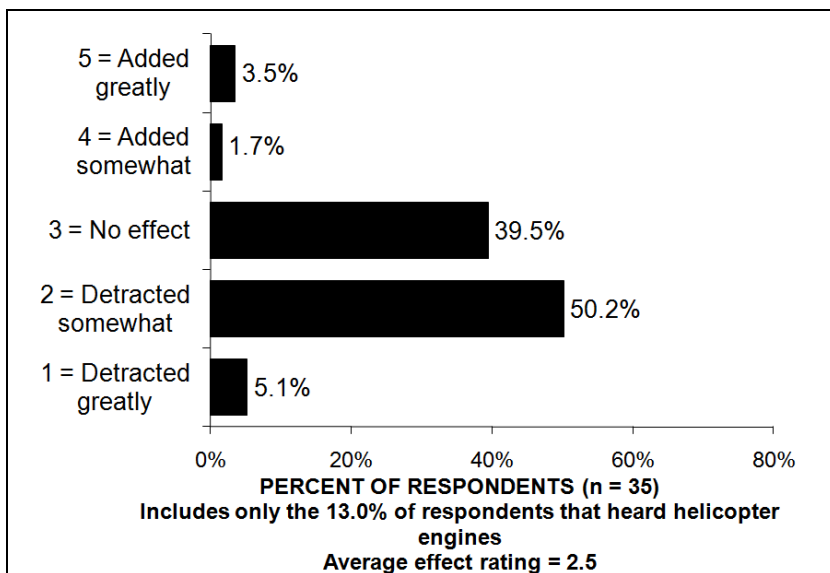


Figure T-54. Effect of helicopter engines on trip enjoyment

VIII. EFFECTS OF ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS

Other tour boat passengers were asked about encounters with cruise ships and other motorized craft when they were at Margerie and Grand Pacific glaciers. Other tour boat respondents were asked how the presence of each type of craft present at the glaciers affected their enjoyment of the Margerie and Grand Pacific glaciers. This section reports the effects of encounters at Margerie and Grand Pacific glaciers.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 10).

Highlights

- Of all the different types of craft, large cruise ships detracted from the enjoyment of the most other tour boat passengers who visited Margerie and Grand Pacific glaciers (26.6%). Motorized craft other than large cruise ships was second (7.1%). These two types of craft were also those most likely to be seen by other tour boat respondents when visiting Margerie and Grand Pacific glaciers.
- A small percent (0.8%) of other tour boat passengers indicated that large cruise ships added to their enjoyment of the glaciers and 17.3% reported they had no effect on their enjoyment of Margerie and Grand Pacific glaciers.
- For those other tour boat respondents who saw each type of craft, large cruise ships had the greatest detraction rate of all craft (59.5%). Seeing or hearing helicopters and propeller-driven planes at Margerie and Grand Pacific glaciers had the second and third greatest detraction rates respectively (45.3% and 33.3%, respectively). Their lower overall detraction rates relative to motorized water craft other than large cruise ships were due to lower encounter rates.

Presence of different types of craft affected enjoyment of Margerie and Grand Pacific glaciers

Mail survey

11c. How did the presence of each type of craft affect your enjoyment of the Margerie/Grand Pacific tidewater glaciers?

	How did the presence of each type of craft affect your enjoyment of Margerie/Grand Pacific glaciers?					
	↓ Did not see	↓ Detracted greatly	↓ Detracted somewhat	↓ No Effect	↓ Added somewhat	↓ Added greatly
A. LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
B. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
C. KAYAKS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
D. PROPELLER-DRIVEN AIRPLANES	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
E. HELICOPTERS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly

As Q-11c was asked only of respondents who saw craft when visiting Margerie and Grand Pacific glaciers, respondents who saw no craft when visiting Margerie and Grand Pacific glaciers would not be included in the “did not see” category for these items presenting a distorted picture. To provide more meaningful results, respondents who visited Margerie and Grand Pacific glaciers and did not see any craft were included in the “did not see” category and the percentages for each response option reflect the increase in total n.

The data for Question 11c are presented in two ways: Table T-11 presents the effect ratings as a percent of all respondents who visited Margerie and Grand Pacific glaciers and Table T-12 presents the effect ratings as a percent of those who saw the craft when visiting Margerie and Grand Pacific glaciers.

As can be seen in Table T-11, of all the different types of craft, large cruise ships detracted from the enjoyment of the most other tour boat passengers who visited Margerie and Grand Pacific glaciers. Motorized craft other than large cruise ships was second. These two types of craft were also those most likely to be seen by other tour boat respondents when visiting Margerie and Grand Pacific glaciers.

Table T-12 presents the effects of the different type of craft for only those respondents who saw that type of craft when visiting the Margerie and Grand Pacific glaciers. These results show that although large cruise ships had the greatest detraction rate of all craft, seeing or hearing helicopters and propeller-driven planes at Margerie and Grand Pacific glaciers have the second and third greatest detraction rates respectively. Their lower overall detraction rates relative to motorized water craft other than large cruise ships were due to lower encounter rates.

Table T-11. Effects of different types of craft for respondents who visited Margerie and Grand Pacific glaciers

Type of craft	Percent of all respondents who visited Margerie and Grand Pacific glaciers					
	Did not see/ Don't know	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
Large cruise ships	55.2%	9.0%	17.6%	17.3%	0.8%	0.0%
Motorized craft other than large cruise ships	64.4%	0.8%	6.3%	24.2%	4.3%	0.0%
Kayaks	84.7%	0.0%	0.0%	10.9%	3.1%	1.2%
Propeller-driven aircraft	89.3%	1.6%	2.0%	6.3%	0.0%	0.8%
Helicopters	95.6%	0.8%	1.2%	1.6%	0.0%	0.8%

Table T-12. Effects of different types of craft for respondents who saw/heard craft at Margerie and Grand Pacific glaciers

Type of craft	Saw craft at glaciers	Percent of respondents who saw/heard type of craft at Margerie/Grand Pacific glaciers						
		<i>n</i>	Average effect rating	1 = Detracted greatly	Detracted somewhat	No effect	Added somewhat	5 = Added greatly
Large cruise ships	44.8%	75	2.2	20.1%	39.4%	38.7%	1.8%	0.0%
Motorized craft other than large cruise ships	35.6%	60	2.9	2.2%	17.6%	68.1%	12.0%	0.0%
Kayak	15.3%	26	3.4	0.0%	0.0%	71.7%	20.6%	7.7%
Propeller-driven aircraft	10.7%	18	2.7	14.9%	18.4%	59.2%	0.0%	7.4%
Helicopters	4.4%	7	2.7	18.3%	27.0%	36.5%	0.0%	18.3%

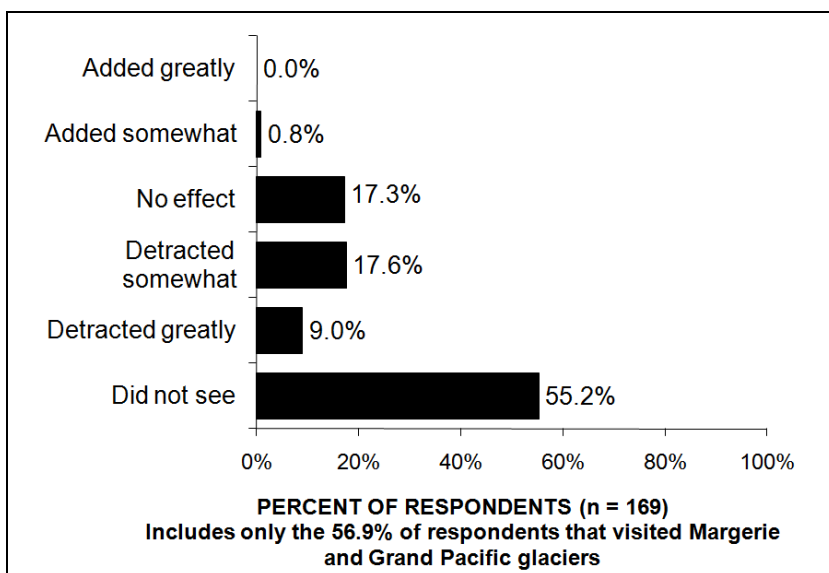


Figure T-55. Effect of seeing large cruise ships at Margerie and Grand Pacific glaciers

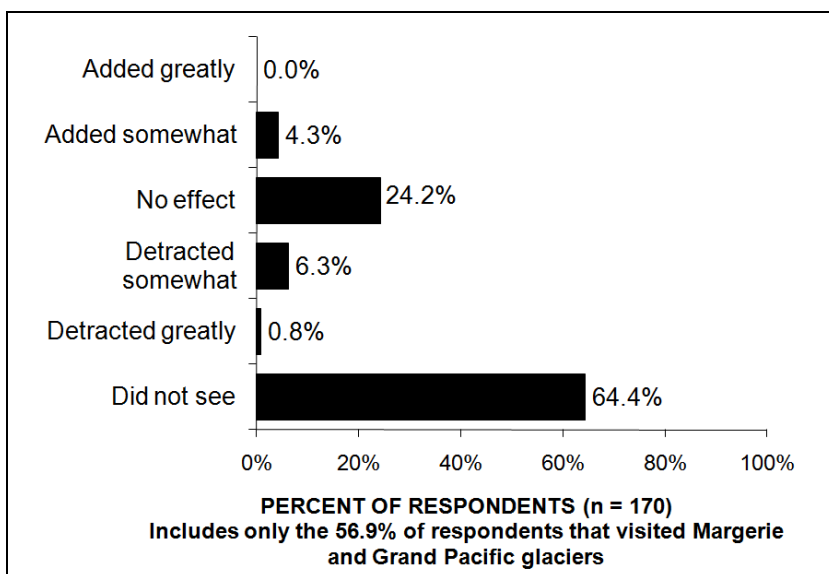


Figure T-56. Effect of seeing motorized water craft other than large cruise ships at Margerie and Grand Pacific glaciers

Tour-Boat Visitor Survey

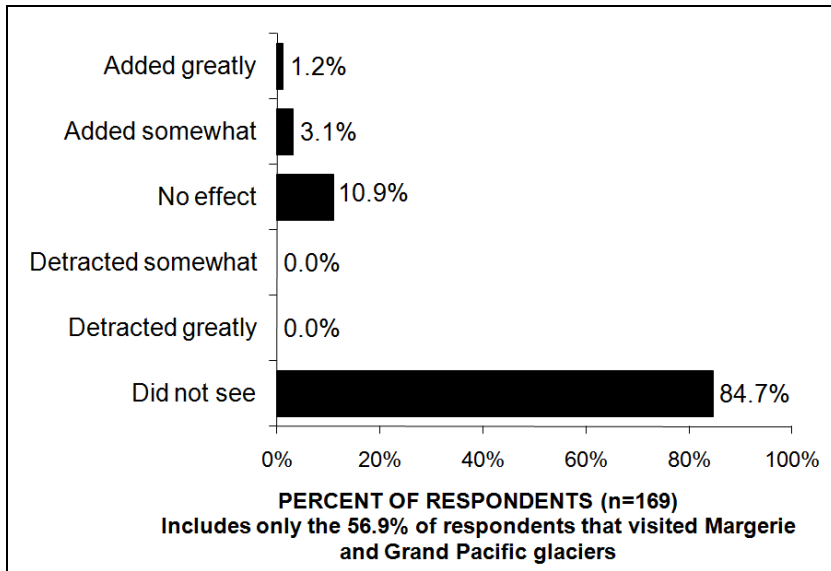


Figure T-57. Effect of seeing kayaks at Margerie and Grand Pacific glaciers

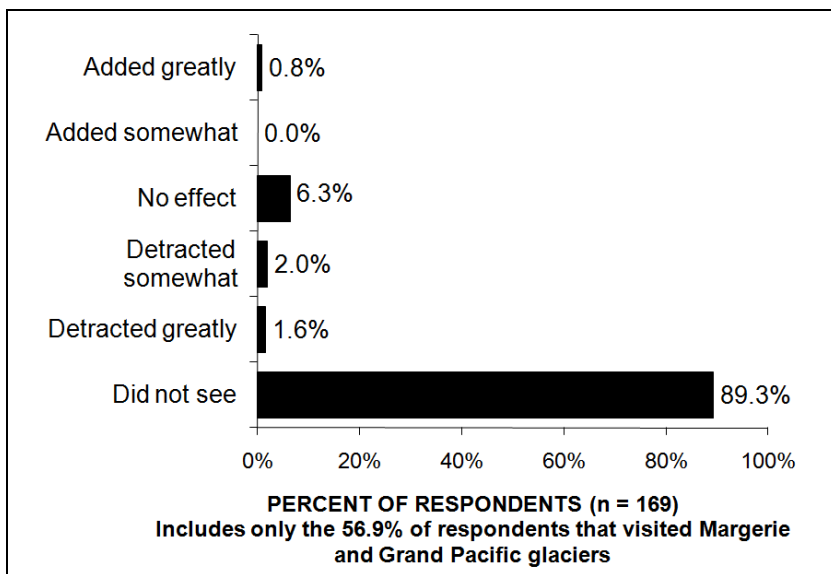


Figure T-58. Effect of seeing propeller-driven airplanes at Margerie and Grand Pacific glaciers

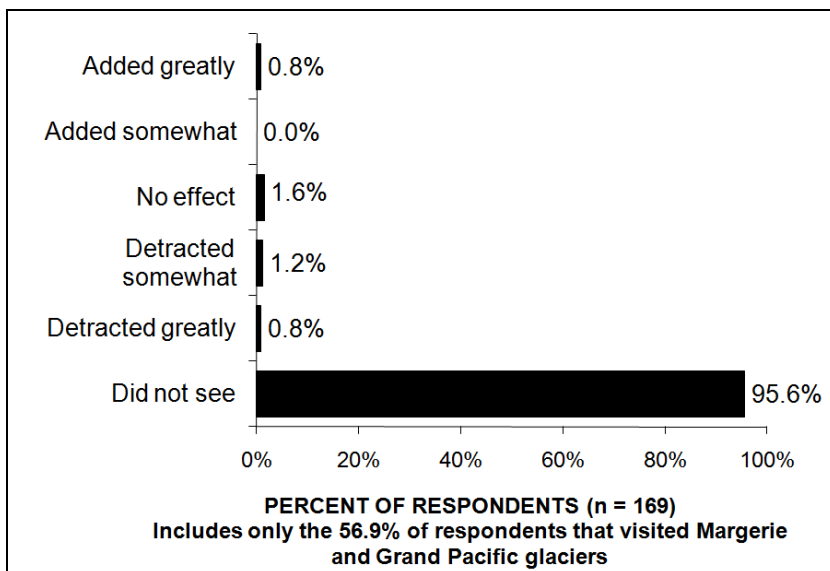


Figure T-59. Effect of seeing helicopters at Margerie and Grand Pacific glaciers

IX. EFFECTS OF ENCOUNTERS: ENTIRE TRIP

Other tour boat passengers were asked about encounters with cruise ships and other motorized craft during their whole trip. Respondents were asked about the effects of these encounters on 1) enjoyment of Glacier Bay proper, 2) specific aspects of trip experience, and 3) on future recommendations. This section reports the findings for these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 10).

Highlights

- Of all motorized craft, large cruise ships detracted from the highest percentage (36.3%) of all other tour boat visitors' enjoyment of Glacier Bay proper. This effect was not due to simply more other tour boat visitors seeing cruise ships. Of respondents who saw each type of craft, respondents who saw large cruise ships had the highest detraction rates.
- For other tour boat respondents who saw each type of craft, helicopters and propeller-driven aircraft had the second and third highest rates of detraction on enjoyment of Glacier Bay proper (44.5% and 24.7%, respectively). These crafts' overall detraction rates were low (less than 10%) because fewer other tour boat passengers encountered these craft.
- Of 8 possible trip experiences that other tour boat passengers may have in Glacier Bay proper, large cruise ships detracted from those most related to wilderness experiences as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). Specifically, trip experiences most affected by seeing or hearing large cruise ships were 1) Solitude and 2) Pristine environment.
- There was a slight relationship between the importance of a trip experience and the effect of large cruise ships upon it for other tour boat passengers. This relationship however was such that items that were more important were less affected by cruise ships. The two dimensions that were most affected, "Solitude" and "Pristine Environment," were the least important and the fourth most important, respectively. The most important dimensions of "Scenic beauty" and "Wonder of nature" were the third and fifth most affected dimensions, respectively.
- Most other tour boat passengers indicated that large cruise ships had no effect on their viewing of land animals (85.5%) or marine animals (84.1%).
- Most (93.7%) other tour boat passengers reported being very likely to recommend visiting Glacier Bay on other tour boats. Experience with the different types of craft had no effect on the likelihood of making a recommendation for the majority of other tour boat passengers (54% or more for each type of craft). Of the different types of craft, experiences with large cruise ships were the most likely to decrease the likelihood that people recommend others visit on other tour boats (32.8%).

- Overall ratings of the time spent boating/cruising in Glacier Bay proper indicated that 69.7% of other tour boat visitors' time was "extremely good" and 24.4% of other tour boat visitors' time was "very good." Less than 1% of other tour boat visitors rated their time spent boating/cruising in Glacier Bay proper as poor, very poor or extremely poor.

Effect of encounters of different types of craft on enjoyment of Glacier Bay proper

Mail Survey

10. During the trip in which you were contacted, how did seeing or hearing (other than your own transport) each type of motorized craft affect your enjoyment of Glacier Bay proper?						
	How did seeing or hearing the following vehicles affect your enjoyment of Glacier Bay proper?					
	↓	↓	↓	↓	↓	↓
A. LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
B. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
C. PROPELLER-DRIVEN AIRPLANES	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
D. HELICOPTERS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly

The data for Question 10 are presented in two ways: Table T-13 presents the effect ratings as a percent of all respondents and Table T-14 presents the effect ratings as a percent of those who saw the craft. As can be seen in Table T-13, large cruise ships were seen by the most other tour boat passengers and also resulted in the highest rates of detraction from enjoyment of Glacier Bay proper. Motorized craft other than large cruise ships were the second most likely to be seen and to detract from other tour boat passengers enjoyment of Glacier Bay proper.

Looking at Table T-14, it is clear that the higher rates of detraction for large cruise ships was not due to just more other tour boat passengers seeing large cruise ships. Of respondents who saw each type of craft, those who saw large cruise ships reported the highest rates of detraction. However, Table T-14 also shows that helicopters and propeller-driven aircraft had the second and third highest rates of detraction. These findings indicate that the low levels of overall detraction rates for these craft were due to low encounter rates rather than the aircraft being innocuous. Thus, increases in air traffic would increase the overall levels of negative effects from these craft.

Table T-13. Effect of different craft on enjoyment of Glacier Bay proper: Percent of all respondents

Type of craft	Percent of all respondents					
	Did not see/ Don't know	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
Large cruise ships	23.3%	9.1%	26.2%	40.5%	0.9%	0.0%
Motorized craft other than large cruise ships	29.0%	0.4%	12.2%	54.1%	4.2%	0.0%
Propeller-driven aircraft	66.2%	0.7%	7.7%	24.5%	0.7%	0.2%
Helicopters	88.3%	1.1%	4.1%	6.3%	0.0%	0.2%

Table T-14. Effect of different craft on enjoyment of Glacier Bay proper: Percent who saw craft

Type of craft	Saw craft	n	Average effect rating	Percent of respondents who saw craft				
				1 = Detracted greatly	Detracted somewhat	No effect	Added somewhat	5 = Added greatly
Large cruise ships	76.7%	222	2.4	11.9%	34.1%	52.8%	1.2%	0.0%
Motorized craft other than large cruise ships	71.0%	211	2.9	0.6%	17.2%	76.2%	5.9%	0.0%
Propeller-driven aircraft	33.8%	98	2.8	2.0%	22.7%	72.6%	2.0%	0.7%
Helicopters	11.7%	34	2.5	9.6%	34.9%	53.6%	0.0%	1.9%

Effect of encounters with large cruise ships on different trip experiences

The qualitative interviews conducted during Summer 2007 revealed seven dimensions of visitor experience that were affected by cruise ships. These identified dimensions of visitor experience had significant overlap with dimensions of visitor experience measured by the list of Recreational Experience Preference (REP) items. To have two items for each dimension, 9 REP items were selected and 5 new items were constructed using the REP format (see general Introduction for more detail). Respondents were asked the importance of each of these experiences during their visit to Glacier Bay (see page 27). Additionally respondents were asked how hearing or seeing a large cruise ship affected each possible trip experience.

Mail survey

8. How did hearing or seeing a large cruise ship affect each of the following aspects of your experience in Glacier Bay proper? *(Circle one response for each aspect of your experience.)*

		How did hearing or seeing a large cruise ship affect each of the following aspects of your experience?				
		↓	↓	↓	↓	↓
A.	EXPERIENCE THE SCENIC BEAUTY	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
B.	EXPERIENCE TRANQUILITY	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
C.	BE AMAZED BY NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
D.	EXPERIENCE A PRISTINE SETTING	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
E.	ENJOY THE SOUNDS OF NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
F.	EXPERIENCE SOLITUDE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
G.	EXPERIENCE NATURE UNTOUCHED BY HUMANS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
H.	HAVE PERSONAL EXPERIENCES WITH NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
I.	VIEW WILDLIFE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
J.	EXPERIENCE NATURE'S WONDERS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
K.	BE CLOSE TO NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
L.	FEEL ALONE WITH NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
M.	EXPERIENCE PEACE AND CALM	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
N.	EXPERIENCE THE NATURAL SOUNDS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly

Cronbach's alpha was calculated for each of the seven dimensions to assess the internal consistency of the two scale items selected to measure the effect of cruise ships on each dimension. George and Mallery (2003) provide the following rules of thumb: “_ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and < .5 – Unacceptable” (p. 231). As can be seen in Table T-15, Cronbach's alpha was over 0.8 for 6 of the 7 scales indicating good reliability of those scales. The Cronbach's alpha for the scale for “Seeing nature” was 0.710; on the low end of acceptable reliability. Other tourboat passengers was the only user group that demonstrated at least acceptable reliability for the “Seeing nature” scale. However, the two scale items were treated as two separate scales to allow comparison across user groups. Thus, a total of 8 scales representing 8 dimensions were used in subsequent analyses.

Table T-15. Internal consistency measure (Cronbach's alpha) for each dimension

Scale	Items	Cronbach's alpha
Seeing nature		0.710
	View wildlife	
	Experience the scenic beauty	
Experiencing the wonder of nature		0.879
	Be amazed by nature	
	Experience nature's wonders	
Intimate experience with nature		0.865
	Have personal experiences with nature	
	Be close to nature	
Hear the sounds of nature		0.889
	Enjoy the sounds of nature	
	Experience the natural sounds	
Tranquility		0.896
	Experience tranquility	
	Experience peace and calm	
Solitude		0.871
	Experience solitude	
	Feel alone with nature	
Pristine environment		0.881
	Experience a pristine setting	
	Experience nature untouched by humans	

Table T-16 reveals that the trip experiences most affected by seeing or hearing a large cruise ship were: 1) Solitude and 2) Pristine environment. Review of all items suggests that the presence of large cruise ships affected the ratings on the items that most strongly represent wilderness experience as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). Furthermore, for each item, the most frequent scale score indicated “No effect.” A few other tour boat passengers indicated for each trip experience that large cruise ships “Added somewhat” or “Added greatly” to their experience. All 8 of the trip experiences average effect ratings were below 3, the “No effect” point on the scale.

Table T-16. Mail Survey, Q-8, Effects of large cruise ships on trip experiences

Trip Experiences	N	Mean	Percent of people rating effect of seeing/hearing large cruise ship during this trip to Glacier Bay proper on experiences ¹								
			1	1.5	2	2.5	3	3.5	4	4.5	5
Solitude	229	2.39	8.9	8.4	23.6	16.1	42.1	0.0	0.6	0.0	0.3
Pristine environment	230	2.46	8.3	3.4	26.2	14.1	47.2	0.0	0.6	0.0	0.3
Experience the scenic beauty	229	2.49	8.6		36.9		51.9		1.7		0.9
Tranquility	231	2.53	6.3	4.8	22.1	11.5	54.4	0.6	0.0	0.0	0.3
Experiencing the wonder of nature	230	2.61	4.9	2.3	21.3	10.6	60.1	0.6	0.0	0.0	0.3
Intimate experience with nature	229	2.66	4.0	2.6	17.0	11.3	64.8	0.0	0.0	0.0	0.3
Hear the sounds of nature	231	2.71	3.4	3.7	13.2	10.1	68.5	0.3	0.6	0.0	0.3
View wildlife	231	2.74	4.3		17.6		77.9		0.0		0.3

¹The rating scale included for each item was: 1 = Detracted greatly, 2 = Detracted somewhat, 3 = No effect, 4 = Added somewhat, 5 = Added greatly. Scale values that fall between the 5 points on the rating scale are due to averaging the ratings for the two scale items for a dimension.

Other tour boat respondents were asked about the importance of each of these 8 trip experiences as well (see page 27). To see whether the important trip experiences were more (or less) likely to be affected by large cruise ships, the average importance ratings were plotted against the average detraction ratings. As shown in Figure T-60, points of greatest concern would be those that fell in the lower right-hand quadrant of the plot. This area corresponds to important trip experiences from which cruise ships detracted. The area denoted by the dotted line corresponds to the area presented in Figure T-61 showing the average importance ratings by average detraction ratings for other tour boat passengers.

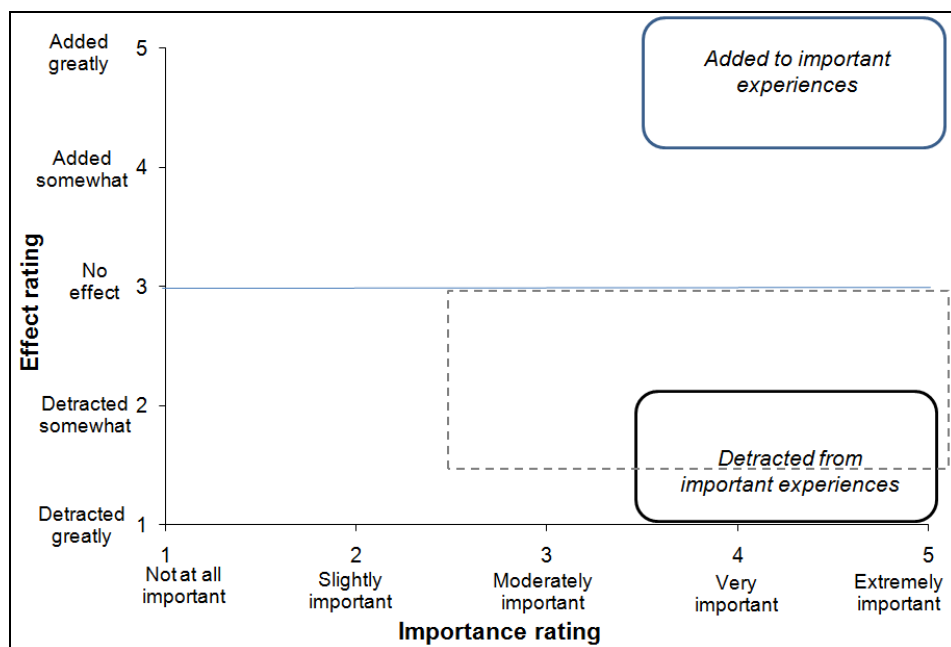


Figure T-60. Average importance ratings by average effect ratings for each type of trip experience

As can be seen in Figure T-61, for other tour boat passengers there was a slight relationship between the importance of a trip experience and the effect of large cruise ships upon it. This relationship however was such that items that were more important were less affected by cruise ships. The two dimensions that were most affected, “Solitude” and “Pristine Environment,” were the least important and the fourth most important, respectively. The most important dimensions of “Scenic beauty” and “Wonder of nature” were the third and fifth most affected dimensions, respectively.

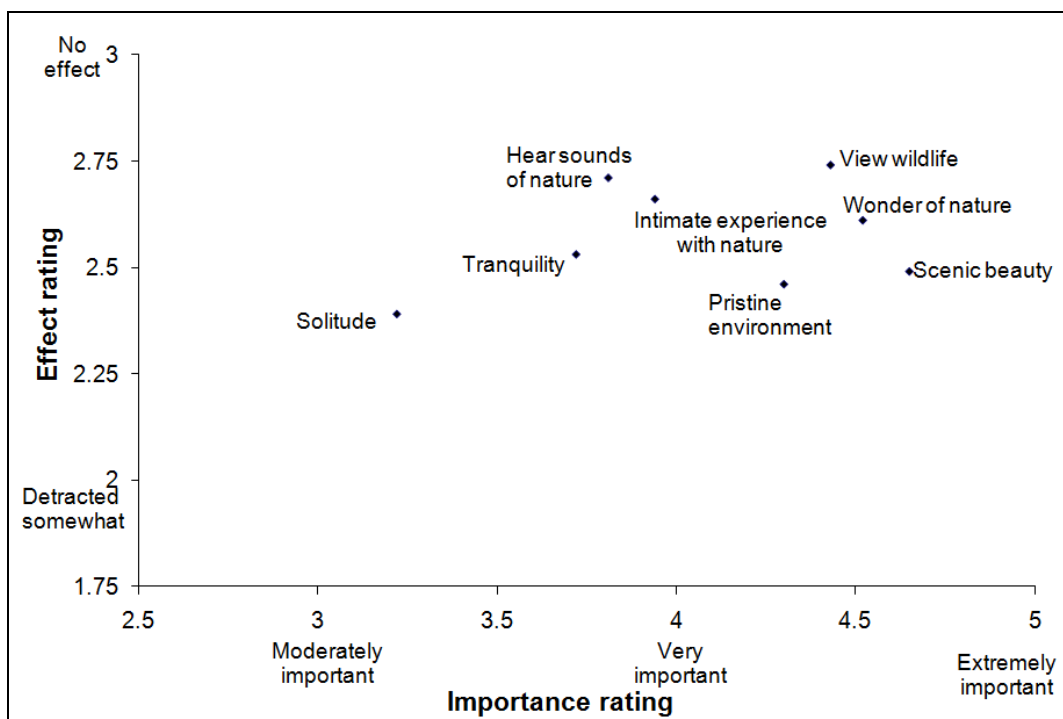


Figure T-61. Average importance ratings by average effect ratings for each trip experience dimension

Effect of encounters with large cruise ships on viewing land animals

Mail survey

13. During your trip to Glacier Bay proper, how did large cruise ships affect your viewing of **land animals** (e.g., bear, moose, etc.)? *(Check all that apply)*

- ☐ Large cruise ships blocked my view of land animals.
- ☐ Large cruise ships made land animals move to where I could easily see them.
- ☐ Large cruise ships made land animals move to where I could not easily see them.
- ☐ Large cruise ships had no effect.
- ☐ Don't know/Don't remember.

Tour-Boat Visitor Survey

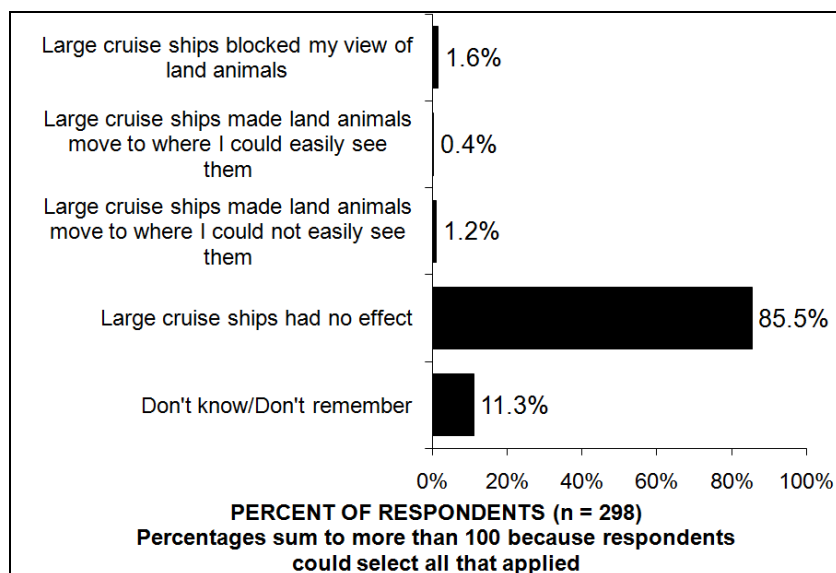


Figure T-62. Effect of large cruise ships on viewing land animals

Effect of encounters with large cruise ships on viewing marine animals

Mail survey

14. During your trip to Glacier Bay proper, how did large cruise ships affect your viewing of **marine animals** (e.g., whales, sea lions, etc.)? (*Check all that apply*)

- ☐ Large cruise ships blocked my view of marine animals.
- ☐ Large cruise ships made marine animals move to where I could easily see them.
- ☐ Large cruise ships made marine animals move to where I could not easily see them.
- ☐ Large cruise ships had no effect.
- ☐ Don't know/Don't remember.

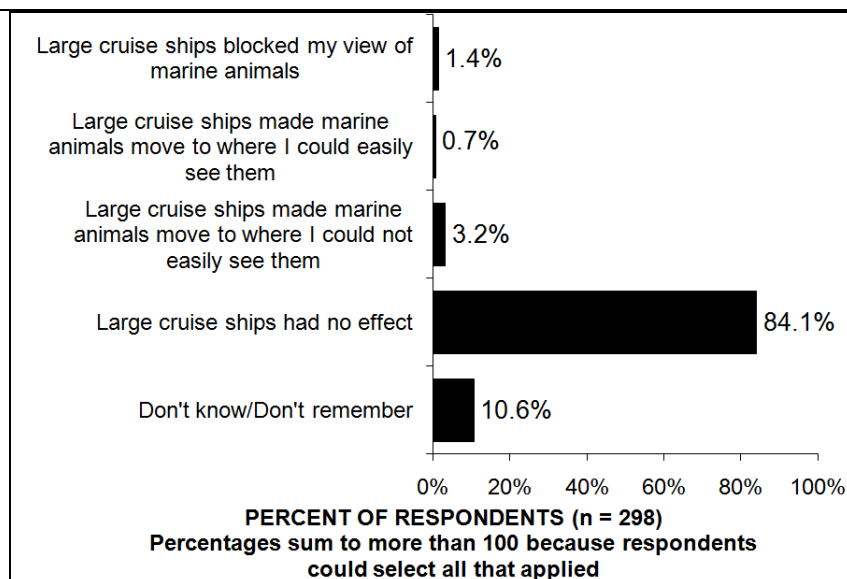


Figure T-63. Effect of large cruise ships on viewing land animals

Future recommendations to visit Glacier Bay

Given their trip experience, other tour boat survey respondents were asked how likely they would be to recommend a friend or family member visit Glacier Bay on a tour boat (Q-18). A follow-up question asked how their experience with different kinds of craft affected their likelihood of recommending a similar visit (Q-19).

Mail Survey

18. Based on your trip experience boating/cruising in Glacier Bay, how likely would you be to recommend that a friend or family member visit Glacier Bay on the same kind of vessel you used (e.g., charter, small cruise, private vessel, etc.)?

- ☐ Very likely to recommend visiting Glacier Bay.
- ☐ Somewhat likely to recommend visiting Glacier Bay.
- ☐ No opinion
- ☐ Somewhat unlikely to recommend visiting Glacier Bay.
- ☐ Very unlikely to recommend visiting Glacier Bay.

19. How did your experience (or lack of it) with each of the following types of craft affect whether you would recommend that a friend or family member visit Glacier Bay proper on the same kind of vessel you used (e.g., charter, small cruise, private vessel, etc.)?

	How did your experience (or lack of) with each craft affect whether you recommend others to visit Glacier Bay on the same kind of vessel you used?				
	↓	↓	↓	↓	↓
A. LARGE CRUISE SHIPS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
B. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
C. PROPELLER-DRIVEN AIRPLANES	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
D. HELICOPTERS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely

As can be seen in Figure T-64, 93.7% of other tour boat passengers reported being very likely to recommend visiting Glacier Bay on other tour boats. As can be seen in Table T-17, experience with the different types of craft had no effect for the majority of other tour boat passengers. Experience with large cruise ships was the most likely to decrease the likelihood that people recommend others visit on other tour boats whereas experience with motorized craft other than large cruise ships was the most likely to increase the likelihood of recommending others visit Glacier Bay on other tour boats.

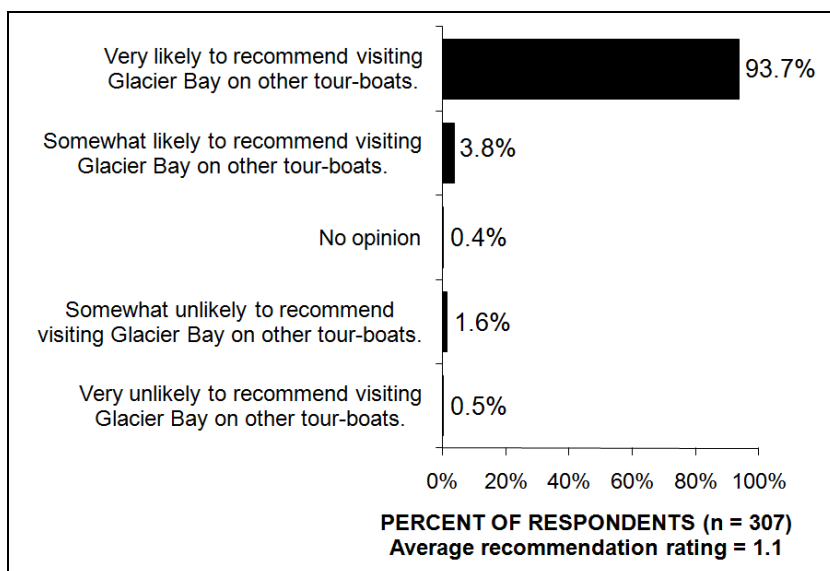


Figure T-64. Likelihood of recommending a friend or family member visit Glacier Bay on other tour boats

Table T-17. Effect of experience with different craft on future recommendations

Type of craft	Percent of all respondents				
	A lot less likely	Somewhat less likely	No effect	Somewhat more likely	A lot more likely
Large cruise ships	25.4%	7.4%	56.5%	3.2%	7.4%
Motorized craft other than large cruise ships	2.8%	1.4%	54.4%	7.4%	34.0%
Propeller-driven aircraft	9.9%	5.8%	79.7%	2.0%	2.5%
Helicopters	10.9%	7.1%	77.5%	2.0%	2.5%

Overall rating of time spent boating/cruising in Glacier Bay proper

Other tour boat passengers were asked to rate overall the time they spent boating/cruising in Glacier Bay proper. This question served as a global measure of effect of cruise ships on visitor experience. As can be seen in Figure T-65, 69.7% of other tour boat passengers rated their time boating or cruising in Glacier Bay proper as “Extremely good” and 24.4% rated their time as “Very good”.

Mail Survey

20. Overall, how would you rate the time you spent boating/cruising in Glacier Bay proper during your trip?
(Check one box.)

- ☐ Extremely poor
- ☐ Very poor
- ☐ Poor
- ☐ Good
- ☐ Very good
- ☐ Extremely good

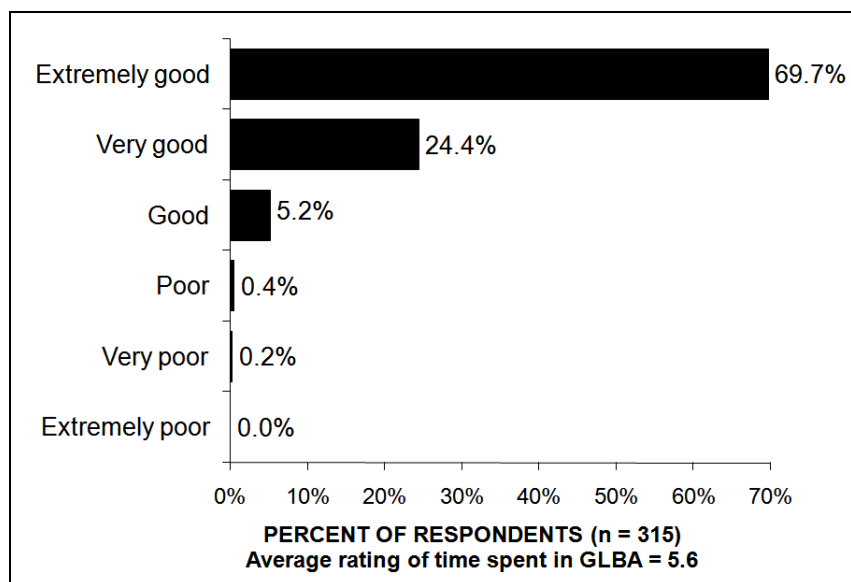


Figure T-65. Overall rating of time spent boating/cruising in Glacier Bay proper

X. OPINIONS REGARDING CRUISE SHIPS IN GLACIER BAY PROPER

Other tour boat passengers were asked the extent to which they agreed with four statements regarding the presence of cruise ships in Glacier Bay proper (see Q-15 below). This section reports the findings from these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question. When significant differences due to the number of cruise ships in the bay were found, they are reported. If number of cruise ships in the bay is not discussed, readers can assume that analyses found no significant effects of this variable.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences between 1- and 2-cruise ship in the bay days were found (see Introduction and Method section for estimation procedures, p. 10).

Mail survey

15. Please indicate the extent to which you agree or disagree with each of the following statements.						
		Do you agree or disagree with this statement?				
		↓	↓	↓	↓	↓
A.	LARGE CRUISE SHIPS IN GLACIER BAY PROPER ARE MAJESTIC.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
B.	LARGE CRUISE SHIPS PROVIDED A SENSE OF SCALE WHEN VIEWING SCENERY IN GLACIER BAY	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
C.	LARGE CRUISE SHIPS ARE A GOOD WAY FOR A LARGE NUMBER OF PEOPLE TO VISIT GLACIER BAY PROPER	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
D.	IT IS INAPPROPRIATE FOR LARGE CRUISE SHIPS TO BE IN GLACIER BAY PROPER	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Highlights

- Of the four statements, other tour boat visitors were most likely to agree with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper” (44.8%)
- Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay” and with “It is inappropriate for large cruise ship to be in Glacier Bay proper” were at similar levels (34.1% and 36.4%, respectively). Agreement rates for both statements however depended on the average number of cruise ships in the bay per day. Other tour boat respondents who experienced 2-cruise ships in the bay per day were more likely to agree with “Large cruise ships provide a sense of scale” (experienced an average of 1, 1.5, and 2-cruise ships in the bay days: 27.9%, 29.4%, and 38.2%, respectively) and less likely to agree that it is inappropriate for large

Tour-Boat Visitor Survey

cruise ships to be in Glacier Bay proper (experienced an average of 1, 1.5, and 2-cruise ships in the bay days: 42.1%, 42.8%, and 31.8%, respectively).

- Over two-thirds of other tour boat passengers disagreed that “Large cruise ships in Glacier Bay proper are majestic.”
- Responses to these four statements were correlated (r 's ranged from .39 to .62).

Agreement with “Large cruise ships in Glacier Bay proper are majestic.”

Over two-thirds (71.0%) of other tour boat passengers disagreed or strongly disagreed that large cruise ships in Glacier Bay proper are majestic. A small number (6.3%) of other tour boat passengers felt that large cruise ships in Glacier Bay proper were majestic.

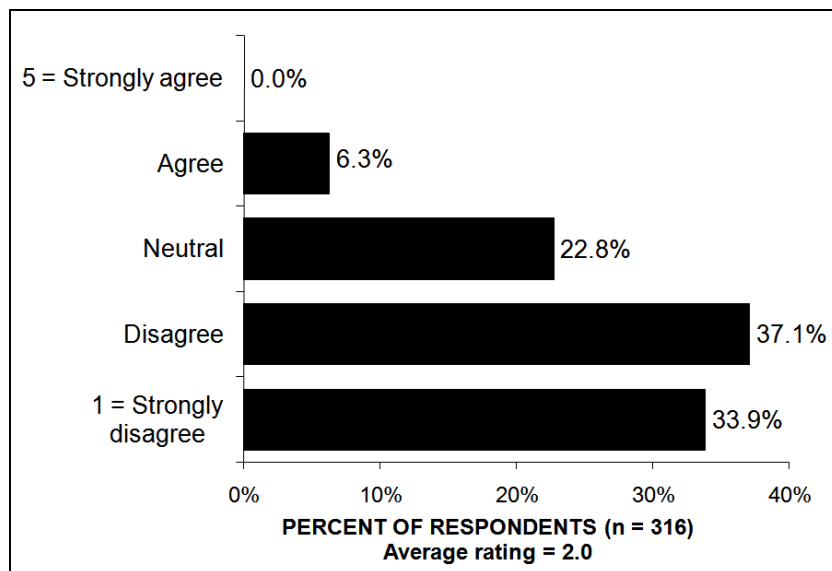


Figure T-66. Agreement with “Large cruise ships in Glacier Bay proper are majestic”

Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay.”

Agreement with the statement, “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay” depended on the average number of cruise ships in the bay per day, $F(2, 296) = 3.64$, $p = .027$. As can be seen in Figure T-67, other tour boat respondents who experienced 2-cruise ships in the bay per day were more likely to agree or strongly agree with the statement than other tour boat respondents who experienced 1.5- or 1-cruise ship in the bay per day. Increasing from current conditions to the maximum allowed of 2-cruise ships in the bay everyday will result in greater agreement that large cruise ships provided a sense of scale when viewing scenery in Glacier Bay (34.1% vs. 38.1%, respectively; see Figure T-68).

Tour-Boat Visitor Survey

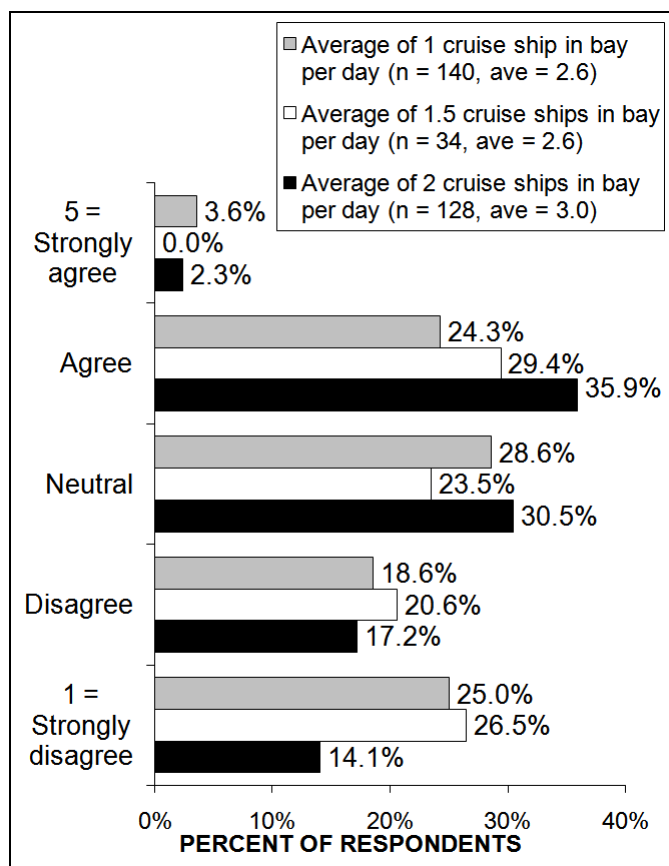


Figure T-67. Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay”

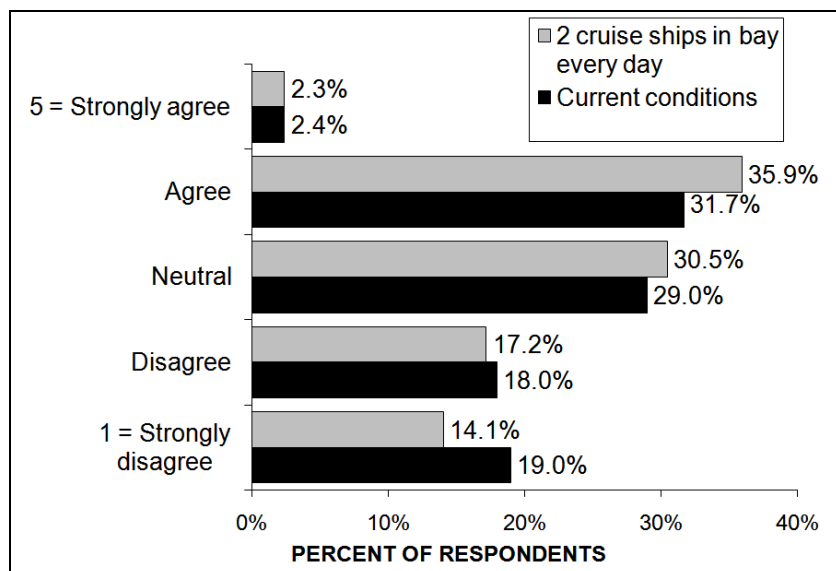


Figure T-68. Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay”

Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.”

About twice as many other tour boat passengers agreed as disagreed (44.8% vs. 24.8%) with the statement, “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.”

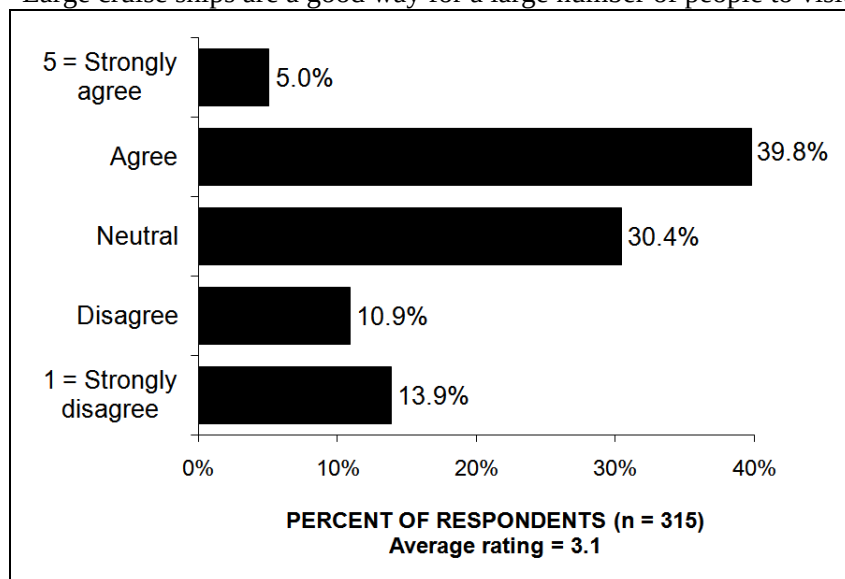


Figure T-69. Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper”

Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper.”

Agreement with the statement, “It is inappropriate for large cruise ships to be in Glacier Bay proper” depended on the average number of cruise ships in the bay per day, $F(2, 296) = 3.46$, $p = .033$. As can be seen in Figure T-70, other tour boat respondents who experienced 2-cruise ships in the bay per day were more likely to disagree or strongly disagree with the statement than other tour boat respondents who experienced 1.5- or 1-cruise ship in the bay per day. Increasing from current conditions to the maximum allowed of 2-cruise ships in the bay everyday will result in fewer other tour boat respondents strongly agreeing (15.1% vs. 9.3%, respectively) and more other tour boat respondents being neutral (36.8% vs. 39.5%, respectively) or strongly disagreeing (5.3% vs. 7.8%, respectively) with the statement (see Figure T-71).

Tour-Boat Visitor Survey

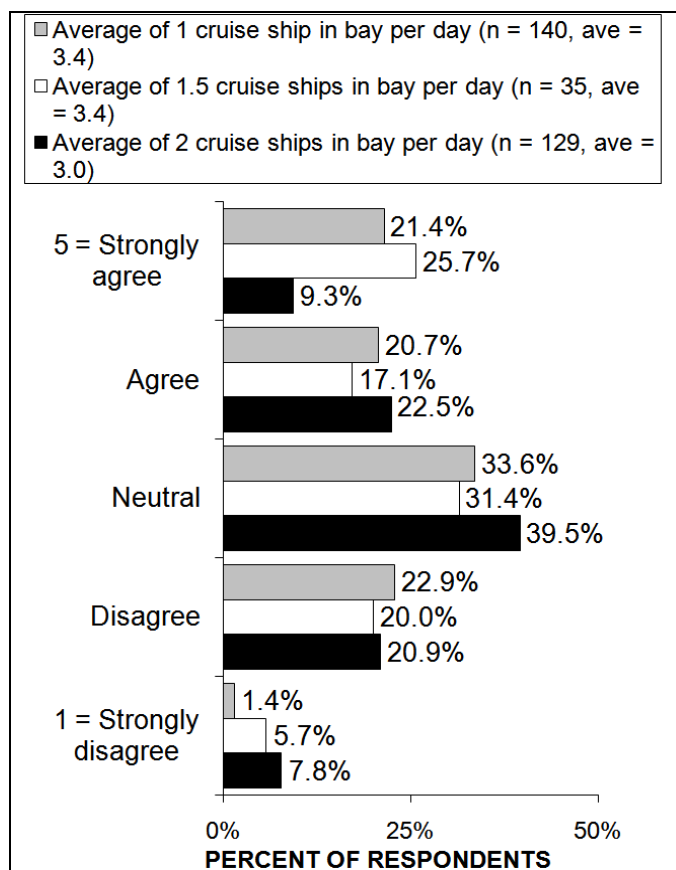


Figure T-70. Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper”: 1 vs. 2 cruise ship days

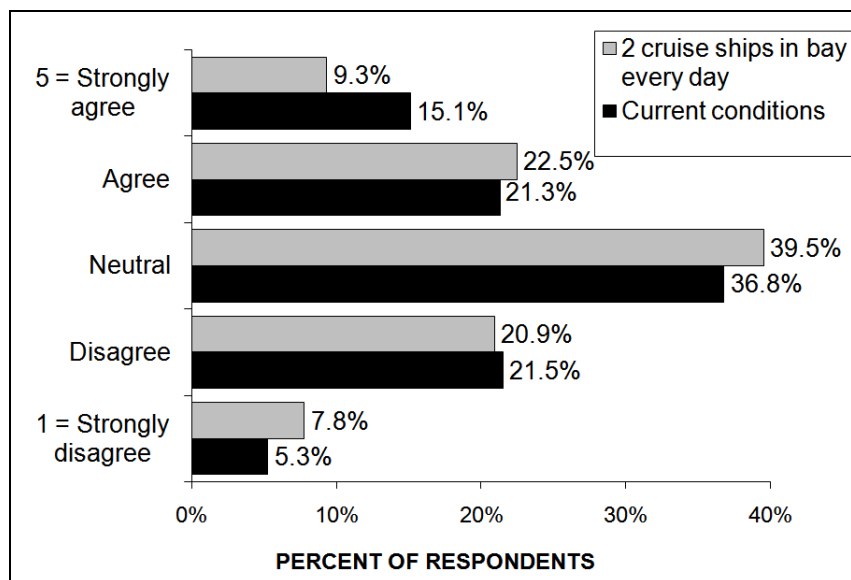


Figure T-71. Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper”: Current vs. maximum allowed conditions

Table T-18. Correlations among agreement with opinion statements

Variable		A	B	C	D
A	Large cruise ships in Glacier Bay proper are majestic	--			
B	Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay	.48	--		
C	Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.	.50	.45	--	
D	It is inappropriate for large cruise ships to be in Glacier Bay proper	-.53	-.39	-.62	--

Opinion Scale

A scale measure that consists of multiple items (i.e., responses) with internal consistency is a more reliable measure than any of the individual items. Crohnbach's alpha was calculated to assess the internal consistency of these four items as a measure of opinions about large cruise ships in Glacier Bay proper. George and Mallery (2003) provide the following rules of thumb: “_ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and < .5 – Unacceptable” (p. 231). The Cronbach's alpha for other tour boat passengers was .793 indicating a scale that has acceptable reliability. Because it is useful to be able to compare across the user groups and because the reliability for these four items was just below the acceptable range for only one user group (cruise ship passengers), it was decided to compute a single opinion scale for these four items for all user groups. The opinion scale score was computed by averaging the responses to the four individual opinion items. Because of the increased reliability, the opinion scale was used in subsequent analyses rather than the individual items.

Analyses indicated that other tour boat passengers agreement ratings on the opinion scale differed by the average number of cruise ships in the bay per day they experienced (even when the number of days in the park was taken into account), $F(2, 296) = 3.86, p < .022$. Post hoc Tukey tests revealed that other tour boat visitors who experienced on average 2 cruise ships in the bay per day were more supportive of large cruise ships in Glacier Bay proper than other tour boat visitors who experienced either 1 or 1.5 cruise ships in the bay per day ($M = 2.81$ versus $M = 2.54$ and $M = 2.54$, respectively). Because there was no difference between an average of 1 and 1.5 cruise ships in the bay per day, these groups were combined. Figure T-72 shows the distribution of opinion scale scores for other tour boat visitors who saw an average of 1 or 1.5 cruise ships per day and those who saw an average of 2.0 cruise ships per day. As can be seen, these distributions are very similar in shape with the one for 2 cruise ships in the bay per day being shifted slightly toward the “agree” end of the scale.

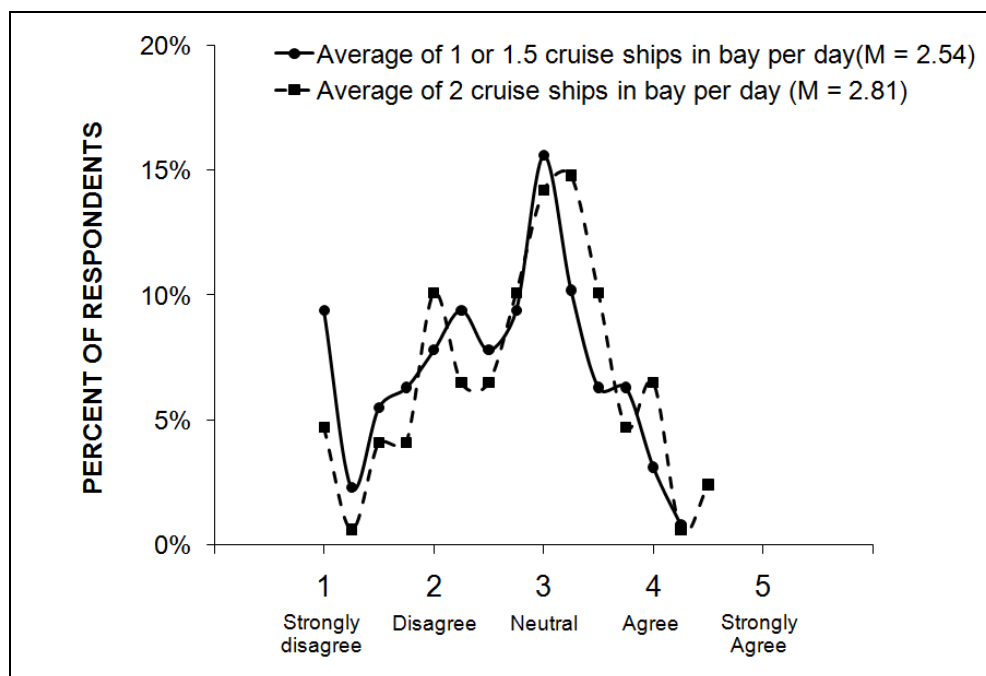


Figure T-72. Distribution of opinion scale scores by average number of ships in bay per day

Figure T-73 shows the distribution of opinion scale scores for other tour boat passengers under current conditions and the maximum allowed of 2 cruise ships in the bay per day. The two distributions are similarly shaped with the one for maximum allowed conditions being shifted slightly toward the “Agree” end of the scale. This difference is small although in a direction more supportive of large cruise ships in Glacier Bay proper.

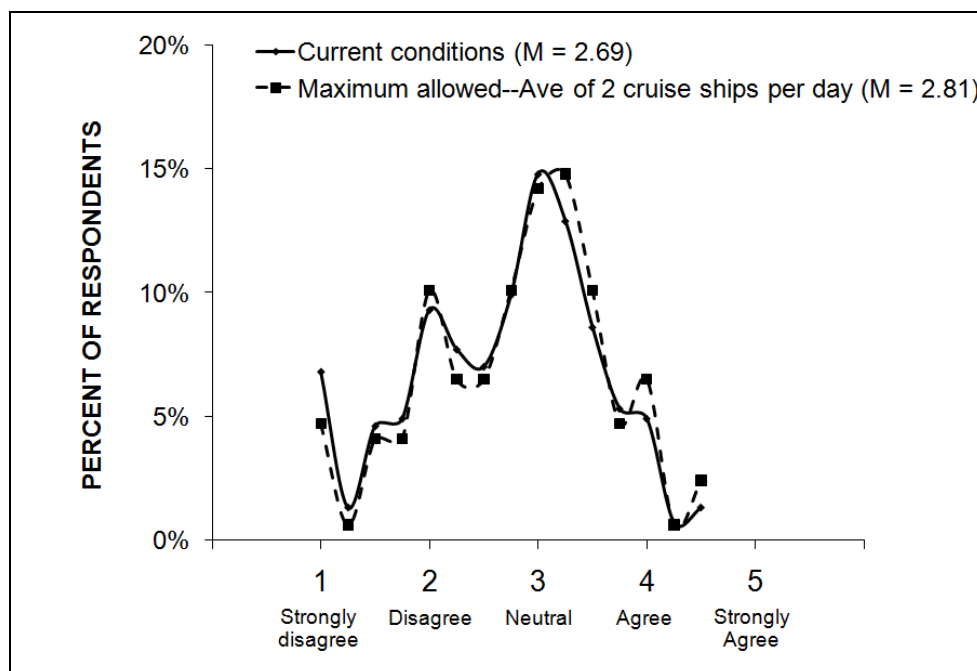


Figure T-73. Distribution of opinion scale scores: Current conditions vs. Maximum allowed

XI. LENGTH OF EXPOSURE EFFECTS ON VISITOR EXPERIENCE

Other tour boat passengers were asked to report the number of hours they saw or heard large cruise ships during their stay in Glacier Bay proper. Although a more subjective measure of exposure than number of cruise ships in the bay per day and one that park managers have considerably less control over, this measure provided more detailed information about exposure to cruise ships. It may be that the effect of cruise ships heard or seen depended on the length of time that other tour boat passengers heard or saw cruise ships regardless of the number of cruise ships in the bay the days they visited. These analyses are described and reported in this section.

Length of exposure was the total number of hours that other tour boat respondents reported seeing cruise ships during their stay in Glacier Bay proper. Along with individuals who did not see or hear cruise ships, individuals who did not know or remember the hours they saw or heard cruise ships were excluded from these analyses. The effect of length of exposure to cruise ships was examined for the following measures of effects of cruise ships on visitor experience: 1) cruise ship detraction ratings for each of the eight visitor experience dimensions, 2) likelihood of future recommendations and the effect of seeing large cruise ships on the likelihood of future recommendations, 3) overall enjoyment ratings, 4) effect of cruise ships on trip enjoyment, 5) effect of cruise ships on enjoyment of Margerie and Grand Pacific glaciers), and 6) the four opinion measures.

Of the 17 measures examined, total number of hours heard or saw cruise ships was significantly related to six measures (see Table T-19). As can be seen in Table T-19, higher total number of hours heard or saw cruise ships were associated with greater negative effects of cruise ships for each measure. The largest correlation observed was -.225 and that equates to 5.1% of the variance in scores being explained by the relationship between total number of hours saw or heard cruise ships and effect of cruise ships on trip enjoyment. Thus, for individuals who saw or heard cruise ships, the total number of hours cruise ships were seen or heard was not strongly predictive of reported effects of cruise ships on other tour boat visitors' experience in Glacier Bay proper.

Table T-19. Significant correlations between total number of hours heard or saw cruise ships and different measures of effects of cruise ships

Measure	Correlation (<i>r</i>)	<i>p</i> -value
Cruise ships effect on experiencing the scenic beauty	-.224	.001
Cruise ships effect on experiencing the wonder of nature scale	-.173	.014
Cruise ships effect on experiencing tranquility scale	-.193	.006
Cruise ships effect on experiencing pristine environment scale	-.200	.004
Experience with cruise ships effect on likelihood to recommend	-.153	.038
Effect of cruise ships on trip enjoyment	-.225	.002

XII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS

This section examines whether there were particular features of cruise ships (e.g., haze, public address system, etc.) that were associated with effects of cruise ships on other tour boat passengers. Knowing whether certain characteristics of cruise ships are more predictive of effects on other tour boat passengers can provide insights into possible mitigation strategies, if needed.

A total of 235 (76.4%) other tour boat passengers reported hearing or seeing cruise ships during their visit to Glacier Bay proper. The data from these individuals were used in the following analyses and thus, the results reflect only those individuals who had experience with cruise ships during the trip in which they were contacted to participate in the survey.

Characteristics of encounters with cruise ships measured

As part of the mail survey, other tour boat passengers were asked to report about different characteristics of their encounters with large cruise ships. These characteristics were captured by the eight variables listed in Table T-20.

Table T-20. Characteristics of cruise ships used as predictors in regression analyses

Average number of cruise ships in the bay (1 vs. 1.5 vs. 2)
Total length of time saw or heard large cruise ships
Haze from large cruise ship exhaust affected my views in some manner.
Heard sound from large cruise ship public address system.
Heard large cruise ship engines.
Number of large cruise ships seen at Margerie and Grand Pacific glaciers
Other large cruise ships had no effect on viewing land animals
Other large cruise ships had no effect on viewing marine animals

Measures of effect of cruise ships on visitor experience

A number of measures of effects of cruise ships on other tour boat passengers' experience were included in the survey: 1) effects of cruise ships on different dimensions of visitor experience, 2) effect of cruise ships on trip enjoyment, 3) likelihood of future recommendations, and 4) overall ratings of trip enjoyment. To determine if there were common factors underlying responses on these measures, an exploratory factor analysis was done.³ Likelihood of future recommendations and overall ratings of trip enjoyment used different response scales than the other measures and were not included in the factor analysis. The results of the factor analysis revealed a single factor underlying responses to these measures and explained 79.3% of the variance. The measures of cruise ships effects on 8 dimensions of trip experience and the measure of effect of cruise ships on trip enjoyment had factor loadings ranging from .789 to .938. A factor scale score was computed by averaging the scores on each measure which had a factor loading over 0.3.⁴ This

³ In the exploratory factor analysis, the factors were extracted using maximum likelihood and oblimin rotation. The scree test was used to determine the appropriate number of factors to retain by selecting and interpreting the number of factors above the bend in the curve. This approach to exploratory factor analysis is consistent with "best practices" outlined in Costello and Osborne (2005).

⁴ The factor scale score based on the average of the items loading on the factor was compared to the factor score derived based on the factor score coefficients. The two scores were correlated at 0.998. The factor scale score based on the average of the items was used for the following reasons: 1) the scale for the factor score was the same as the

computed factor score will be referred to as the cruise ship effect score and it is a continuous measure of effects of cruise ships ranging from 1 = “detracted greatly” to 5 = “added greatly.” Analyses that use this continuous measure as the dependent variable will show which variables predict different levels of effects of cruise ships ranging from detracted greatly to added greatly.

It may also be useful for park managers to understand how changes in significant predictors can affect the likelihood that visitors report cruise ships detract from their enjoyment. To obtain this information, a dichotomous variable, cruise ships detracted, was created from the continuous cruise ship effect factor score. Individuals who had a cruise ship effect factor score ranging from 1.0 to 2.9 were classified as “cruise ships detracted from experience” whereas individuals who had cruise ship effect factor scores of 3 were classified as “no effect.” Individuals with cruise ship effect factor scores above 3.0 were excluded from the analyses as these individuals reported that cruise ships added to their trip enjoyment. Seven other tour -boat passengers (3.3%) had cruise ship effect factor scores over 3.0 and thus, were excluded from analyses using the cruise ships detracted score. Analyses that use this dichotomous measure as the dependent variable will show which variables predict changes in the likelihood that cruise ships detract from other tour boat visitors’ enjoyment.

Individual relationships between characteristics of cruise ship encounters and the effect of cruise ships

Analyses were conducted to determine whether any of the eight measured characteristics of cruise ship encounters were related to the effect of cruise ships on other tour boat visitors experience as measured by the cruise ship effect factor score (the continuous dependent measure). For characteristics of cruise ship encounters that were continuous in nature, correlations were calculated. For characteristics of cruise ship encounters that were nominal in nature, t-tests or one-way ANOVAs were calculated.

Analyses indicated that seven of the eight measured characteristics of cruise ship encounters were significant predictors of the effect of cruise ships as measured by the cruise ship effect score. Only number of cruise ships in the bay each day was not a significant predictor ($p = .818$).

Table T-21 summarizes the characteristics of cruise ships that were found to be significant predictors of the effect of cruise ships as measured by the cruise ship effect score. The findings below indicate that cruise ships detracted more (lower scores on the detract factor) from other tour boat passengers’ trip experience:

1. the longer the total length of time other tour boat passengers saw or heard cruise ships,
2. if other tour boat passengers reported that haze from large cruise ship exhaust affected their views in some manner,
3. if other tour -boat passengers heard large cruise ships’ public address systems,
4. if other tour -boat passengers heard large cruise ship engines,
5. the more cruise ships they saw at Margerie and Grand Pacific glaciers,
6. if other tour -boat passengers reported large cruise ships affected their viewing of land animals, and
7. if other tour -boat passengers reported large cruise ships affected their viewing of marine animals.

original items, 2) analyses indicated that the factor scale score for the other user groups could be computed using the average and still achieve high correlations, thus allowing a way to compare across user groups if desired.

Table T-21. Characteristics of cruise ships that were significant predictors of effects of cruise ships

Predictor variable	<i>r</i>	<i>p</i> -value
Total length of time saw or heard large cruise ships	-.183	.013
Haze from large cruise ship exhaust affected my views in some manner.	-.168	.021
Heard sound from large cruise ship public address system.	-.216	.003
Heard large cruise ship engines.	-.206	.004
Number of large cruise ships seen at Margerie and Grand Pacific glaciers	-.232	.002
Other large cruise ships had no effect on viewing land animals	.307	<.001
Other large cruise ships had no effect on viewing marine animals	.431	<.001

NOTE: Higher scores of the detractor factor reflect more positive effects of cruise ships.

To understand the unique relationship of each of the predictor variables with the effects of cruise ships on other tour boat passengers' visitor experience, a regression was performed that included the seven significant variables as predictor variables. A stepwise procedure was adopted to determine the best fitting model. The final model included three of the seven variables (see Table T-22). The omnibus test of the model was significant, $F(3, 131) = 17.77, p < .001$, and the R^2 indicated that 28.9% of the variance in cruise ship effect scores was explained by the model.

Table T-22. Summary of model for effects of cruise ships measured by cruise ship effect score for other tour boat passengers

Predictor Variable	B	S.E.	<i>t</i>	<i>p</i> -value
Other large cruise ships had no effect on viewing marine animals	.619	.123	5.01	<.001
Number of large cruise ships seen at Margerie and Grand Pacific glaciers	-.225	.076	-2.96	.004
Heard large cruise ship engines	-.301	.125	-2.41	.017
Constant	2.122	.127	16.77	<.001

The regression equation associated with the above model is below.

Cruise ship effect Score = $2.12 + (.619 * \text{Cruise ships had no effect on viewing marine animals}) + (-.225 * \text{\# of cruise ships seen at Margerie and Grand Pacific glaciers}) + (-.301 * \text{Heard cruise ship engines})$

The regression coefficients (B) show the change in one variable given that all other variables are held constant. For example, for people not hearing large cruise ship engines or seeing any cruise ships at Margerie and Grand Pacific glaciers, a large cruise that affects the viewing of marine animals will decrease the cruise ship effect score by .619 points compared to those who experience no effect of large cruise ships on their viewing of marine animals.

The regression equation above was used to calculate predicted cruise ship effect scores for several scenarios. The first scenario was the most common reported in the current survey with 56.3% of respondents reporting that cruise ships had no effect on viewing marine animals, saw no cruise ships when

at Margerie and Grand Pacific glaciers, and heard no large cruise ship engines during their visit. The predicted cruise ship effect score was 2.74 indicating minimal detracting (3 = No effect). The second most common scenario (reported by 17.4% of respondents) was that cruise ships had no effect on viewing marine animals, they saw one cruise ship when at Margerie and Grand Pacific glaciers, and heard no large cruise ship engines during their visit. The predicted cruise ship effect score was 2.52 indicating an increase in detracting (2 = Detracted somewhat) from Scenario 1 of almost a quarter point. The third most common scenario (reported by 8.9% of respondents) was that cruise ships affected the viewing of marine animals, they saw no cruise ships when at Margerie and Grand Pacific glaciers, and they heard no large cruise ship engines during their visits. The predicted cruise ship effect score was 2.12 indicating an increase in detracting from Scenario 1 of .62 points. Comparing Scenario 2 with Scenario 3 indicates that having large cruise ships affect the viewing of marine animals resulted in greater detracting than seeing 1 large cruise ship when at Margerie and Grand Pacific glaciers, given that all other things remained constant. The worst case scenario of visitors reporting that large cruise ships affected viewing of marine animals, seeing 2 large cruise ships when at Margerie and Grand Pacific glaciers and hearing large cruise ships engines results in a predicted cruise ship effect score of 1.37 (1 = Detracted Greatly and 2 = Detracted Somewhat). There were no respondents who experienced this scenario under current conditions.

Individual relationships between characteristics of cruise ship encounters and the likelihood that cruise ships detract from trip enjoyment

Analyses were conducted to determine whether any of the measured characteristics of cruise ship encounters were related to the likelihood cruise ships detract from other tour boat visitors experience as measured by the cruise ship detracted score (the dichotomous dependent measure). Logistic regression analysis was used to determine whether any of the measured characteristics of cruise ship encounters (see Table T-20) predicted who was negatively affected by cruise ships. Logistic regression is a form of linear regression used when the dependent variable is dichotomous (e.g., cruise ships detracted: yes or no)⁵. In logistic regression, predictor variables may be either categorical (e.g., heard cruise ship engines: yes or no) or continuous (e.g., total length of time heard or saw large cruise ships).

In logistic regression there are multiple ways to evaluate whether the generated model is good fit to the data. The first is the omnibus chi-square test of the model coefficients. A significant chi-square indicates that the coefficients in the model as a whole significantly predict the dependent variable. When a model has only one predictor variable, a significant model chi-square indicates that the predictor variable significantly predicted the dependent variable. Second, the Hosmer and Lemeshow Goodness of Fit test statistic⁶ can be computed when the predictor variables are continuous. The Hosmer and Lemeshow Goodness of Fit test statistic is a measure of the difference between the data predicted by the model and the observed data. A significant Hosmer and Lemeshow Goodness of Fit test statistic indicates that the data predicted by the model differ significantly from the observed data and thus, the model is not a good fit. Third, examining the percent of cases correctly classified by the model provides information on the goodness of fit of the model. Higher percentages correctly classified indicate a better fitting model.

⁵Discriminant function analysis may also be used to predict membership in two or more groups. Given that there were only two groups, logistic regression was selected over discriminant function analysis because it requires fewer assumptions in theory, is more statistically robust in practice and easier to use and understand.

⁶ The Hosmer and Lemeshow Goodness of Fit test examines the null hypothesis that the data were generated by the model fitted by the researcher. The test divides subjects in to deciles based on predicted probabilities, and then computes a chi-square from observed and expected frequencies. If the computed test statistic has a probability of .05 or less, the null hypothesis that there is no difference between the observed and model-predicted values of the dependent variable is rejected. Well-fitting models generate data that do not differ from what was observed and their Hosmer and Lemeshow Goodness of Fit Test statistic is not significant.

Predicting for whom cruise ships detracted from trip enjoyment

A separate logistic regression was run for each predictor variable listed in Table T-20 with cruise ships detracted (detracted vs. not effected) as the dependent variable. The maximum number of observations for these analyses was 199, as seven other tour boat respondents indicated that cruise ships added to their enjoyment and were thus, excluded from these analyses. Of the eight variables, two resulted in models with significant model chi-squares indicating they were significant predictors of cruise ships detracting from trip enjoyment: 1) Large cruise ships had no effect on viewing land animals, and 2) Large cruise ships had no effect on viewing marine animals. Each of these had non-significant Hosmer and Lemeshow's Goodness of Fit test statistics indicating that these models did not predict values significantly different from what they ought to be (i.e. from the observed values), and therefore, were good fits. However, these two variables were not sufficiently strong predictors to improve upon prediction based on selecting the most common condition of "detracted." Thus, none of the variables resulted in a good fitting model based on the criteria above. Table T-23 contains the results of these two logistic regressions. Because neither were good fitting models, no further analyses were performed.

Table T-23. Model summaries for predicting likelihood that cruise ships detracted from trip enjoyment

Predictor Variable	Constant	B ¹	Chi-Sq p-value	Hosemer & Lemeshow	% classified ²
Large cruise ships had no effect on viewing land animals	0.34	1.48	.006	nc	61.8%
Large cruise ships had no effect on viewing marine animals	0.23	2.10	<.001	nc	61.2%

¹In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

²The variation in the percent classified for each predictor variable was due to small differences in the number of respondents in each analysis rather than due to the predictor variables being better or worse. Each logistic regression resulted in 100% of people being classified as "cruise ships detracted."

Summary

Three characteristics of encounters were found to predict effects of cruise ships as measured by the continuous dependent measure: 1) large cruise ships had no effect on viewing marine animals, 2) heard large cruise ship engines, and 3) number of large cruise ships heard or seen at Margerie and Grand Pacific glaciers. In contrast, none of the measured characteristics of encounters were found to predict the likelihood of cruise ships detracting. These findings suggest that the three encounter characteristics while predictive of smaller shifts in experience (as measured by the continuous measure) are not predictive of larger shifts that would produce a shift from no effect of cruise ships to cruise ships detracting.

Review of the data indicated most other tour boat passengers who saw cruise ships had similar experiences with them. These findings indicate that for this limited range of experiences with cruise ships, characteristics of encounters have little predictive utility. If experiences with cruise ships become more varied, then characteristics of encounters may be more predictive.

It should be noted that findings from stepwise procedures are exploratory in nature. The results of stepwise procedures can be affected by meaningless patterns unique to a particular sample. Thus, the findings can be used to develop theory that would then be tested directly in future research.

XIII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM VISITOR CHARACTERISTICS

The experience other tour boat passengers have with cruise ships may also be affected by some characteristic(s) associated with them. For example, visitors for which it was important to experience a pristine environment may react more negatively to their encounters with cruise ships than visitors for which experiencing a pristine environment was not as important. Knowing whether certain characteristics of other tour boat passengers are more predictive of effects of cruise ships on other tour boat passengers can provide insights to park managers. For some visitor characteristics (e.g., gender, age) that may be significant predictors, park managers have few options for mitigating their impacts. For others (e.g., importance of different trip dimensions, attitudes toward cruise ships), park managers may be able to design mitigation efforts such as managing expectations to match the most likely visitor experience.

A total of 235 (76.4%) other tour boat passengers reported hearing or seeing cruise ships during their visit to Glacier Bay proper. The data from these individuals were used in the following analyses and thus, the results reflect only those individuals who had experience with cruise ships during the trip in which they were contacted to participate in the survey.

Characteristics of other tour boat passengers measured

As part of the mail survey, other tour boat respondents were asked to report about different characteristics of themselves. These characteristics were captured by the 18 variables listed in Table T-24.

Table T-24. Visitor characteristics used as predictors in regression analyses

Gender	Hispanic (yes or no)
Age	First trip to GLBA
Education level (years of schooling)	Type of party
Residence	Party size
Caucasian (White: yes or no)	
Importance of experiencing the wonder of nature	Importance of experiencing solitude
Importance of intimate experience with nature	Importance of experiencing pristine environment
Importance of hearing the sounds of nature	Importance of experiencing the scenic beauty
Importance of experiencing tranquility	Importance of viewing wildlife
Opinion scale re: large cruise ships in Glacier Bay proper	

Measures of effect of cruise ships on visitor experience

A number of measures of effects of cruise ships on other tour boat visitor experience were included in the survey: 1) effects of cruise ships on different dimensions of visitor experience, 2) effect of cruise ships on trip enjoyment, 3) likelihood of future recommendations, and 4) overall ratings of trip enjoyment. As described in the previous section, two composite measures were calculated. The first was a continuous measure of the effects of cruise ships on visitor experience based on the results of a factor analysis (see above for complete description). The range of the cruise ship effect factor score was from 1 “detracted greatly” to 5 “added greatly.” The second was a dichotomous measure of whether cruise ships detracted from trip experience (detracted versus no effect) based on the continuous measure cruise ships effects score (see section above for complete description).

Individual relationships between characteristics of other tour boat passengers and the effect of cruise ships

Analyses were conducted to determine whether any of the measured characteristics of other tour boat passengers were related to the effect of cruise ships on their experience as measured by the cruise ship effect score. For characteristics of visitors that were continuous in nature, correlations were calculated. For characteristics of visitors that were nominal in nature, *t*-tests or one-way ANOVAs were calculated.

Table T-25 summarizes the 8 characteristics of other tour boat passengers that were found to be significant predictors of the effect of cruise ships as measured by the cruise ship effect score. The older respondents were the more positive effects cruise ships had on their experience. Six of the eight trip dimension scales were significant predictors indicating for each that the more important the trip dimension was the more cruise ships detracted from trip experience. The more visitors agreed with cruise ships being in Glacier Bay proper the more positive effects cruise ships had on other tour boat passengers' experiences. Because the opinion scale items were asked in the mail back questionnaire, it is possible that the opinion scale reflects other tour boat passengers' experiences with cruise ships during their trips. Thus, while the opinion scale and effects of cruise ships are related, there was no way from the current data to determine 1) whether visitor opinions shaped the perception of the experience, 2) whether the experience shaped visitors' opinions, or 3) whether some other more complex relationship underlies the observed correlation.

Table T-25. Other tour boat passenger characteristics that were significant predictors of effects of cruise ships

Predictor variable	<i>r</i>	<i>p</i> -value
Age	.166	.017
Importance of experiencing the wonder of nature	-.155	.026
Importance of intimate experience with nature	-.351	<.001
Importance of hearing the sounds of nature	-.318	<.001
Importance of experiencing tranquility	-.349	<.001
Importance of experiencing solitude	-.318	<.001
Importance of experiencing pristine environment	-.304	<.001
Opinion re: large cruise ships in Glacier Bay proper	.472	<.001

NOTE: Higher scores of the detraction factor reflect more positive effects of cruise ships.

To understand the unique relationship of each of the predictor variables with the effects of cruise ships on other tour boat passengers' visitor experience, a stepwise regression was performed that included all eight variables as predictor variables. A stepwise procedure was adopted to determine the best fitting model. The final model included three of the eight variables (see Table T-26). The omnibus test of the model was significant, $F(3, 188) = 32.76$, $p < .001$, and the R^2 indicated that 34.4% of the variance in cruise ship effect scores was explained by the model.

Table T-26. Summary of model for effects of cruise ships measured by cruise ship effect score for other tour boat passengers

Predictor Variable	B	S.E.	<i>t</i>	<i>p</i>
Age	.009	.003	2.93	.004
Importance of experiencing tranquility	-.157	.035	-4.53	<.001
Opinion re: large cruise ships in Glacier Bay proper	.300	.042	7.13	<.001
Constant	1.77	.274	6.46	<.001

The regression equation associated with the above model is below.

Cruise ship effect score = $1.77 + (.009 * \text{Age}) + (-.157 * \text{Importance of experiencing tranquility}) + (.300 * \text{Opinion regarding large cruise ships in Glacier Bay proper})$

The regression coefficients (B) show the change in one variable given that all other variables are held constant. For example, for people who rated the importance of experiencing tranquility “very important” and who are age 55, a shift from “agreed somewhat” to “agreed strongly” with large cruise ships being in Glacier Bay proper result in a .300 higher cruise ship effect score indicating less detracted due to cruise ships (cruise ship effect score goes from 1 = detracted greatly to 5 = added greatly).

The regression equation above was used to calculate predicted cruise ship effect scores for several scenarios (see Table T-27). Scenario 1 used frequent values obtained in the current sample for each of the variables: 1) neutral opinions regarding large cruise ships in Glacier Bay proper, 2) age of 65, and 3) importance of tranquility score of 4 which indicates it was very important. The predicted cruise ship effect score was 2.63, slightly less than no effect (3 = no effect). Scenario 2 was the same as Scenario 1 except that the opinion scale score was 2 indicating the individual somewhat disagrees with cruise ships being in Glacier Bay proper. The predicted cruise ship effect score was 2.33 or 0.3 points toward “detracted somewhat” compared to Scenario 1. Scenario 3 was identical to Scenario 1 except for the importance of tranquility scale score going from 4 = Very important to 5 = Extremely important. The predicted cruise ship effect score was 2.47 or 0.15 points toward “detracted somewhat” compared to Scenario 1. Scenario 4 was identical to Scenario 1 except that the individual was 55 years old. The predicted cruise ship effect score was 2.54 or 0.1 points toward “detracted somewhat” compared to Scenario 1. Together these scenarios illustrate that moderate changes on these variables have relatively small effects on the predicted cruise ship effect score.

Table T-27. Predicted cruise ship effect score for potential scenarios

Scenario		Opinion Scale	Age	Importance of tranquility scale	Predicted cruise ship effect score
1	Common values for each variable	3 = Neutral	65	4 = Very important	2.63
2	Opinion scale goes down by one to “Somewhat disagree”	2 = Somewhat disagree	65	4	2.33
3	Importance of tranquility scale goes up by one to “Extremely important”	3	65	5 = Extremely important	2.47
4	Age is 10 years younger	3	55	4	2.54

Individual relationships between characteristics of other tour boat passengers and the likelihood that cruise ships detract from trip enjoyment

Analyses were conducted to determine whether any of the measured characteristics of other tour boat passengers were related to the likelihood cruise ships detract from visitors experience as measured by the cruise ship detracted score (the dichotomous dependent measure). Logistic regression analysis was used to determine whether any of the measured characteristics of other tour boat passengers (see Table T-24) predicted who was negatively affected by cruise ships. Logistic regression is a form of linear regression used when the dependent variable is dichotomous (e.g., cruise ships detracted: yes or no)⁷. In logistic

⁷Discriminant function analysis may also be used to predict membership in two or more groups. Given that there were only two groups, logistic regression was selected over discriminant function analysis because it requires fewer assumptions in theory, is more statistically robust in practice and easier to use and understand.

regression, predictor variables may be either categorical (e.g., gender: male or female) or continuous (e.g., age).

In logistic regression there are multiple ways to evaluate whether the generated model is good fit to the data. The first is the omnibus chi-square test of the model coefficients. A significant chi-square indicates that the coefficients in the model as a whole significantly predict the dependent variable. When a model has only one predictor variable, a significant model chi-square indicates that the predictor variable significantly predicted the dependent variable. Second, the Hosmer and Lemeshow Goodness of Fit test statistic⁸ can be computed when the predictor variables are continuous. The Hosmer and Lemeshow Goodness of Fit test statistic is a measure of the difference between the data predicted by the model and the observed data. A significant Hosmer and Lemeshow Goodness of Fit test statistic indicates that the data predicted by the model differ significantly from the observed data and thus, the model is not a good fit. Third, examining the percent of cases correctly classified by the model provides information on the goodness of fit of the model. Higher percentages correctly classified indicate a better fitting model.

Predicting for whom cruise ships detracted from trip enjoyment

A separate logistic regression was run for each predictor variable listed in Table T-24 with cruise ships detracted (detracted vs. not effected) as the dependent variable. The maximum number of observations for these analyses was 235. Of the 18 variables, seven resulted in models with significant model chi-squares indicating they were significant predictors of cruise ships detracting from trip enjoyment: 1) age, 2) five of the eight trip experience dimensions, and 3) opinion scale re: large cruise ships being in Glacier Bay proper. One of these had a significant Hosmer and Lemeshow's Goodness of Fit test statistics indicating that the model predicted values significantly different from what they ought to be (i.e. from the observed values), and therefore, was not a good fit. Table T-28 contains the results of these seven logistic regressions. Although these seven variables were statistically significant predictors, two were not sufficiently strong to improve upon prediction based on selecting the most common condition of "detracted." Thus, these two models will not be considered a good fit because they were not strong predictors. Table T-28 contains the results of these seven logistic regressions. The remaining five variables that produced good fitting models were included in further analyses.

⁸ The Hosmer and Lemeshow Goodness of Fit test examines the null hypothesis that the data were generated by the model fitted by the researcher. The test divides subjects in to deciles based on predicted probabilities, and then computes a chi-square from observed and expected frequencies. If the computed test statistic has a probability of .05 or less, the null hypothesis that there is no difference between the observed and model-predicted values of the dependent variable is rejected. Well-fitting models generate data that do not differ from what was observed and their Hosmer and Lemeshow Goodness of Fit Test statistic is not significant.

Table T-28. Model summaries for predicting likelihood that cruise ships detracted from trip enjoyment based on other tour boat visitor characteristics

Predictor Variable	Constant	B*	Chi-Sq <i>p</i> -value	Hosmer & Lemeshow	% classified
Age	3.45	-.046	.001	.255	62.9%
Importance of intimate experience with nature	-2.24	.683	<.001	.218	63.6%
Importance of hearing the sounds of nature	-1.31	.473	.004	.950	61.3%**
Importance of experiencing tranquility	-1.58	.555	.001	.791	63.1%
Importance of experiencing solitude	-0.67	.352	.001	.281	61.2%**
Importance of experiencing pristine environment	-3.71	.970	<.001	.177	63.0%
Opinion re: large cruise ships in Glacier Bay proper	2.93	.657	<.001	.085	65.6%

*In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

**The percent classified did not exceed what would be found by selecting the most common condition and therefore, the model was not considered good fitting.

To understand the unique relationship of each of the predictor variables with the probability of cruise ships detracting from trip enjoyment, a logistic regression was performed that included all the variables that had good fitting models as predictor variables. A backward stepwise procedure was adopted to determine the best fitting model. The final model included 1) age, 2) importance of experiencing pristine environment, and 3) opinion scale re: large cruise ships in Glacier Bay proper as predictors of probability that cruise ships detracted from trip enjoyment. The omnibus test of the model was significant, $\chi^2(3, n = 303) = 41.46, p < .001$, the Hosmer and Lemeshow test statistic was not significant, $\chi^2(8) = 8.86, p = .354$, and the model correctly classified 38.3 percent of people who indicated cruise ships did not detract from their enjoyment and 94.0 percent of people who said cruise ships detracted for a total of 72.4 percent of other tour boat respondents correctly classified by the model. Together, these findings indicated a good fitting model.

Table T-29 summarizes the parameters of the model. The logistic coefficients (i.e., B) provide information about how changes in one of the predictor variables (e.g., age) affects the likelihood that cruise ships will detract from respondents' trip enjoyment when the other predictor variables (e.g., importance of experiencing pristine environment) are held constant.

Table T-29. Summary of Model with Three Predictor Variables

Predictor Variable	B*	S.E.	Wald	df	p	exp(B)
Age	-.054	.017	9.93	1	.002	.947
Importance of experiencing pristine environment	.944	.272	12.04	1	.001	2.569
Opinion scale re: large cruise ships in Glacier Bay proper	-.783	.245	10.25	1	.001	.457
Constant	2.08	1.75	1.42	1	.233	8.016

*In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

The generic form of a model with three predictor variables is given below:

$$\ln \left(\frac{p}{1-p} \right) = \text{constant} + B_1(\text{predictor variable 1}) + B_2(\text{predictor variable 2}) + B_3(\text{predictor variable 3})$$

Where: p is the probability that cruise ships detracted and B_1 is the logistic coefficient for the first predictor variable, B_2 is the logistic coefficient for the second predictor variable, and B_3 is the logistic coefficient for the third predictor variable.

A logistic curve can be drawn by computing the probability that cruise ships detracted from trip enjoyment for each level of one predictor variable when holding the level of the other predictor variables constant. Figure T-74, Figure T-75, and Figure T-76 show the logistic curves for each predictor variable when holding the levels of the other predictor variables constant. As can be seen increasing age and increasing agreement with cruise ships being in Glacier Bay are associated with lower probabilities of cruise ships detracting (Figure T-74 and Figure T-75, respectively). Furthermore, higher importance of experiencing a pristine environment was associated with higher probabilities of cruise ships detracting (see Figure T-76).

The likelihood that cruise ships would detract for a 55 year old respondent who somewhat disagrees with large cruise ships being in Glacier Bay proper and for whom experiencing a pristine environment was extremely important is predicted to be .91. In contrast, a 75 year old who somewhat agrees with cruise ships being in Glacier Bay proper and for whom experiencing a pristine environment was very important had a .21 probability of cruise ships detracting from their trip enjoyment.

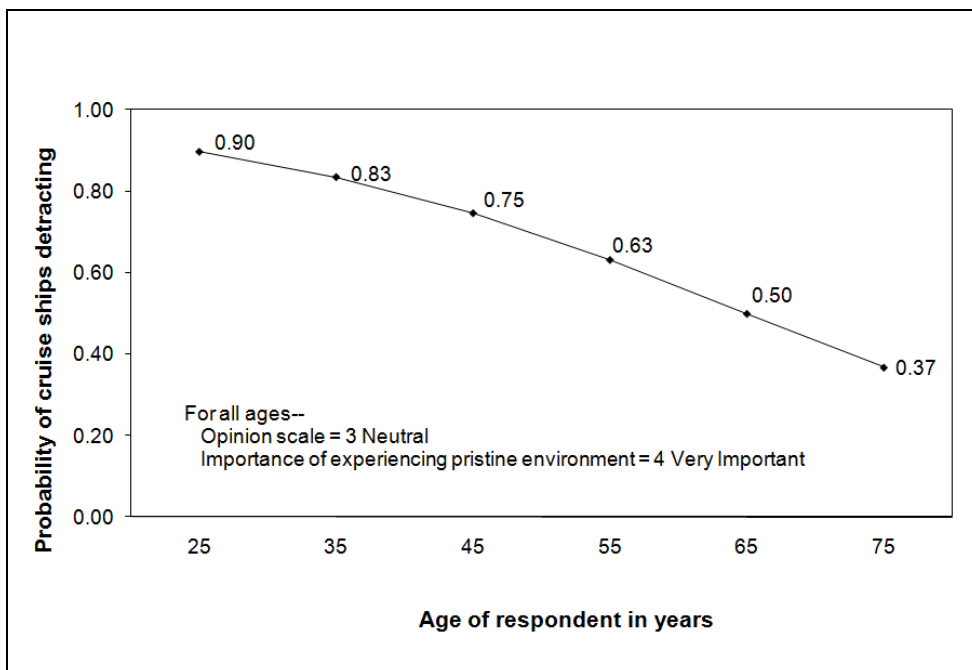


Figure T-74. Probability of cruise ships detracting for different ages of respondents

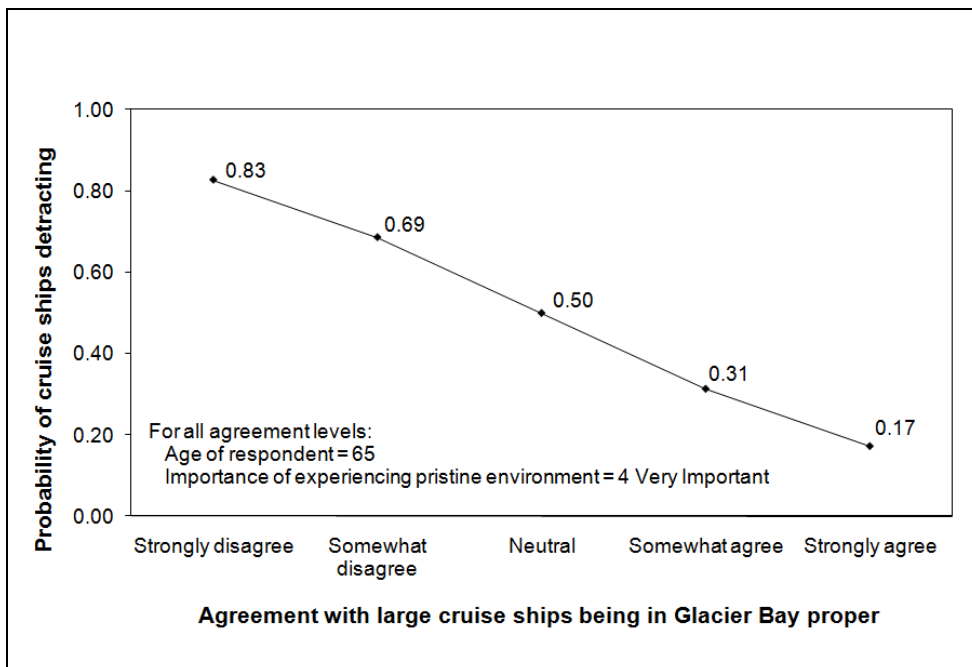


Figure T-75. Probability of cruise ships detracting for different agreement levels with large cruise ships being in Glacier Bay proper

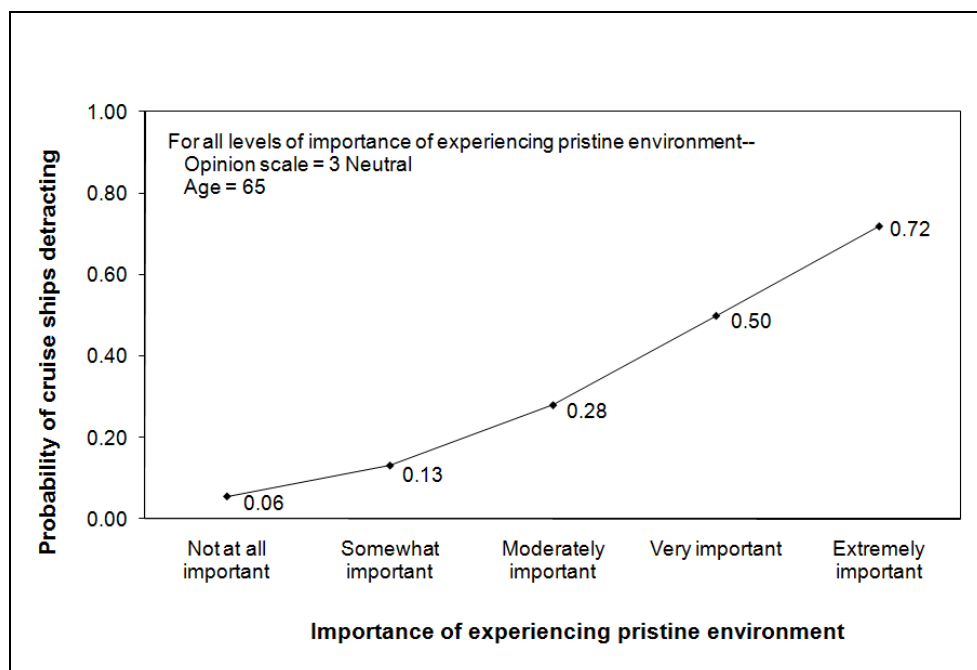


Figure T-76. Probability of cruise ships detracting for different agreement levels with large cruise ships being in Glacier Bay proper

Summary

Two characteristics of visitors were found to predict effects of cruise ships as measured by the continuous dependent measure and by the dichotomous variable: 1) age, and 2) opinion regarding large cruise ships in Glacier Bay proper. Additionally, the importance of experiencing tranquility predicted effects of cruise ships for the continuous measure, and the importance of experiencing pristine environment predicted effects of cruise ships for the dichotomous measure. These findings suggest that age and opinions regarding cruise ships being in Glacier Bay proper were able to predict both smaller and larger effects of cruise ships on visitor experience.

Review of the data indicated most other tour boat passengers who saw cruise ships had similar experiences with them. Thus, for this limited range of experiences with cruise ships, characteristics of visitors were more predictive of effects of cruise ships than characteristics of the encounters with cruise ships. If experiences with cruise ships become more varied, then characteristics of encounters may be more predictive and it is unknown how visitor characteristics would compare as predictors.

It should be noted that findings from stepwise procedures are exploratory in nature. The results of stepwise procedures can be affected by meaningless patterns unique to a particular sample. Thus, the findings can be used to develop theory that would then be tested directly in future research.

XIII. EXPERIENCES WITH DIFFERENT FORMS OF TRANSPORT

When other tour boat visitors are visiting Glacier Bay, evidence of human presence is generally limited to the other visitors in the bay, and the forms of transport used by those visitors.⁹ Although this report focuses on the effects of cruise ships on other tour boat experiences, survey questions also asked about encounters with other forms of transport. There were two primary reasons for considering the effects of other forms of transport: 1) to set the effect of cruise ships in a context relative to the effects of those other forms, and 2) to determine whether visitors' experiences with multiple forms of transport affect the degree to which those encounters (including encounters with cruise ships) detract from their experiences.

Effects of cruise ships relative to other forms of transport

Tables T-11 to T-14 in chapters VI and VII above summarized the detraction ratings for different forms of transport encountered at Margerie/Grand Pacific glaciers and during the entire trip. Table T-30 shows that for both situations, cruise ships detracted from approximately three times as many other tour boat visitor experiences as the visitor transport with the next highest detraction.

Table T-30. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip

Type of craft	Percent who said craft detracted (somewhat or greatly) from enjoyment of Margerie/Grand Pacific glaciers ¹	Percent who said craft detracted (somewhat or greatly) from enjoyment of Glacier Bay proper ²
Large cruise ships	26.6%	35.3%
Motorized craft other than large cruise ships	7.1%	12.6%
Propeller-driven aircraft	3.6%	8.4%
Helicopters	2.0%	5.2%

¹ These summary data were derived from those presented in Table T-11.

² These summary data were derived from those presented in Table T-13. **Error! Reference source not found..**

Detraction due to cruise ships was higher than other forms of transport in part because cruise ships were encountered by more other tour boat visitors (see Chapter VI). However, even when detraction was calculated only for the respondents who saw each form of transport, cruise ships were the form most likely to detract from other tour boat visitor experiences (see Table T-31).

Table T-31. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip

Type of craft	Percent of respondents who encountered each form of transport that said craft detracted (somewhat or greatly)	
	Detracted from enjoyment of Margerie/Grand Pacific glaciers ¹	Detracted from enjoyment of Glacier Bay proper ²
Large cruise ships	59.5%	46.0%
Motorized craft other than large cruise ships	19.8%	17.8%
Propeller-driven aircraft	33.3%	24.7%
Helicopters	45.3%	44.5%

⁹ Exceptions would be NPS staff or scientific researchers and commercial jetliners at high altitudes.

Tour-Boat Visitor Survey

¹ These summary data were derived from those presented in Table T-12.

² These summary data were derived from those presented in Table T-14.

In sum, cruise ships were the form of mechanized transport that had the greatest detracting effect on the experiences of other tour boat visitors. Whereas other types of craft had some detracting effects, cruise ships: a) were more likely to detract from the experiences of visitors who encountered them and b) were more likely to be encountered than other types of craft (resulting in higher overall detraction rates).

Does the number of cruise ships affect encounters with other forms of transport and ratings of their detraction?

One indirect way in which cruise ships could affect visitor experiences is by altering the number of encounters other tour boat visitors have with other forms of transport. For example, if captains of smaller vessels planned their trips to the tidewater glaciers for days when only one cruise ship visits Glacier Bay, then encounters with those motorized vessels would be higher on 1-cruise ship days. Analyses of the survey data found no evidence of such an indirect effect. None of the measures of encounters differed for 1 and 2-cruise ship days. In addition, there was no evidence that any effects of cruise ships on encounters detracted from other tour boat visitors' experiences -- none of the detraction measures differed for 1 and 2-cruise ship days.

The survey results showed that encounters with other forms of mechanized transport (and their effects on visitor experiences) were not altered by the number of ships in Glacier Bay, and thus, these results should not substantially alter managers' decisions about cruise ship policy. The next section discusses evidence (consistent with Johnson, 1990) that encounters with multiple forms of transport were not cleanly separated in visitors' detraction ratings.

Do encounters with one type of craft affect experiences with other types of craft?

In addition to shifting actual encounters with different types of craft, cruise ships may affect how those experiences with different craft are perceived. More broadly, experiences with one type of craft may affect how other tour boat visitors perceive their experiences with other types of craft. Johnson (1990) discussed evidence for such effects in a 1989 study of Glacier Bay visitors. Understanding the inter-related reactions to different types of craft can help managers more effectively measure and mitigate the impacts of changes in vessel management policy.

The current research program focused on assessing the effects of cruise ships on other tour boat visitor experiences. Some limited additional questions asking about other types of craft were included to provide context for understanding the effects of cruise ships. However, the nature of these questions was only sufficient to support exploratory analyses regarding the possible relationships between encounters with and effects of the different type of craft. These exploratory analyses are discussed below to help managers appreciate the complexity of visitor experiences and to provide researchers with information that may be useful in the development of future surveys.

Relationships between encounters with various forms of transport and ratings of their detraction were assessed by examining the correlations between the variables shown in Table T-32. Measures of encounters with each form of transport (i.e., cruise ships, other motorized vessels, propeller-driven aircraft, and helicopters) were included, as well as measures of the detracting effects of those encounters.

Table T-32. Measures used in analysis of relationships between encounters with various forms of transport and ratings of their detraction

Type of craft	Encounter Measures						Detraction Measures		
	Saw/heard Y/N	Number saw/heard	Hours saw/heard	Heard engine	Heard P.A.	Saw haze	Detract Y/N	Degree detract	Detract scale*
Large cruise ships	X		X	X	X	X	X		X
Motorized craft other than large cruise ships	X	X	X	X	X	X	X	X	
Propeller-driven aircraft	X	X	X	X			X	X	
Helicopters	X	X	X	X			X	X	

*Average of cruise ship detraction scales for each REP item and the rated detraction of cruise ships in Glacier Bay proper.

The results of the correlation analysis showed that in some cases, the detracting effects of encounters were intertwined. Table T-33 includes all 24 significant relationships found by the analyses (i.e., relationships between encounters with one type of craft and detraction measures for a different type of craft). For example, the first correlation shows that detraction due to cruise ships was related to the number of propeller-driven aircraft that other tour boat passengers encountered.

Table T-33. Significant relationships between encounters with one type of craft and detraction measures for a different type of craft: Results of correlation and logistic regression analyses.

Correlation analyses				Logistic regression analyses			
Encounter measure	Detraction measure	<i>r</i>	<i>p</i> -value	Encounter measure	Detraction measure	B*	Chi-Sq <i>p</i> -value
Number prop-driven aircraft encountered	Cruise ship detraction scale	-.163	.037	Encountered watercraft other than cruise ship	Cruise ship detracted Y/N	0.776	.040
Heard helicopter engines	Cruise ship detraction scale	.226	.002	Heard helicopter engines	Cruise ship detracted Y/N	1.286	.012
Encountered helicopters	Cruise ship detraction scale	.197	.006	Encountered helicopters	Cruise ship detracted Y/N	1.180	.036
Hours encountered helicopters	Cruise ship detraction scale	-.265	<.001	Hours encountered helicopters	Cruise ship detracted Y/N	4.737	.024
Number helicopters encountered	Cruise ship detraction scale	-.267	<.001	Number helicopters encountered	Cruise ship detracted Y/N	1.372	.019
Heard prop-driven aircraft engines	Watercraft other than cruise ship detraction	.148	.039	Encountered helicopters	Watercraft other than cruise ship detracted Y/N	1.190	.015
Encountered helicopters	Watercraft other than cruise ship detraction	.220	.002	Hours encountered helicopters	Watercraft other than cruise ship detracted Y/N	1.360	.013
Hours encountered helicopters	Watercraft other than cruise ship detraction	-.195	.008	Number helicopters encountered	Watercraft other than cruise ship detracted Y/N	0.623	.010
Number helicopters encountered	Watercraft other than cruise ship detraction	-.199	.007	Heard helicopter engines	Watercraft other than cruise ship detracted Y/N	0.937	.048
Heard helicopter engines	Watercraft other than cruise ship detraction	-.193	.007	Hours encountered helicopters	Prop-driven aircraft detracted Y/N	1.639	.021
Hours encountered helicopters	Prop-driven aircraft detraction	-.266	.014	Number helicopters encountered	Prop-driven aircraft detracted Y/N	0.694	.015
Number helicopters encountered	Prop-driven aircraft detraction	-.227	.041				
Heard PA from large cruise ship	Helicopter detraction	.387	.035				

*In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

A variety of hypotheses may account for such intertwined relationships. Some visitors may be both more observant of other craft and more likely to say such craft detracted from their experiences, or a disturbing encounter with one type of craft may sensitize them to the presence of other forms of transport. Alternately, visitors might respond to all the detraction measures based on a generalized feeling of how much they were “bothered” by the presence of other visitors, and be either unwilling or unable to clearly separate the effects of different vessels or craft. Future research could be designed to test these different explanations. Because a complete investigation of these relationships was not a focus of the current research, we can say little about the specific ways in which encounters with the various forms of transport affect visitor ratings of detraction. However, there was strong evidence that those encounters do not have independent effects on the rated detraction due to each type of craft.

Although the exploratory analyses discussed in this section do not clearly define the relationships between encounters with and effects of the different type of craft, they can help managers decide whether information designed to mitigate the detracting effects of cruise ships should focus entirely on cruise ships or should also address the effects of other forms of transport. Specifically, if the detracting effects of each form of transport were unrelated to each other, then each effect could be treated independently. However, because the effects are related, mitigation efforts focused on all forms of transport are likely to be more effective.

Because of the limited understanding of the factors that determine other tour boat visitor ratings of the detracting effect of cruise ships, some might argue that the measure should not be used in formulating vessel management policy. A complete understanding of the visitor experience would be ideal. However, it is important to remember that no matter what factors actually led some visitors to report that cruise ships detracted from their experiences, there is every reason to believe that those visitors thought that cruise ships did detract from their experiences. Measuring the prevalence of such detraction is a necessary first step in determining whether it is an issue that merits further study or management action.

XV. SOCIAL VALUE CONFLICT

Reviewers of an earlier draft of this report suggested that the concept of recreational conflict might shed light on the ways cruise ships affect visitor experiences. Because the current research was not conceptualized from this perspective, the measures collected in this study do not map directly onto key variables or concepts used in the conflict approach. However, as described below, several measures that approximate the concepts were available. The findings and discussion below are based on these approximate measures, and thus, are exploratory in nature. Their primary value is to guide the planning of future research that might seek to understand how and why cruise ships affect visitors' experiences (rather than if they do).

Recreational conflict overview

When diverse groups use a common recreation area, conflict between those groups is likely. Interpersonal (or goal interference) conflict arises when a physical encounter with (i.e., hearing and/or seeing) an individual or group interferes with the goals of another individual or group (Jacob & Schreyer 1980). For example, in Glacier Bay proper, individuals who wish to experience nature untouched by humans may experience interpersonal/goal interference conflict when seeing a cruise ship in the otherwise pristine environment of the bay. Recreationists may also experience a second type of conflict – social value conflict occurs between groups who do not share the same norms and/or values, and does not require a physical encounter between the conflicting groups (Ruddell & Gramann 1994). For example, individuals who feel that cruise ships in Glacier Bay are inappropriate may perceive conflict with cruise ships even if they never see a cruise ship during their visits to Glacier Bay proper.

Research examining conflict among recreationists has found that social value conflict occurs not only for individuals who do not encounter a potentially conflicting other group, but can also occur in individuals who encountered the other group. A study by Vaske, Needham, and Cline, Jr. (2007) asked snowmobilers and skiers whether they agreed with the statement “just knowing that skiers (snowmobilers) are in the area bothers me.” Agreement with this statement was used as a measure of social value conflict in individuals who also experienced interpersonal conflict. Findings indicated that a sub-group of individuals who were classified as experiencing interpersonal conflict also experienced social value conflict.¹⁰ In sum, individuals who have encounters with another potentially conflicting group can experience interpersonal conflict and/or social value conflict whereas individuals who do not have physical encounters with another potentially conflicting group can only experience social value conflict.

Understanding the source of conflict can be useful when setting policy intended to reduce such conflict. For example, interpersonal conflicts, those that arise solely from physical encounters, can be addressed by separating user groups through restricted use or zoning (i.e., limiting opportunities for physical encounters). However, these strategies will not reduce social value conflict, which is independent of actual encounters. Education has been suggested as a more effective means to reduce social value conflicts (Vaske et al. 2007). Thus, managers may be better able to mitigate the detracting effects of cruise ships on other tour boat visitors if they know the nature of the conflict (or conflicts) that underlies reported detraction.

¹⁰ Although their methods did not allow this determination, it should be noted that it was possible that some of the people reported as experiencing both interpersonal conflict and social value conflict may have experienced only social value conflict.

Applying the conflict framework to current research

The current research was designed to inform park management of potential changes in the effects of cruise ships associated with the shift from the 1:2 mix of one- versus two-cruise ships in the bay days to every day being a two-cruise ships in the bay day. Accordingly, it provided cruise ship detraction rates only for those other tour boat respondents who saw cruise ships, and was not designed to distinguish whether these detraction effects were due to interpersonal conflict or social value conflict. It was presumed that only the detraction arising from actual interaction with cruise ships (either hearing or seeing) would be affected by the change in policy. Therefore, the primary objective was to determine whether changes in the number of cruise ships in the bay would produce significant changes in: a) the likelihood of encountering cruise ships and b) the likelihood that cruise ships would detract from visitor experiences.

Applying the conflict framework to the current research suggests that for some people, conflict may arise that is not due to physical encounters with cruise ships. As noted above, the current research was not conceptualized using the conflict framework and thus does not have all the necessary data to assess rates of interpersonal conflict and social value conflict among all other tour boat visitors. However, for some visitors, data were collected that approximated some of the key concepts from the conflict approach, and those data were used in these exploratory analyses. Specifically, among visitors who saw cruise ships, data were available that could serve as reasonable operationalizations for: 1) problems/conflicts and 2) social value conflict. For those who did not see cruise ships, only a measure assessing social value conflict was available.

Measure of problem/conflict

Recreational conflict research typically considers a problem or conflict to exist if a person reports a problem with specific behaviors engaged in by another user group. The current research was interested in the effects of cruise ships rather than the behavior of those aboard them. Thus, for analyses of conflict, if a visitor indicated that cruise ships detracted from their trip experience, a problem or conflict was assumed to be inherent in that detraction. If cruise ships did not detract, then no problem or conflict was considered present.

A dichotomous measure of cruise ship detraction based on an aggregated measure of cruise ship effects was developed for other analyses (see Measures of Effect of Cruise Ships on Visitors Experience for description of this measure). Individuals whose scores on the aggregated measure indicated a negative effect of cruise ships on their trip enjoyment were coded as “cruise ships detracting” whereas individuals who reported no effects of cruise ships were coded as “cruise ships did not detract”. The small number of individuals with aggregate scores indicating cruise ships added to their trip enjoyment were excluded. Because only visitors who saw or heard cruise ships were asked cruise ship effect questions, there were no problem/conflict data for people who did not see cruise ships.

As seen in Table T-34, 76% of other tour boat respondents saw or heard cruise ships and of those, 62% reported cruise ships detracted from their trip experience.

Table T-34. Summary of variables related to social value conflict

% of all tour boat visitors who saw/heard cruise ships	76%
% for whom cruise ships detracted of those who saw/heard them	62%
% of all tour boat visitors agreed it is inappropriate for large cruise ships to be in Glacier Bay proper (social value conflict)	36%

Measure of social value conflict

Social value conflict is defined as arising when the values a person holds are in conflict with the values of another individual or group. These value conflicts can exist and result in perceived problems even if the two user groups have no physical contact. Review of the questionnaire suggested that one of the included

opinion items could serve as a reasonable measure of social value conflict between other tour boat passengers and cruise ships in Glacier Bay proper. This item asked respondents' agreement with the statement, "It is inappropriate for large cruise ships to be in Glacier Bay proper." Individuals who indicated that they strongly agreed or agreed with the statement were classified as having a social value conflict with cruise ships in Glacier Bay proper. Individuals who indicated that they were neutral, disagreed, or strongly disagreed were classified as having no social value conflict. Because all respondents completed the opinion measures, social value conflict data were available for all other tour boat respondents.

As can be seen in Table T-34, 36% of all other tour boat respondents agreed that it is inappropriate for large cruise ships to be in Glacier Bay proper suggesting over one-third of other tour boat respondents experience social value conflict with cruise ships in Glacier Bay proper.

Analyses

Within the framework of user conflict, it is possible that cruise ships detracted from the experiences of some tour boat passengers who did not see cruise ships based exclusively on their social value conflict with cruise ships being in Glacier Bay proper. In addition, for tour boat passengers who saw cruise ships and reported that the ships detracted from trip experience, understanding whether that detraction arose from interpersonal conflict, social value conflict, or a mix of the two can help park managers assess whether limiting encounters with cruise ships is likely to reduce conflict and associated detraction. Thus, further analysis of these variables has the potential to: 1) provide an estimate of negative effects of cruise ships due to social value conflict among other tour boat passengers who did not see cruise ships and 2) provide insight into the possible sources of conflict underlying the reported detraction for those who did see cruise ships.

Source of conflict for those who saw/heard cruise ships

A total of 62% of the other tour boat passengers who saw/heard cruise ships indicated that cruise ships detracted from their trip enjoyment. When these individuals are separated by their agreement with "It is inappropriate for large cruise ships to be in Glacier Bay proper", 36% of those who saw/heard cruise ships experienced only interpersonal conflict (see Table T-35).

The methods used in prior social value conflict research allowed the separation of individuals who experienced problems due to their encounters with another user group into those who had social value conflict and those who did not. However, these methods did not provide a means to distinguish if those who experienced problems from encountering another group did so for both interpersonal and social value conflict or for social value conflict only. Thus, per the conflict literature, the remaining 26% would be considered to have experienced a mix of social value conflict and interpersonal conflict. However, it is possible that the detraction effects experienced by these individuals could have been entirely due to social value conflict or to interpersonal conflict.

For those who saw/heard cruise ships but reported no conflict, a small percentage were classified as having social value conflict. However, because these individuals did not report detraction, it is possible that: 1) the level of conflict was insufficient to result in detraction, 2) our opinion item was a less than ideal measure of social value conflict, or 3) there was inconsistency within individuals. Prior research examining social conflict used methods that examined or distinguished the rate of social value conflict among only those users who both encountered another user group and reported effects of the encountered group (Vaske et al. 2007). If they had looked at rates of social value conflict in other groups, it is possible that they would have seen similar patterns to those reported in Table T-35.

Table T-35. Source of conflict for other tour boat respondents

	Did not see/hear cruise ships		Saw/heard cruise ships	
Cruise ships did not detract	100%		38%	
No conflict		48%		33%
Social value conflict only		52%		5%
Cruise ships detracted	0%		62%	
Interpersonal conflict only				36%
Both types of conflict*				26%
Total	100%	100%	100%	100%

Estimating additional detraction effects due to social value conflict

In the current survey, visitors who did not see or hear cruise ships were not asked whether cruise ships in Glacier Bay affected their trip enjoyment. However, the social value conflict literature suggests that some individuals who do not see another user group may still experience negative effects of that group because of differing social values. Using the information in Table T-34 and Table T-35, we can estimate the percentage of other tour boat respondents who did not see cruise ships but would be expected to have negative reactions due to social value conflict.

Our proxy measure for social value conflict indicated that 52% of other tour boat respondents who did not see cruise ships agreed that it was inappropriate for large cruise ships to be in Glacier Bay proper (see Table T-35). As 24% of other tour boat passengers did not encounter cruise ships (100% - 76% per Table T-34), it would be expected that up to 13% ($24\% \times 52\%$) of other tour boat passengers who did not see cruise ships in Glacier Bay proper would report negative effects of cruise ships on their trip experience from simply knowing that the ships are in the bay (i.e., because of social value conflict).

Discussion

The survey focused primarily on effects of cruise ships on those visitors who encountered ships, and did not include measures traditionally used to measure the different sources of user conflict. Thus, analyses examining social value conflict among other tour boat passengers were exploratory and are presented for park managers' consideration in light of current and future visitor research.

More than one-third (36%) of other tour boat passengers reported social value conflict with cruise ships in Glacier Bay proper. Only day-boat users reported a higher rate of conflict (39%). Many other tour boat passengers visit Glacier Bay on smaller cruise ships that have been marketed as providing eco-cruises and more intimate experiences relative to large cruise ships. Thus, the relatively higher rate of social value conflict was consistent with the values of people attracted to these cruises.

The fact that some other tour boat passengers believe it is inappropriate for large cruise ships to be in Glacier Bay is undoubtedly not surprising to park management. The idea that this belief can result in cruise ships detracting from park visitors' experiences even when they do not encounter cruise ships during the trip may be more novel.

The concept of social value conflict also suggests that people who never go to Glacier Bay proper can experience negative effects of cruise ships because they hold values incongruent with cruise ships being in the bay. If managers make use of social value conflict when considering the impacts of cruise ships, a question naturally arises concerning the population in which such conflicts should be considered. Is the

relevant population park visitors? Park visitors and AK residents? All U.S. residents? All North Americans? The world? In light of such complex decisions, managers might reasonably elect to focus on the experiences of park visitors, recognizing that those experiences may be influenced by a variety of factors including social value conflict.

Managers can still benefit from the insight that there are people whose experiences are negatively affected by cruise ships independent of whether they physically encounter one. This insight suggests that vessel limits or zoning efforts that reduce encounters will not have a directly proportional effect on detraction rates (because some visitors' experiences will be negatively affected as long as any cruise ships are allowed in Glacier Bay, whether or not they encounter one). Research to better understand the specific value conflicts for these visitors may help managers to determine whether other mitigation efforts, such as educational programs, would mitigate the negative effects of cruise ships on their experiences. For example, if people believe that large cruise ships are inappropriate in Glacier Bay proper because they pollute the environment, then providing information about the air and water standards/monitoring for cruise ships that are much more rigorous than most Alaskan coastal villages may help to reduce the conflict. However, if individuals believe that large cruise ships are simply incongruent with the park aesthetic, then educational programs are unlikely to be effective. Qualitative information from interviews with visitors found evidence of both beliefs, but their prevalence in visitors who reported detraction due to cruise ships is unknown.

XVI. SUMMARY AND IMPLICATIONS

The Tour Boat Mail Survey was designed to address the following three research objectives:

4. How do cruise ships affect, if at all, tour boat visitors' experiences in Glacier Bay proper?
 - a. Which dimensions of tour boat visitor experiences in Glacier Bay proper, if any, do cruise ships affect?
 - b. If cruise ships affect tour boat visitor experiences in Glacier Bay proper, which features of cruise ships have effects?
5. What are estimated effects for tour boat visitors under the Record of Decision maximum use level of 2 cruise ships per day, every day?
6. How do the effects of cruise ships on tour boat visitor experiences in Glacier Bay proper compare to the effects of other forms of mechanized transport?

This section addresses each of these objectives. However, the third objective will not be discussed independently. Rather, when the effects of cruise ships on the experiences of tour boat passengers (either current effects or estimated effects under the maximum use level) are discussed, the analogous effects of other forms of mechanized transport will be compared and contrasted.

Objective 1: How do cruise ships affect, if at all, tour boat visitors' experiences in Glacier Bay proper?

Recalled encounters with cruise ships

It is difficult to imagine how cruise ships could have a direct effect on tour boat visitor experiences if visitors did not remember seeing them. Accordingly, the maximum possible extent of such direct effects is indicated by the proportion of visitors who report seeing cruise ships. In this survey, 76.4% of tour boat visitors reported seeing or hearing large cruise ships. In comparison, motorized water craft other than large cruise ships were heard or seen by a similar percentage of tour boat visitors (71.3%) and fewer tour boat visitors reported seeing or hearing propeller-driven aircraft and helicopters (33.3% and 10.9%, respectively). For more detail regarding encounters on the entire trip see Chapter VI.)

Qualitative interviews conducted in 2007 suggested that cruise ships might have particularly strong effects on experiences at focal attractions in Glacier Bay. Perhaps the foremost attraction for most visitors is the terminus of Tarr Inlet where the Margerie and Grand Pacific glaciers are visible. In this survey, 24.9% of all tour boat visitors (44.0% of those who said they visited Margerie/Grand Pacific glaciers) reported seeing or hearing large cruise ships at that location. In comparison, 20.1% of all tour boat visitors reported seeing or hearing motorized water craft other than large cruise ships at the glaciers. (For more detail regarding encounters at Margerie and Grand Pacific glaciers see Chapter V.)

These results suggest that if every encounter with a cruise ship had a strong negative effect on tour boat visitors (which it did not), about three-quarters of tour boat visitors (76.4%) would experience such negative effects at some point during their trip whereas 24.9% would be negatively affected by encounters at Margerie/Grand Pacific glacier. The effects of encounters with other cruise ships that were actually reported by passengers on other tour boats are discussed in the following section.

General and specific effects of cruise ships

The survey was designed to measure a wide range of effects that encounters with cruise ships might have on tour boat visitors' experiences. Some of these effects were very general whereas others were much more specific. For example, the question asking tour boat visitors how seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper was an extremely general measure. More specific measures asked about effects of encounters on visitor enjoyment of Margerie/Grand Pacific glaciers, effects of encounters on particular trip experiences, and effects of particular aspects of encounters (e.g., engine sounds, public address system sound, and haze) with cruise ships.

The more specific measures were included for two different reasons. First, past studies have found that general measures tend to be less sensitive to trip experiences (e.g., seeing or hearing cruise ships) than more specific measures. And second, because more specific information about the aspects of encounters (e.g., location, engine sounds, public address system sound, and haze) that have the greatest effects on trip experiences has the potential to help managers set policy that mitigates negative effects.

Throughout earlier sections of this report, percentages were often calculated and reported for various sub-populations of tour boat visitors. For example, the percentage of tour boat visitors reporting that cruise ships detracted from their general enjoyment of Glacier Bay was calculated based on the sub-population of tour boat visitors who saw or heard cruise ships. In this section, results are generally reported as percentages of all tour boat visitors. This approach allows direct comparison between the results of different questions, thus enabling readers to better judge the magnitude of the various effects of cruise ships and effects of other motorized craft.

Detraction from general enjoyment and from particular trip experiences

Figure T-77 shows the percentage of tour boat visitors who reported that encounters with large cruise ships detracted from their experiences in any of a number of ways. The largest percentage (37.3%) reported that encounters detracted from their general enjoyment of Glacier Bay. However, slightly smaller percentages (33.9% to 36.7%) reported detraction from particular trip experiences that were related to wilderness experience as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). Just under half of those who saw or heard cruise ships felt that the cruise ships detracted from particular trip experiences or from their general enjoyment.

These quantitative findings showed some consistency with the findings of the qualitative interviews with Glacier Bay visitors conducted in both 2007 and 2008. For example, the most common effects of cruise ships mentioned by interviewed visitors were disruptions of "the wilderness experience" or a "sense of solitude." At the same time, many tour boat passengers reported no detraction due to cruise ships. More than half of them may have felt similar to the private vessel passenger interviewed in 2008 who said, "There's a lot of water, it's a big country, and the cruise boats here are spread out. It's not like other places where they go by day in and day out. It's actually a reprieve."

Although the qualitative report concluded that nearly all participants felt that other vessels (including cruise ships) had no significant effects on their experiences, the mail survey found that almost 40% of tour boat visitors reported that encounters with cruise ships detracted from their general enjoyment of Glacier Bay. Further examination of the mail survey data, reported below under "Measures of overall trip satisfaction", suggests that the results of the two surveys were not as discrepant as this reported incidence of detraction would indicate.

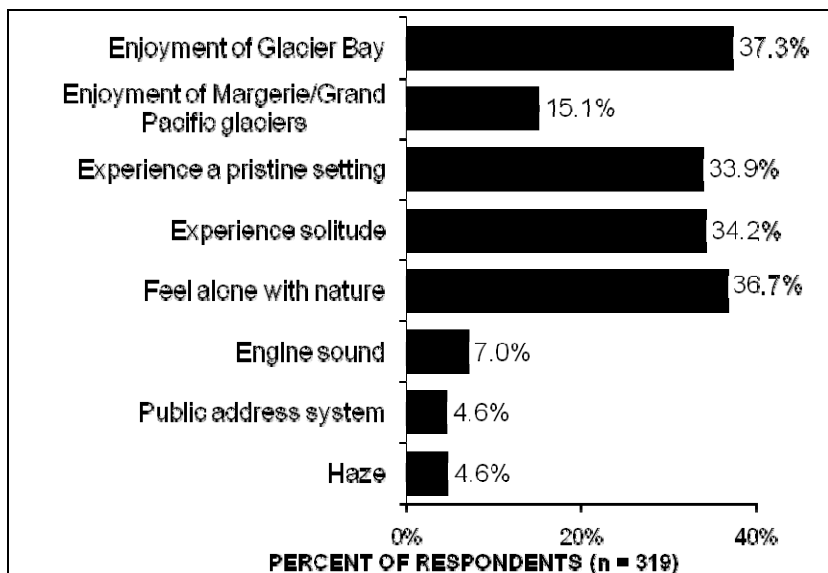


Figure T-77. Percent of all tour boat respondents who reported detraction effects due to large cruise ships

Figure T-78 shows that 12.6% of tour boat visitors reported that seeing or hearing motorized craft other than cruise ships detracted from their general enjoyment of Glacier Bay. This percentage was approximately one-third of the 37.3% who reported detraction due to seeing or hearing cruise ships. Two additional findings suggested that encounters with cruise ships were perceived more negatively than encounters with other vessels. First, for those tour boat visitors who encountered each of the different types of craft, detraction rates were higher for cruise ships than for motorized craft other than cruise ships (46.0% vs. 17.8%, respectively). Second, of tour boat visitors seeing or hearing the craft, 11.9% reported that seeing or hearing cruise ships “detracted greatly” from their enjoyment whereas only one tour boat visitor reported that motorized craft other than cruise ships “detracted greatly”.

Figure T-79 reports the findings for helicopters and propeller-driven aircraft. The overall percentages of tour boat visitors reporting general detraction due to helicopters and propeller-driven aircraft (5.2% and 8.4%, respectively) were substantially lower than the percentages for cruise ships, most likely because encounters with aircraft were relatively rare – helicopters were seen or heard by only 11.7% of tour boat visitors and 33.8% saw or heard propeller-driven aircraft. However, helicopters were nearly as likely as cruise ships to detract from visitors’ experiences, and propeller-driven aircraft were more likely to detract from experiences than watercraft other than cruise ships. For those tour boat visitors who encountered each of the different types of craft, detraction rates for cruise ships, helicopters, and propeller-driven aircraft were 46.0%, 44.5%, and 24.7%, respectively. Helicopters were also relatively likely to “detract greatly” from passengers’ experiences. The percentage of passengers who said helicopters “detracted greatly” was 9.6%, compared to 11.9% for cruise ships.

Tour-Boat Visitor Survey

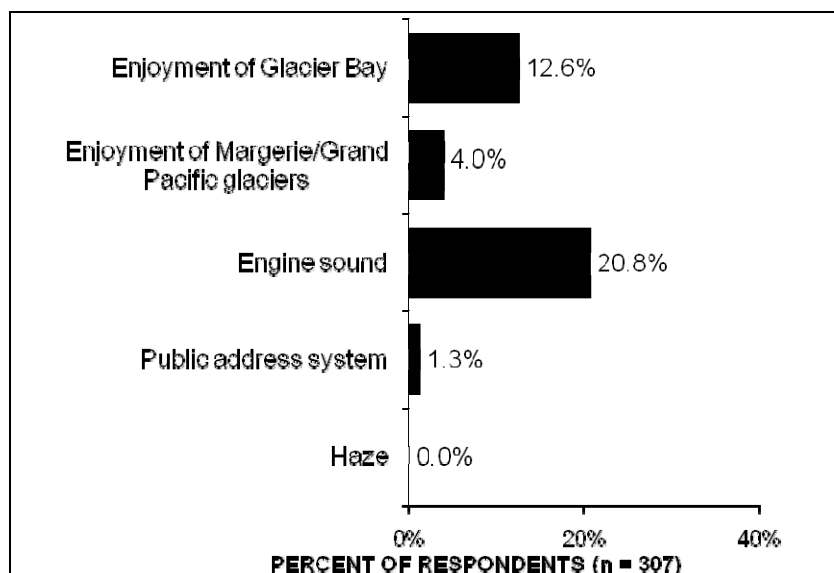


Figure T-78. Percent of all tour boat respondents who reported detraction effects due to motorized water craft other than large cruise ships

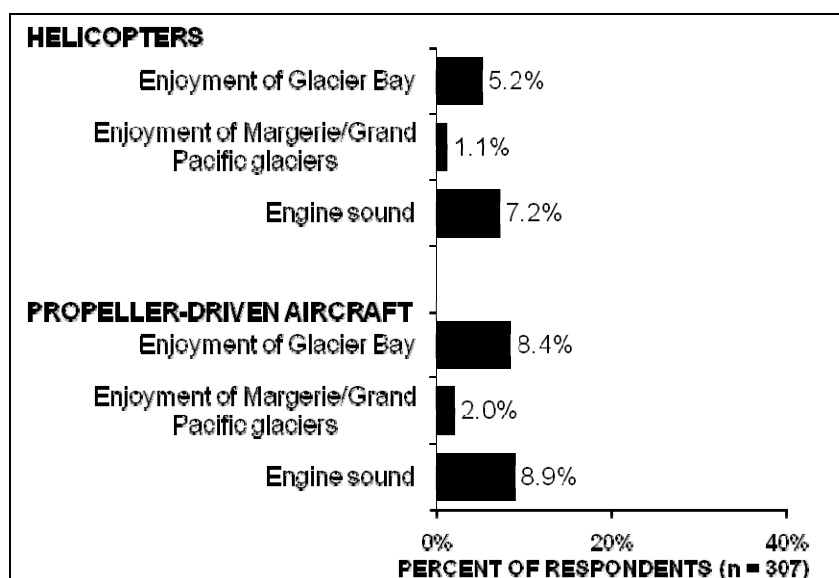


Figure T-79. Percent of all tour boat respondents who reported detraction effects due to aircraft

Detraction at particular sites

A considerably smaller percentage of tour boat visitors reported that cruise ships detracted from their experiences at Margerie and Grand Pacific glaciers than reported detraction from their general enjoyment of Glacier Bay (15.1% vs. 37.3%; see Figure T-77). However, a much smaller percentage of tour boat visitors encountered large cruise ships at Margerie and Grand Pacific glaciers than encountered large cruise ships during the course of their entire trip (23.5% vs. 76.4%, respectively). Comparing the detraction rate for visitors who encountered cruise ships at Margerie and Grand Pacific glaciers with that for visitors who encountered cruise ships anywhere in Glacier Bay proper shows that cruise ship encounters at the glaciers were considerably more likely to detract from tour boat visitors' experiences (59.5%) than encounters that occurred anywhere in Glacier Bay (46.0%). In other words, when visitors did

encounter cruise ships at Margerie and Grand Pacific glaciers, those encounters were more likely to detract from their experiences than encounters at other places in Glacier Bay.

Seeing or hearing large cruise ships at Margerie and Grand Pacific glaciers detracted from almost four times as many tour boat visitors' trips as seeing or hearing motorized craft other than cruise ships (15.1% vs. 4.0%). Two additional findings suggested that encounters with cruise ships were perceived more negatively. First, for those tour boat visitors who encountered each of the different types of craft, detraction rates were higher for cruise ships than for motorized craft other than cruise ships (59.5% vs. 19.8%, respectively). Second, of tour boat visitors seeing or hearing the craft at the glaciers, 20.1% (4.7% of all respondents) reported that seeing or hearing cruise ships "Detracted greatly" from their enjoyment of Margerie and Grand Pacific glaciers whereas only 2.2% (0.3% of all respondents) reported that encounters with motorized craft other than cruise ships "Detracted greatly".

Figure T-79 reports the findings for helicopters and propeller-driven aircraft at Margerie and Grand Pacific glaciers. Detraction effects for both types of aircraft at the glaciers were lower than cruise ships or motorized water craft other than cruise ships. Very few tour boat visitors heard or saw propeller-driven aircraft or helicopters at Margerie and Grand Pacific glaciers. Of those who did, one third (33.3%) of those who encountered propeller-driven aircraft reported that they detracted from their enjoyment of Margerie and Grand Pacific glaciers, and 45.3% of those who saw helicopters reported such detraction. However, the reliability of these values is low given that only 18 tour boat visitors reported seeing or hearing propeller-driven airplanes and only 7 reported encounters with helicopters.

Detraction due to specific aspects of encounters

Although engine sound was the aspect of encounters with other craft most likely to detract from the general trip experiences of tour boat visitors, only 7.0% of tour boat visitors reported detraction due to the sound of cruise ship engines. The engine sounds from both and helicopters and propeller-driven aircraft were approximately as likely to detract from experiences (detracted from 8.9% and 7.2% of trips, respectively). The engine sound of motorized water craft other than cruise ships detracted from more tour boat visitors' experiences (20.8%) in part because they were heard relatively often (21.0% heard motorized water craft other than cruise ships, second only to propeller-driven aircraft at 26.2%) and also because such sounds also had a very high rate of detraction (99.0% of those who heard engine sounds of motorized water craft other than cruise ships reported that the sounds detracted from their trip enjoyment).

The sound of public address systems (PA) from cruise ships detracted from the general trip experiences of 4.6% of tour boat visitors. Detraction due to the PA systems of motorized water craft other than cruise ships was reported less often (1.3%). Relatively few tour boat visitors heard PA systems from cruise ships or from motorized water craft other than cruise ships (4.8% and 4.6%, respectively). Of the tour boat visitors who heard PA systems from cruise ships or from motorized water craft other than cruise ships, much higher percentages reported detraction due to the cruise ship PA systems (95.1% vs. 28.4%, respectively).

Haze from large cruise ship exhaust was reported to detract from general trip experiences by 4.6% of tour boat visitors. Few tour boat visitors (5.3%) said they saw such haze, but of those, 87.6% reported detraction from their experience. None of the sampled tour boat visitors reported that they saw haze from the exhaust of motorized water craft other than cruise ships.

These findings regarding engine sounds, PA sounds, and haze were generally consistent with the findings of the qualitative interviews with Glacier Bay visitors. The feature of cruise ships that elicited the most comments from interviewed visitors was their vast size, not sounds or haze. Accordingly, the effects of sounds and haze are considerably smaller in magnitude than the general levels of detraction associated with cruise ships.

Measures of overall trip satisfaction

In the mail survey of tour boat passengers, the most general measures that could have been affected by seeing or hearing other cruise ships were two questions assessing visitors' overall ratings of their trip experiences (see Chapter IX). On the simplest of these measures, 94.1% of visitors rated their time in Glacier Bay as "Extremely good" or "Very good" and only two (out of 315) tour boat respondents rated their time as "Poor" or "Very poor". The second question showed that 93.7% of tour boat visitors said they were very likely to recommend that others visit Glacier Bay on similar trips. Only 2.1% of tour boat visitors said they would be somewhat or very unlikely to recommend visiting Glacier Bay.

Neither of these general measures of tour boat respondents' experience quality was affected by the number of cruise ships in the bay on the days passengers visited. When asked specifically how their experiences with cruise ships (or lack thereof) affected their recommendations to others, more than half of tour boat visitors said that there was no effect (56.5%). Almost a third of tour boat visitors (32.8%) reported that their likelihood of recommending a visit was decreased by their experiences with cruise ships, but those reports were not more common on days when two cruise ships were in the bay, and many of those tour boat visitors still said that they were very likely to recommend that others visit Glacier Bay on a tour boat.

These results were consistent with established findings that general measures of satisfaction are insensitive to the effects of specific visitor experiences. Visitors commonly rationalize specific negative aspects of their experiences when making more global assessments. Thus, it should not be surprising that 37% of tour boat visitors reported that cruise ships detracted from their general trip enjoyment while over 90% of the same visitors rated their time in Glacier Bay as very or extremely good.

The qualitative report suggested similar discrepancies when asking visitors about their trip experiences at different levels of specificity. In the qualitative report, nearly all the interviewed visitors reported that other vessels (including cruise ships) did not have "significant" effects on their experiences. However, the most commonly reported effects of cruise ships were disruptions of the "wilderness experience", and a closely-related feeling of surreal incongruity when encountering a ship. Thus, the findings of the qualitative report were relatively consistent with the mail survey results. Perhaps the effects of similar rationalizing processes were present in both the qualitative and mail survey results.

Rated detraction due to cruise ships and encounters with other craft

Prior research in Glacier Bay (Johnson, 1990) suggested that the rated effects of cruise ships on visitor experiences were affected by encounters with other forms of transport. The exploratory analyses conducted on the mail survey of tour boat visitors were consistent with this prior research, showing that in some cases, the detracting effects of encounters with different kinds of craft were intertwined. For example, the detraction due to cruise ships was related to encounters with propeller-driven aircraft. Clearly, encounters with each type of craft do not have effects only on the rated detraction due to that specific type of craft.

Because a complete investigation of these relationships was not a focus of the current research, little can be said about the specific ways in which encounters with the various forms of transport affect visitor ratings of detraction. Based on this limited understanding, some might argue that visitor ratings of the detracting effect of cruise ships should not be used in formulating vessel management policy. A complete understanding of the visitor experience would be ideal. However, it is important to remember that no matter what factors actually led some visitors to report that cruise ships detracted from their experiences, there is every reason to believe that those visitors thought that cruise ships did detract from their experiences. Measuring the prevalence of such detraction is a necessary first step in determining whether it is an issue that merits further study or management action.

Implications

The findings from the mail survey of tour boat visitors do not lead to a set of simple implications for management. While general measures of trip satisfaction suggested little to no evidence that cruise ships affected tour boat visitors' trips, measures asking about the effect of cruise ships on specific aspects of trip experiences indicated that cruise ships affected tour boat visitors' trips in a variety of ways. Inconsistent findings between general and specific measures have been found in other visitor research. Such findings suggest that events can have meaningful and significant effects on specific aspects of visitors' trips and yet, visitors can still report minimal effects when considering their trip more generally.

When both general and specific measures find comparable effects, implications for management policy are relatively simple compared to the inconsistent results found in this survey. Questions of policy cannot be settled by simply asking whether most tour boat visitors were generally satisfied with their trips. Managers must also consider whether all the measured effects of cruise ship encounters are acceptable in light of the conditions they seek to provide tour boat visitors. In order to make this decision, managers must have a clear understanding of the type of experience(s) that they wish to (and are in some cases required to) provide. While researchers can provide data and visitors can provide opinions, it is up to managers to decide whether or not the effects of cruise ships described in this report are appropriate and acceptable.

Objective 2: What are estimated effects for tour boat visitors under the Record of Decision maximum use level of 2 cruise ships per day, every day?

Because some tour boat visitors spent multiple days visiting Glacier Bay proper on trips that spanned a mix of 1- and 2-cruise ships in the bay days, a simple comparison of one- versus two-cruise ships in the bay days was not appropriate. The average number of cruise ships in the bay per day was calculated for each respondent. This measure resulted in only three values (1, 1.5, and 2 cruise ships) so a comparison between these three groups was done to examine effects of the presence of 2-cruise ships in the bay. It should be noted that all respondents who experienced 1.5 cruise ships in the bay per day spent multiple days in the bay whereas the majority of respondents who averaged 1 or 2 cruise ships in the bay spent a single day in the bay. Because the average number of cruise ships in the bay did not take into account the amount of time respondents spent in the bay, when analyses found statistically significant relationships with the average number of cruise ships, additional analyses were done that included the number of days spent in Glacier Bay proper. For measures that continued to show significant relationships, the responses of the tour boat visitors who averaged 2 cruise ships in the bay provide a means of predicting survey responses if current conditions were changed to 2-cruise ships in the bay every day.

Of the questions in the mail survey asking about tour boat visitors' experiences and their evaluations of those experiences, three showed statistically significant relationships with the number of cruise ships in the bay per day:

1. Tour boat visitors' likelihood of reporting that one or more other water or air craft were present at Margerie/Grand Pacific glaciers would be expected to increase from 57.3% to 70.6%.
2. The number of large cruise ships that other tour boat visitors reported hearing or seeing at Margerie/Grand Pacific glaciers would be expected to increase from 0.49 to 0.61.
3. The number of motorized watercraft other than large cruise ships that other tour boat visitors reported hearing or seeing at Margerie/Grand Pacific glaciers would be expected to increase from 0.63 to 0.89.

Clearly, the first measure was related to the second and third, and it was not surprising that the number of cruise ships encountered at Margerie/Grand Pacific glaciers would increase with an increase in the number of cruise ships in the bay. However, it is less clear why the number of encounters with watercraft other

Tour-Boat Visitor Survey

than cruise ships should increase. One possibility is that passengers who encounter more cruise ships may be generally sensitized to the presence of other vessels and more likely to report seeing or hearing them. Such an explanation that postulates a change in sensitivity seems more plausible than an actual increase in the number of watercraft other than cruise ships on two-cruise ships in the bay days.

Implications

In sum, the results of this survey suggest that increasing cruise ship use to two ships per day would produce relatively few changes in the experiences of tour boat visitors, and none of those changes would be expected to increase the proportion of all tour boat visitors who report negative effects of cruise ships.

Report 4
A Survey of Backcountry Visitors

Jane E. Swanson
Mark E. Vande Kamp

VOLUME GUIDE

Volume 1

Executive Summary

General Introduction

A Survey of Cruise Ship Passengers

A Survey of Day-Boat Visitors

A Survey of Tour-Boat Visitors

You are here → A Survey of Backcountry Visitors

Volume 2

A Survey of Private Vessel Visitors

A Survey of Charter-Boat Visitors

Qualitative Interviews with Park Visitors: Summer 2008

Qualitative Interviews with Experience Gatekeepers

Appendices (includes questionnaires and general comments)

TABLE OF CONTENTS

LIST OF FIGURES.....	IV
LIST OF TABLES.....	VII
I. INTRODUCTION AND METHOD.....	1
GOALS OF THE BACKCOUNTRY (OVERNIGHT, NON-MOTORIZED) MAIL SURVEY	1
SURVEY DESIGN AND QUESTIONNAIRE DEVELOPMENT.....	1
SAMPLING AND VISITOR CONTACT PROCEDURES.....	2
ADMINISTRATION OF MAILINGS	3
STATISTICAL CONSIDERATIONS.....	3
LIMITATIONS.....	3
<i>Non-response</i>	4
ACCURACY OF THE SAMPLE	5
ESTIMATES FOR CURRENT AND MAXIMUM ALLOWED SEASONAL USE DAYS	6
CONVENTIONS FOLLOWED IN THIS REPORT	6
II. VISITOR PROFILE	7
HIGHLIGHTS.....	7
GENDER AND AGE	8
EDUCATION	9
RESIDENCE	9
ETHNICITY AND RACE	10
NUMBER OF TRIPS TO GLACIER BAY NATIONAL PARK IN LAST 10 YEARS.....	11
III. TRIP CHARACTERISTICS.....	13
HIGHLIGHTS.....	13
PARTY SIZE	14
PARTY TYPE	14
LENGTH OF STAY	15
PLANNED TO TAKE THE PARK DAY TOUR BOAT	17
ACTIVITIES ENGAGED IN ON TRIP TO GLACIER BAY NATIONAL PARK	18
SEE OR HEAR LARGE CRUISE SHIPS.....	19
PLANNED TRIP TO MINIMIZE SEEING OR HEARING OTHER VESSELS.....	19
IMPORTANCE OF DIFFERENT TRIP EXPERIENCES	20
VISITED MARGERIE AND GRAND PACIFIC GLACIERS	24
OTHER TIDEWATER GLACIER VISITED	24
WEATHER	25
IV. ASSESSING EFFECTS OF PRESENCE OF 2-CRUISE SHIPS IN THE BAY.....	28
V. ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS	30
HIGHLIGHTS.....	30
VISITED MARGERIE AND GRAND PACIFIC GLACIERS	32
SAW OTHER CRAFT AT MARGERIE AND GRAND PACIFIC GLACIERS	32
NUMBER OF DIFFERENT TYPES OF CRAFT SEEN AT MARGERIE AND GRAND PACIFIC GLACIERS	33
VI. ENCOUNTERS: ENTIRE TRIP.....	36
HIGHLIGHTS.....	36
SAW OR HEARD LARGE CRUISE SHIPS	39
NUMBER OF DAYS SAW OR HEARD LARGE CRUISE SHIPS	39
TOTAL LENGTH OF TIME SAW OR HEARD LARGE CRUISE SHIPS	40
LENGTH OF TIME SAW OR HEARD LARGE CRUISE SHIPS ON DAY SAW OR HEARD MOST CRUISE SHIPS	41
COMPARISON OF LARGE CRUISE SHIP AND OTHER MOTORIZED CRAFT ENCOUNTERS	42
MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS: LENGTH OF TIME AND NUMBER HEARD OR SEEN	43
PROPELLER-DRIVEN AIRPLANES: LENGTH OF TIME AND NUMBER HEARD OR SEEN	44

Backcountry Visitor Survey

HELICOPTERS: LENGTH OF TIME AND NUMBER HEARD OR SEEN	45
VII. EXPERIENCES WITH HAZE, PUBLIC ADDRESS SYSTEMS, AND ENGINE SOUNDS.....	46
HIGHLIGHTS	46
EXPERIENCES WITH HAZE.....	49
EXPERIENCES WITH PUBLIC ADDRESS SYSTEMS	50
EXPERIENCES WITH ENGINE SOUNDS.....	52
VIII. EFFECTS OF ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS.....	56
HIGHLIGHTS	56
PRESENCE OF DIFFERENT TYPES OF CRAFT AFFECTED ENJOYMENT OF MARGERIE AND GRAND PACIFIC GLACIERS	57
IX. EFFECTS OF ENCOUNTERS: ENTIRE TRIP.....	62
HIGHLIGHTS	62
EFFECT OF ENCOUNTERS OF DIFFERENT TYPES OF CRAFT ON ENJOYMENT OF GLACIER BAY PROPER.....	64
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON DIFFERENT TRIP EXPERIENCES	65
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON VIEWING LAND ANIMALS	70
EFFECT OF ENCOUNTERS WITH LARGE CRUISE SHIPS ON VIEWING MARINE ANIMALS	71
FUTURE RECOMMENDATIONS TO VISIT GLACIER BAY.....	72
OVERALL RATING OF TIME SPENT BOATING/CRUISING IN GLACIER BAY PROPER	74
X. OPINIONS REGARDING CRUISE SHIPS IN GLACIER BAY PROPER.....	76
HIGHLIGHTS	76
AGREEMENT WITH “LARGE CRUISE SHIPS IN GLACIER BAY PROPER ARE MAJESTIC.”	77
AGREEMENT WITH “LARGE CRUISE SHIPS PROVIDED A SENSE OF SCALE WHEN VIEWING SCENERY IN GLACIER BAY.”	77
AGREEMENT WITH “LARGE CRUISE SHIPS ARE A GOOD WAY FOR A LARGE NUMBER OF PEOPLE TO VISIT GLACIER BAY PROPER.	78
AGREEMENT WITH “IT IS INAPPROPRIATE FOR LARGE CRUISE SHIPS TO BE IN GLACIER BAY PROPER.”	78
OPINION SCALE.....	79
XI. LENGTH OF EXPOSURE EFFECTS ON VISITOR EXPERIENCE.....	80
XII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS.....	81
CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS MEASURED.....	81
MEASURES OF EFFECT OF CRUISE SHIPS ON VISITOR EXPERIENCE.....	81
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF CRUISE SHIP ENCOUNTERS AND THE EFFECT OF CRUISE SHIPS	82
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF CRUISE SHIP ENCOUNTERS AND THE LIKELIHOOD THAT CRUISE SHIPS DETRACT FROM TRIP ENJOYMENT	84
<i>Predicting for whom cruise ships detracted from trip enjoyment</i>	<i>85</i>
SUMMARY	85
XIII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM VISITOR CHARACTERISTICS	86
CHARACTERISTICS OF BACKCOUNTRY VISITORS MEASURED	86
MEASURES OF EFFECT OF CRUISE SHIPS ON VISITOR EXPERIENCE.....	86
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF BACKCOUNTRY VISITORS AND THE EFFECT OF CRUISE SHIPS	87
INDIVIDUAL RELATIONSHIPS BETWEEN CHARACTERISTICS OF BACKCOUNTRY VISITORS AND THE LIKELIHOOD THAT CRUISE SHIPS DETRACT FROM TRIP ENJOYMENT	88
<i>Predicting for whom cruise ships detracted from trip enjoyment</i>	<i>89</i>
SUMMARY	89
XIV. EXPERIENCES WITH DIFFERENT FORMS OF TRANSPORT	91

EFFECTS OF CRUISE SHIPS RELATIVE TO OTHER FORMS OF TRANSPORT	91
DOES THE NUMBER OF CRUISE SHIPS AFFECT ENCOUNTERS WITH OTHER FORMS OF TRANSPORT AND RATINGS OF THEIR DETRACTION?	92
DO ENCOUNTERS WITH ONE TYPE OF CRAFT AFFECT EXPERIENCES WITH OTHER TYPES OF CRAFT?	92
XV. SOCIAL VALUE CONFLICT	96
RECREATIONAL CONFLICT OVERVIEW.....	96
APPLYING THE CONFLICT FRAMEWORK TO CURRENT RESEARCH	97
<i>Measure of problem/conflict</i>	97
<i>Measure of social value conflict</i>	97
ANALYSES	98
<i>Source of conflict for those who saw/heard cruise ships</i>	98
<i>Estimating additional detraction effects due to social value conflict.</i>	100
DISCUSSION	100
XI. SUMMARY AND IMPLICATIONS.....	102
OBJECTIVE 1: HOW DO CRUISE SHIPS AFFECT, IF AT ALL, BACKCOUNTRY VISITORS' EXPERIENCES IN GLACIER BAY PROPER?	102
<i>Recalled encounters with cruise ships</i>	102
<i>General and specific effects of cruise ships</i>	103
<i>Measures of overall trip satisfaction</i>	107
<i>Rated detraction due to cruise ships and encounters with other craft</i>	107
<i>Implications</i>	108
OBJECTIVE 2: WHAT ARE ESTIMATED EFFECTS FOR BACKCOUNTRY VISITORS UNDER THE RECORD OF DECISION MAXIMUM USE LEVEL OF 2 CRUISE SHIPS PER DAY, EVERY DAY?	108

List of Figures

Figure B-1. Respondent's Age.....	8
Figure B-2. Respondent's Gender.....	8
Figure B-3. Highest level of formal education completed by respondents.....	9
Figure B-4. Residence location.....	10
Figure B-5. Ethnicity and Race of Respondents	11
Figure B-6. First trip to GLBA	12
Figure B-7. Number of trips to GLBA in last 10 years.....	12
Figure B-8. Party size	14
Figure B-9. Type of party	15
Figure B-10. Number of nights planned to stayed in backcountry	16
Figure B-11. Number of nights stayed in backcountry	16
Figure B-12. Number of nights stayed overnight in the park	17
Figure B-13. Planned to take the park day tour boat.....	17
Figure B-14. Activities engaged in on trip to Glacier Bay National Park	18
Figure B-15. See or hear large cruise ships	19
Figure B-16. Planned trip to minimize seeing or hearing other vessels.....	20
Figure B-17. Planned trip to minimize encounters with different types of vessels	20
Figure B-18. Percent of respondents who visited Margerie and Grand Pacific glaciers	24
Figure B-19. Other tidewater glaciers visited	25
Figure B-20. Percent of respondents who experienced different kinds of weather	26
Figure B-21. Trip weather experience categories based on responses to each kind of weather experienced by a visitor	27
Figure B-22. Percent of respondents who visited Margerie and Grand Pacific glaciers	32
Figure B-23. Percent of respondents who saw other craft at Margerie and Grand Pacific glaciers.....	32
Figure B-24. Number of large cruise ships seen at Margerie and Grand Pacific glaciers	33
Figure B-25. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers	33
Figure B-26. Number of kayaks seen at Margerie and Grand Pacific glaciers	34
Figure B-27. Number of propeller-driven airplanes seen at Margerie and Grand Pacific glaciers.....	34
Figure B-28. Number of helicopters seen at Margerie and Grand Pacific glaciers	35
Figure B-29. Percent of respondents who saw or heard large cruise ships	39
Figure B-30. Number of days respondents saw cruise ships in Glacier Bay proper.....	39
Figure B-31. Total number of hours saw or heard large cruise ships in Glacier Bay proper: Current conditions.....	41

Figure B-32. Number of hours saw or heard large cruise ships on day saw or heard most cruise ships	41
Figure B-33. Number of hours motorized craft other than large cruise ships were heard or seen	43
Figure B-34. Number of motorized craft other than large cruise ships heard or seen.....	43
Figure B-35. Length of time propeller-driven airplanes were heard or seen.....	44
Figure B-36. Number of propeller-driven airplanes heard or seen.....	44
Figure B-37. Number of hours helicopters were heard or seen.....	45
Figure B-38. Number of helicopters heard or seen	45
Figure B-39. Percent of respondents who experienced haze from different types of vessels	49
Figure B-40. Effect of experience of haze from large cruise ships on trip enjoyment.....	49
Figure B-41. Effect of experience of haze from unidentified vessels on trip enjoyment.....	50
Figure B-42. Percent of respondents who experiences public address systems from different types of vessels.....	50
Figure B-43. Effect of large cruise ship public address systems on trip enjoyment.....	51
Figure B-44. Effect of small cruise ship or tour boat public address systems on trip enjoyment	51
Figure B-45. Effect of unidentified public address systems on trip enjoyment	52
Figure B-46. Experiences with engine sounds from watercraft	52
Figure B-47. Experience with engine sounds from aircraft.....	53
Figure B-48. Effect of hearing large cruise ship engines on trip enjoyment.....	53
Figure B-49. Effect of hearing small cruise ship or tour boat engines on trip enjoyment.....	54
Figure B-50. Effect of hearing propeller-driven airplane engines on trip enjoyment	54
Figure B-51. Effect of helicopter engines on trip enjoyment	55
Figure B-52. Effect of seeing large cruise ships at Margerie and Grand Pacific glaciers	59
Figure B-53. Effect of seeing motorized water craft other than large cruise ships at Margerie and Grand Pacific glaciers	59
Figure B-54. Effect of seeing kayaks at Margerie and Grand Pacific glaciers.....	60
Figure B-55. Effect of seeing propeller-driven airplanes at Margerie and Grand Pacific glaciers	60
Figure B-56. Effect of seeing helicopters at Margerie and Grand Pacific glaciers	61
Figure B-57. Average importance ratings by average effect ratings for each type of trip experience .	69
Figure B-58. Average importance ratings by average effect ratings for each trip experience dimension	70
Figure B-59. Effect of large cruise ships on viewing land animals.....	71
Figure B-60. Effect of large cruise ships on viewing marine animals.....	72
Figure B-61. Likelihood of recommending a friend or family member kayak/hike Glacier Bay	74
Figure B-62. Overall rating of time spent boating/cruising in Glacier Bay proper.....	75
Figure B-63. Agreement with “Large cruise ships in Glacier Bay proper are majestic”	77

Backcountry Visitor Survey

Figure B-64. Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay”	77
Figure B-65. Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper”	78
Figure B-66. Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper”	78
Figure B-67. Distribution of opinion scale scores	79
Figure B-68. Percent of all backcountry respondents who reported detraction effects due to large cruise ships.....	104
Figure B-69. Percent of all backcountry respondents who reported detraction effects due to motorized water craft other than large cruise ships.....	105
Figure B-70. Percent of all backcountry respondents who reported detraction effects due to aircraft	105

List of Tables

Table B-1. Visitation and survey participation by sampling periods	3
Table B-2. Summary of non-response analyses for Backcountry (Overnight, Non-motorized) Mail Survey.....	4
Table B-3. Weighted and unweighted findings of key variables.....	5
Table B-4. Internal consistency measure (Cronbach's alpha) for each importance dimension.....	21
Table B-5. Importance ratings for trip experience scales	23
Table B-6. Trip weather experience categories	26
Table B-7. Effects of number of visit days there were 2-cruise ships in bay: Alone and when controlling for nights spent in backcountry.....	29
Table B-8. Percent of backcountry respondents who encountered different kinds of craft.....	42
Table B-9. Number of hours different kinds of craft were heard or seen.....	42
Table B-10. Effects of different types of craft for backcountry respondents who visited Margerie and Grand Pacific glaciers	58
Table B-11. Effects of different types of craft for backcountry respondents who saw/heard craft at Margerie and Grand Pacific glaciers	58
Table B-12. Effect of different craft on enjoyment of Glacier Bay proper: Percent of all respondents	65
Table B-13. Effect of different craft on enjoyment of Glacier Bay proper: Percent who saw craft.....	65
Table B-14. Internal consistency measure (Cronbach's alpha) for each dimension	67
Table B-15. Effects of large cruise ships on trip experiences	68
Table B-16. Effect of experience with different craft on future recommendations.....	74
Table B-17. Correlations among agreement with opinion statements.....	79
Table B-18. Significant correlations between total number of hours heard or saw cruise ships and different measures of effects of cruise ships	80
Table B-19. Characteristics of cruise ships used as predictors in regression analyses.....	81
Table B-20. Characteristics of cruise ships that were significant predictors of effects of cruise ships	83
Table B-21. Summary of model for effects of cruise ships measured by cruise ship effect score for backcountry visitors	83
Table B-22. Predicted cruise ship effect scores for the four possible scenarios.....	84

Backcountry Visitor Survey

Table B-23. Model summary for predicting likelihood that cruise ships detracted from trip enjoyment	85
Table B-24. Visitor characteristics used as predictors in regression analyses	86
Table B-25. Backcountry visitor characteristics that were significant predictors of effects of cruise ships	87
Table B-26. Summary of model for effects of cruise ships measured by cruise ship effect score for backcountry visitors	87
Table B-27. Predicted cruise ship effect score for potential scenarios	88
Table B-28. Model summary for predicting likelihood that cruise ships detracted from trip enjoyment based on backcountry visitor characteristics.....	89
Table B-29. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip.....	91
Table B-30. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip.....	92
Table B-31. Measures used in analysis of relationships between encounters with various forms of transport and ratings of their detraction	93
Table B-32. Significant relationships between encounters with one type of craft and detraction measures for a different type of craft: Results of correlation and logistic regression analyses.	94
Table B-33. Summary of variables related to social value conflict	97
Table B-34. Source of conflict for backcountry respondents	100

I. INTRODUCTION AND METHOD

Glacier Bay National Park and Preserve (GLBA) is a large park and most visitors experience the park in watercraft. The managers of GLBA are pursuing a research initiative arising from the vessel management planning process designed to assess whether cruise ships in Glacier Bay are affecting the environment or visitor experiences (See General Introduction for more background). This study is part of the research program that examined whether cruise ships affect visitor experiences.

All overnight non-motorized visitors are required to obtain backcountry permits; hence these overnight non-motorized visitors will be referred to as backcountry users in this report. Backcountry use has been declining in GLBA since the mid-1990's, and was the smallest user group surveyed in this project. In 2006, there were 714 independent backcountry visitors and an additional 139 visitors on guided (commercial) backcountry trips. Although this user group is relatively small, the backcountry users often kayak the bay expecting a wilderness experience although much of the bay is not legally designated wilderness. Thus, cruise ships and other motorized craft may have significant effects on these users' experiences. To determine the effects, if any, of other cruise ships in Glacier Bay on the quality of visitor experience, a mail survey of backcountry visitors was conducted.

Goals of the backcountry (overnight, non-motorized) mail survey

The Backcountry (overnight, non-motorized) Mail Survey was designed to address the research questions identified for the research program as a whole.

1. How do cruise ships affect, if at all, backcountry visitors' experiences in Glacier Bay proper?
 - a. Which dimensions of backcountry visitor experiences in Glacier Bay proper, if any, do cruise ships affect?
 - b. If cruise ships affect backcountry visitor experiences in Glacier Bay proper, which features of cruise ships have effects?
2. What are estimated effects for backcountry visitors under the Record of Decision maximum use level of 2 cruise ships per day, every day?
3. How do effects of cruise ships on backcountry visitor experiences in Glacier Bay proper compare to the effects of other forms of mechanized transport?

Survey design and questionnaire development

The survey procedures and questionnaires were developed in conjunction with staff at GLBA. Survey questions were written based upon through discussions with NPS staff, review of related literature, and qualitative interviews with park visitors during the summer of 2007 (see General Intro for details). To the extent possible, the questionnaires for each park user group included the same questions to allow comparison among the different groups.

The survey included an on-site questionnaire and a mail questionnaire (See Appendices F and I). The on-site questionnaire consisted of eight questions that asked about general demographics, travelling party characteristics, how many nights they planned to stay in the backcountry and if they planned to take the park day tour boat as part of this kayaking trip. (Additionally, backcountry visitors were asked to provide their name and address to receive the mail questionnaire.) This descriptive information was used in determining whether the final sample of completed mail surveys was representative of overnight, non-motorized backcountry visitors (i.e., whether non-response had biased the sample).

Backcountry Visitor Survey

The mail questionnaire included questions about trip experiences, encounters with cruise ships and other motorized craft (in all areas of Glacier Bay, and specifically, at Margerie and Grand Pacific Glaciers), effects of cruise ships and other motorized craft on different aspects of the trip, attitudes about cruise ships in GLBA, and general demographics.

Drafts of these questionnaires were peer-reviewed and revised based on feedback. The revised questionnaires were reviewed and approved by the Office of Management and Budgeting under the full review process.

Sampling and visitor contact procedures

The results of the Backcountry Mail Survey represent the population of all people visiting Glacier Bay proper on a backcountry permit between June 27, 2008 and August 31, 2008 who are over the age of 17.

All visitors entering on a backcountry permit are required to complete an orientation at the Visitor Information Station (VIS). The VIS conducted backcountry orientations at scheduled times each day. The fieldworker stationed at the VIS contacted backcountry visitors either before or after the scheduled orientation. Face-to-face contacts were made by project personnel to increase participation in the survey. Initially, backcountry contacts were planned for 47 days during the sampling period, and sampling occurred on these days through August 4. During this period, 12 days had one-cruise ship in the bay and 14 days had two-cruise ships in the bay. Because the number of contacts was lower than expected to obtain the desired sample size, beginning August 5 contacts were made every day through August 30. Between August 5 and August 30, 7 days had one-cruise ship in the bay and 19 days had two-cruise ships in the bay. By the conclusion of the sampling period, backcountry visitors were contacted on 19 one-cruise ship in the bay days and 33 two-cruise ships in the bay days. With 36.5% of the days having one-cruise ship in the bay, the sample of days approximated the 1:2 ratio (33% vs. 66%) of one versus two-cruise ships in the bay days.

During the entire sampling period, as many backcountry visitors over the age of 18 as possible were contacted on each day. The survey worker introduced the survey and asked the person to participate. When a visitor refused to participate, the survey worker logged the time, party size, and gender of the refusing individual. The on-site questionnaire took approximately 3 minutes to complete (see Appendix F). Respondents completed the on-site questionnaire and returned it to the survey worker. The survey worker thanked the person for his or her participation.

The survey worker found some parties were firm that only certain people in their party should participate although all party members were eligible if they were age 18 or older. Because he had not gone through the script asking each of these individuals to participate, these other party members were not recorded as refusals, although they should have been. Because they were not included as refusals, there was no way to determine if individuals in these parties differed from individuals in parties where more people participated.

Of the 249 backcountry users contacted, 236 (94.8%) agreed to participate in the mail survey. Despite increased sampling days, the final sample size was smaller than planned. Analyses indicated that a) the increased sampling efforts did result in a greater percentage of backcountry visitors being contacted during the second sampling period (see Table B-1) and b) 29% of all backcountry visitors agreed to participate in the survey. Provided that this sample is representative of the population of backcountry users, the primary effect of a smaller sample is less accuracy (e.g., increased confidence intervals) in the results. Representativeness is assessed below in the Limitations section under non-response. The section "Accuracy of the Sample" discusses the implications of the changes in sampling and the findings of the non-response analyses on the estimates provided by this survey.

Table B-1. Visitation and survey participation by sampling periods

Sampling period	Park visitation data	Survey participation	
		N	% of actual visitors
June 29 – July 31	510	125	25%
August 1 – August 31	292	111	38%
June 29 – August 31	802	236	29%

Administration of mailings

Mailings were administered by employees of the Protected Area Social Research Unit (PASRU) in Seattle, Washington. The names and addresses from the contact sheets were entered by the survey worker and sent electronically to the PASRU where they were compiled into a database. This database served as the basis for administering the mailings. All visitors who provided a name and address were mailed a questionnaire, a map of GLBA, and a cover letter from the PASRU. Respondents were instructed to complete the questionnaire and return it by mail in the postage-paid envelopes. As a follow-up, all respondents were sent a thank you/reminder letter about one week after they received the questionnaire. Non-respondents received a second reminder letter and an additional copy of the questionnaire about 14 days after the first reminder letter. For those who did not respond after the second reminder, a third reminder letter was sent about 14 days after the second reminder letter. This multi-phased approach is the recommended technique to maximize response rates (Dillman 2000). Of the 236 people who agreed to participate in the mail survey, 3 did not provide addresses and 5 were returned due to incorrect or out-of-date addresses. The final response rate was 69.3%, with 158 of 236 questionnaires completed and entered in the data file.

Statistical considerations

Consistent with convention, statistical significance was set at the **.05 level** for analyses included in this report. Statistical tests with *p*-values equal to or less than .05 are interpreted as indicating effects that are reliable or real (there is a probability of 5 percent or less that the observed effects are due to chance alone). Although the analyses highlight statistically significant effects, they do not reveal whether effects have important practical implications. Some effects that fall just short of the .05 significance level may have large practical implications while other effects with high statistical significance may have no practical implications. Thus, it is important to consider both the statistical significance and the practical implications of these data.

Limitations

The Backcountry (Overnight, Non-motorized) Mail Survey has several general limitations that should be kept in mind when interpreting the data. 1) In all surveys, it is assumed that respondents provide accurate and honest answers to the questions asked. 2) The data represent visitor attitudes, opinions, and evaluations of their experience at a particular point in time (i.e., the time of the survey) and people's attitudes, opinions, and experience evaluations are dynamic so changes can occur at any time. 3) Statistical inferences can only be made for the subset of GLBA visitors who visited Glacier Bay proper on backcountry permits. In addition, there are other limitations noted in the body of the report that are due to the manner in which individual questions were interpreted. Finally, there are limitations that revolve around the issue of non-response (i.e., possible bias in the sample due to differences between the visitors who completed the questionnaires and those who didn't). Potential limitations associated with non-response are discussed below.

Non-response

There were two points at which visitors could elect not to participate in the survey. The first point was when the fieldworker approached them, introduced the study, and asked them to participate. The second point was when visitors who received the mail survey chose whether to complete and return it. Because decisions whether to participate are unlikely to be random, the survey responses of visitors who agree to participate may differ from those who do not. In that case, the sample data will not accurately represent the population. Such inaccuracy is said to be the result of non-response bias.

Potential non-response bias is generally assessed by comparing respondents to non-respondents for all known characteristics. In this survey, visitors who completed the on-site questionnaire but failed to return the mail questionnaire were more fully described than visitors who refused to participate on-site (and provided no information beyond what the survey worker could observe). The rate of on-site refusals was lower than anticipated (5.2% vs. 10.0%) so the potential for non-response bias was minimal. Accordingly, only one set of non-response analyses were conducted, one to determine whether visitors who were sent the mail questionnaire and failed to return it differed from visitors who returned the questionnaire.

A variety of data from the on-site questionnaire provided an opportunity for the use of statistical tests to identify differences between respondents and non-respondents to the mail questionnaire. Specifically, possible differences were assessed using Chi-square tests for independence or *t*-tests to determine whether response rates were independent of a particular visitor characteristic (using a .05 significance level). The visitor characteristics that were used in assessing possible non-response bias were party size, type of personal group, how many nights they planned to stay in the backcountry in Glacier Bay proper, gender, age, location of residence, and whether they took the day-boat to or from a drop-off location.

Statistically significant differences in response rates were found for one of the seven characteristics listed above. This finding is reported in Table B-2.

Table B-2. Summary of non-response analyses for Backcountry (Overnight, Non-motorized) Mail Survey.

Characteristic	Statistical Result	Description of finding
Age	$t(223) = -2.32, p = .021$	Respondents who returned the mail questionnaire were older than respondents who did not return the mail questionnaire ($M_s = 42.7$ vs. 38.6 , respectively).

Because it was possible that backcountry visitor's experiences of Glacier Bay proper differed based on age, key dependent measures of people's experiences with cruise ships were selected and a comparison of actual findings with those weighted to correct for the non-response were made. The key dependent measures were 1) whether they saw large cruise ships during their trip, 2) how seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper, 3) how the presence of large cruise ships affected their enjoyment of Margerie/Grand Pacific glaciers, and 4) Overall rating of time spent boating in Glacier Bay proper. Table B-3 summarizes the unweighted and weighted findings for these variables. As can be seen, the largest difference observed between weighted and non-weighted findings was 3 percentage points (see italics in Table B-3). Given the small differences on these key variables, the difference in response rates observed were deemed unlikely to bias the findings and conclusions of the backcountry visitor survey.

Table B-3. Weighted and unweighted findings of key variables.

Variable/ Response option	Findings (not weighted)	Weighted for ... Age
Saw large cruise ships		
No	15.9	16.4
Don't Know	0.0	0.0
Yes	84.1	83.6
How seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper		
Did not see	16.5	17.0
Detracted greatly	22.2	22.7
Detracted somewhat	44.3	44.2
No effect	15.8	14.9
Added somewhat	1.3	1.3
Added greatly	0.0	0.0
How the presence of large cruise ships affected their enjoyment of Margerie/Grand Pacific glaciers		
Did not see	16.7	17.4
Detracted greatly	16.7	16.3
Detracted somewhat	38.9	42.1
No effect	16.7	13.7
Added somewhat	11.1	10.4
Added greatly	0.0	0.0
Overall rating of time spent boating in Glacier Bay proper		
Extremely poor	0.0	0.0
Very poor	0.0	0.0
Poor	0.7	0.6
Good	9.2	7.6
Very good	34.0	37.0
Extremely good	56.2	54.8

Accuracy of the sample

Assuming a random sample and questions of the yes/no type in which the true occurrences of these values in the population are 50%/50%, the data from the larger sample from the contact sheet (i.e., 236 respondents) can be generalized to the population with a 95 percent assurance that the obtained or observed percentages to any item will vary no more than $\pm 5.5\%$. Assuming a random sample and questions of the yes/no type in which the true occurrences of these values in the population are 50%/50%, the data from the smaller sample from the mail survey (i.e., 158 respondents) can be generalized to the population of people selected to represent their party that use the corridor with a 95 percent assurance that the obtained or observed percentages to any item will vary no more than $\pm 7.1\%$.

Subject to the limitations stated previously, the authors generally believe that the data are representative of persons over the age of 17 who visited Glacier Bay proper with backcountry permits during the time of

the survey. This confidence is based on the sample size, the fact that deviations from the sampling plan were relatively minor, and that corrections for differences in response rates were small.

Estimates for current and maximum allowed seasonal use days

Cruise ship use level during the 2008 peak season was 153 seasonal use days (a.k.a. current conditions). This level of use corresponds to a 1:2 ratio of 1-cruise-ship in the bay days and 2-cruise-ships in the bay days. This ratio held true during the 2008 sampling period. As analyses suggested that the backcountry visitors sample was representative of backcountry visitors during the 2008 peak season, the best estimates for current conditions (153 seasonal use days) were observed effects for all respondents to the survey.

The maximum allowed under the Record of Decision is two cruise ships entering the bay every day. Because backcountry visitors spent multiple days visiting Glacier Bay proper and the 1:2 ratio of 1- and 2-cruise ships in the bay days were fairly evenly distributed throughout the season, there was not a group of backcountry visitors that experienced only 2-cruise ships in the bay days over the range of days people spent in the park. Regression models provide a means to predict levels of a particular variable under the 2-cruise ships in the bay scenario. Thus, if regression analyses found significant relationships between a measure of 2-cruise ships in the bay days and an effect, the regression equation was used to predict expected conditions under the maximum allowed conditions of 2-cruise ships in the bay every day. If the regression analyses found no significant effect, for a measure of 2-cruise ships in the bay, then it was assumed that there would be no significant change when increasing cruise ship use levels to the maximum-allowed conditions of all 2-cruise ships in the bay days. The maximum allowed estimate in these cases was the observed effect for all respondents (i.e., same as current conditions).

Comparisons between current conditions and the maximum allowed were made on key variables. It should be noted that differences, if any, between current conditions (66% are 2-cruise ship days) and the maximum allowed (100% 2-cruise ship days) will be smaller than differences between 1- and 2-cruise ships in the bay days (0% and 100% 2-cruise ship days, respectively). Be that as it may, park managers will need to assess whether the observed differences in rates are 1) practically meaningful and 2) acceptable.

Conventions followed in this report

As mentioned previously, an on-site questionnaire and a mail questionnaire were used to collect the data presented in this report. These questionnaires are included in this report (see Appendices F and I), and it is recommended that they be reviewed before reading the body of this report.

In the body of this report, each question is presented as it appeared on the questionnaire, and corresponding graphs, tables, or analyses follow it. The specific survey instrument and question used to collect the data reported in each chart are noted in the chart titles. The number of respondents (n) whose data are represented in each chart is also reported, generally at the bottom of the chart.

When a chart reports data for a subset of respondents (*c.f. Figure B-17. Planned trip to minimize encounters with different types of vessels*), a note describes the sub-sample included in the chart.

Missing data for up to 10 percent of respondents to a particular question are generally not considered likely to alter the interpretation of that question. Throughout this report, few questions had more than 10 percent missing data. Exceptions are noted in the text and charts.

It is neither possible nor desirable that this report describes all possible analyses of the data collected by the survey, or even all analyses that are potentially of interest to park managers. However, some analyses that may be of interest are briefly noted throughout this report, and described as potential future analyses.

II. VISITOR PROFILE

Backcountry (overnight, non-motorized) visitors were asked a variety of demographic questions that are used here to describe or provide a profile of such visitors. In this section, each question is presented along with the findings in chart format. Highlights of this section are below.

Highlights

- Overnight backcountry visitors were fairly evenly distributed between age 18 and 75. About 40% were between age 25 and 39. The average age of overnight backcountry visitors was 41.3 years. Overnight backcountry visitors were more likely to be male (58.2%) than female (41.8%).
- Overnight backcountry visitors were highly educated with 57.3% of them having graduate or professional training and the average highest number of years of education being 17.9 (equivalent to a master's degree).
- Most overnight backcountry visitors were non-Alaskan U.S. residents (71.2%). Alaskan residents comprised 16.1% of overnight backcountry visitors followed by non-U.S. residents (12.7%).
- The vast majority of overnight backcountry visitors reported being White (96.7%) followed by multi-racial (2.6%). Hispanic ethnicity was reported by 2.5% of overnight backcountry visitors.
- For 73.6% of overnight backcountry visitors, this trip was their first to Glacier Bay National Park. About 10% of overnight backcountry visitors have taken 4 or more trips to GLBA in the last 10 years.

Gender and age

Contact Sheet

3. What year were you born? 19 ____

7. Are you: ☐ FEMALE ☐ MALE

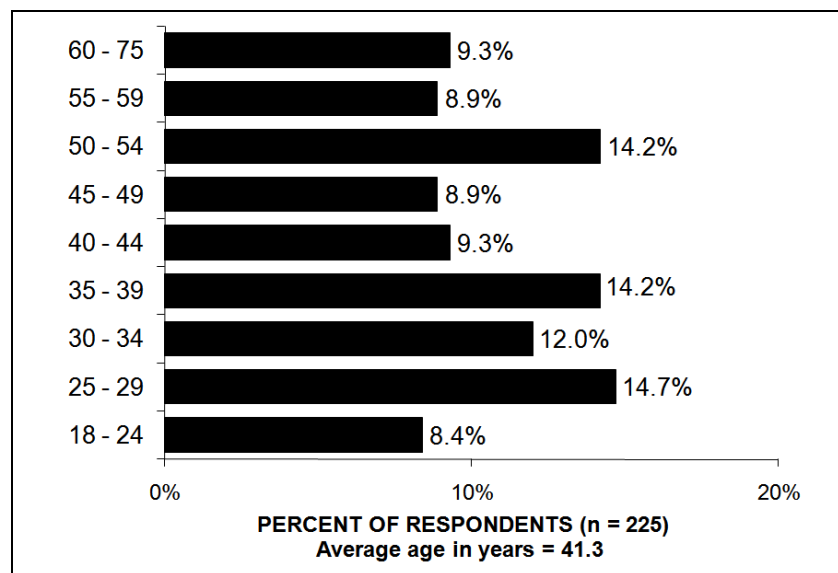


Figure B-1. Respondent's Age

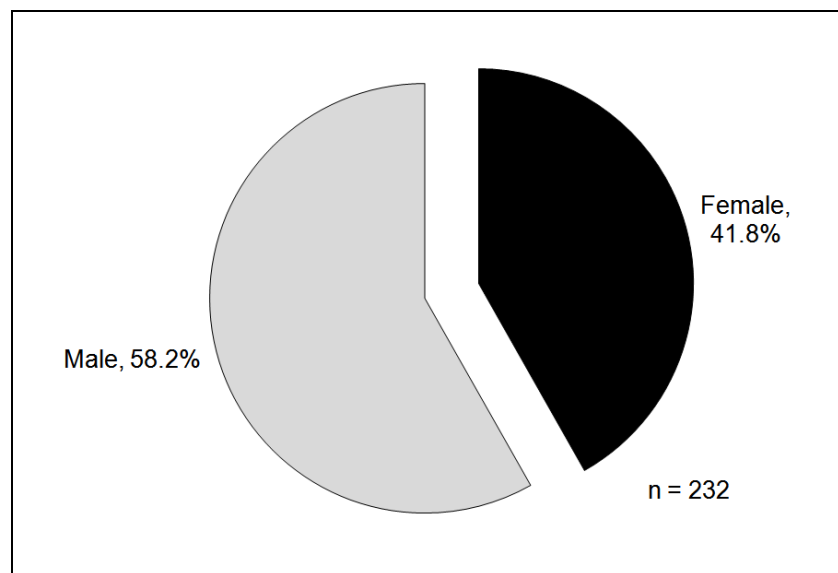


Figure B-2. Respondent's Gender

Education

Mail questionnaire

24. What is the highest level of formal schooling you have completed? *(Circle the appropriate number.)*

1 2 3 4 5 6 7 8 9 10 11 12	13 14 15 16	17 18 19 20 21 22 23 24+
(Elementary thru High School)	(College/Vocational)	(Graduate/Professional)

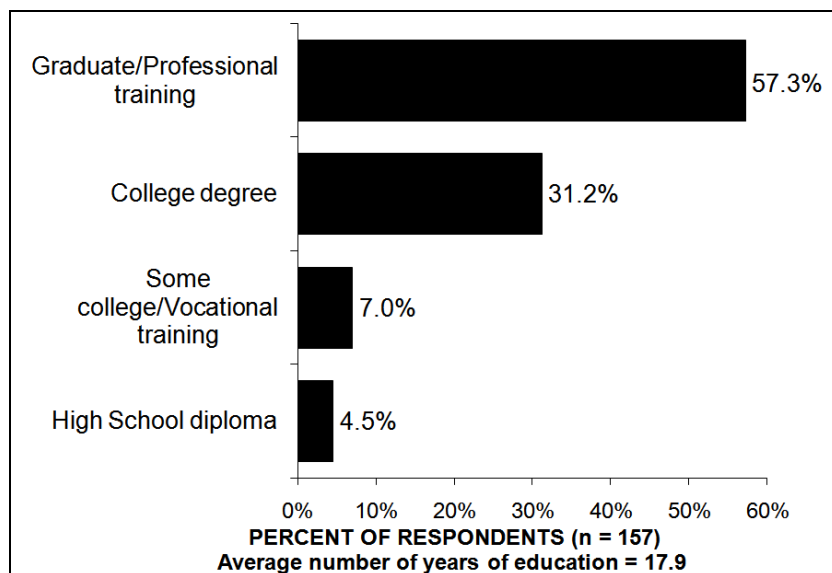


Figure B-3. Highest level of formal education completed by respondents

Residence

Contact Sheet

8. What is your home Zip or Postal Code? *(If you live outside of the United States, please write the name of your country.)*

Backcountry Visitor Survey

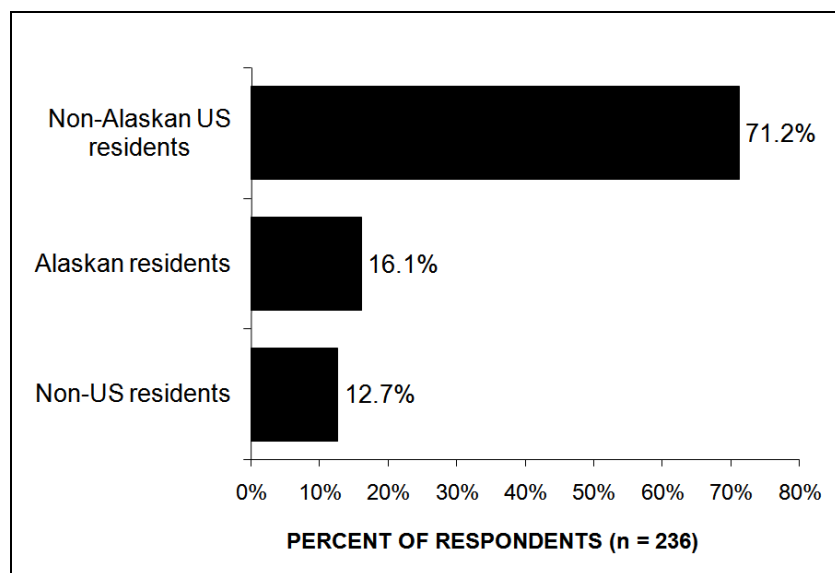


Figure B-4. Residence location

Ethnicity and race

Mail Survey

25. Are you Hispanic or Latino?

- ☐ YES – Hispanic or Latino
- ☐ NO – Not Hispanic or Latino

26. What is your race? (Check one or more races to indicate what you consider yourself to be)

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or other Pacific Islander
- ☐ White

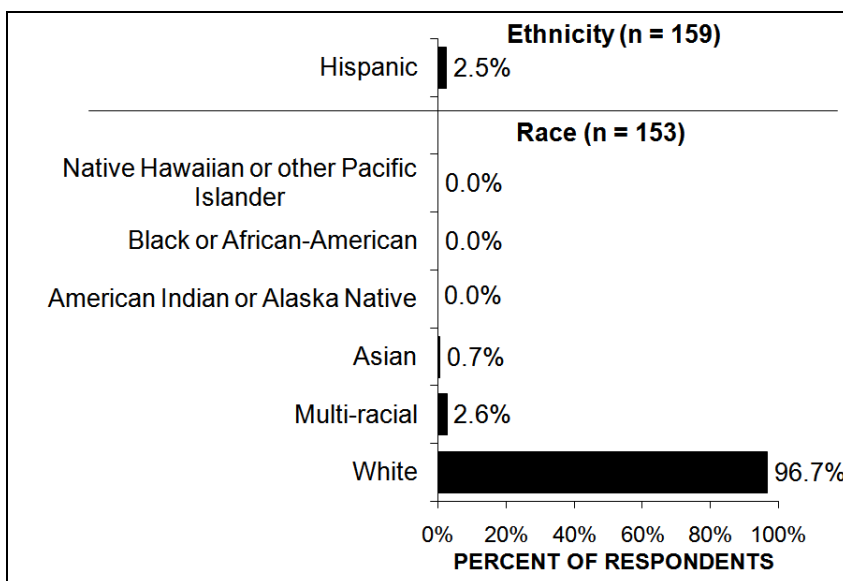


Figure B-5. Ethnicity and Race of Respondents

Number of trips to Glacier Bay National Park in last 10 years

Mail Survey

1. Was the trip during which you were contacted your first trip to Glacier Bay National Park and Preserve?

- ☐ Yes → GO TO QUESTION 2
- ☐ No → 1a. **Including the trip during which you were contacted**, how many times have you visited Glacier Bay National Park and Preserve in the last 10 years?

_____ NUMBER OF VISITS TO GLACIER BAY NPP IN LAST 10 YEARS

Backcountry Visitor Survey

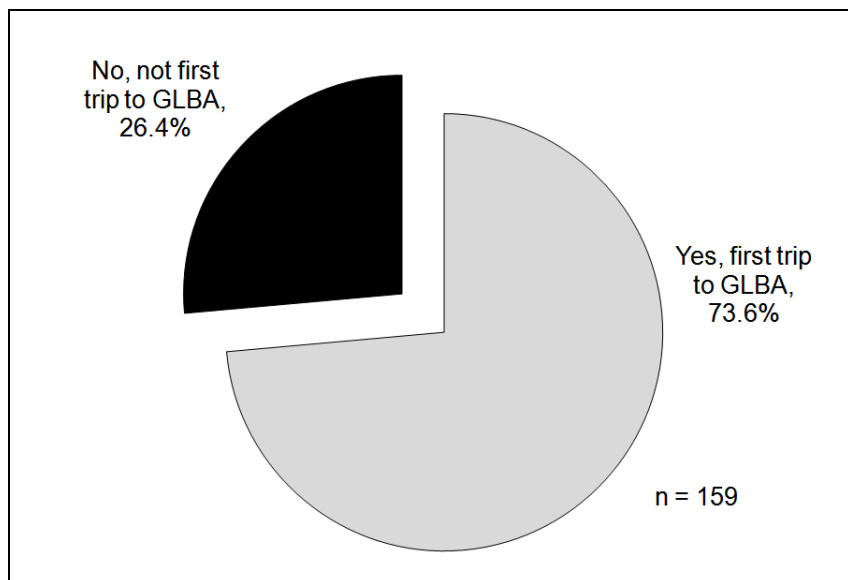


Figure B-6. First trip to GLBA

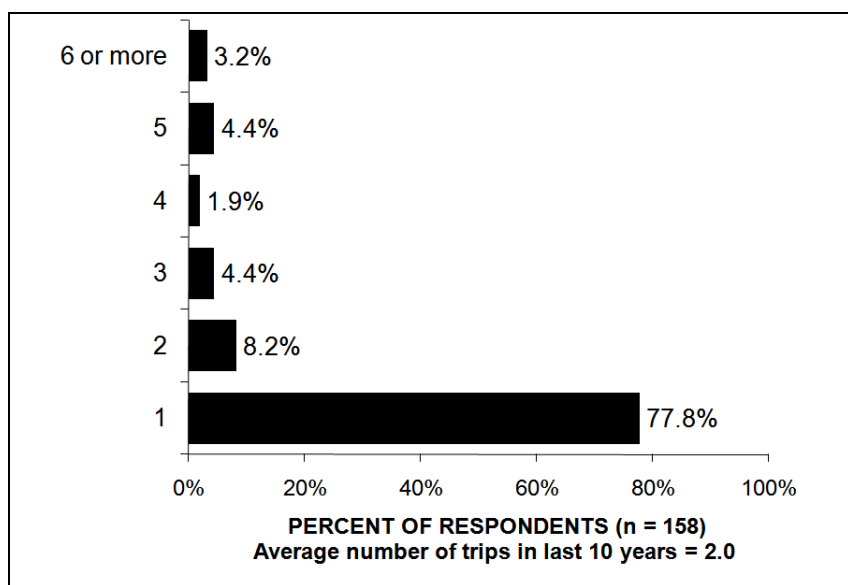


Figure B-7. Number of trips to GLBA in last 10 years

III. TRIP CHARACTERISTICS

Backcountry (overnight, non-motorized) visitors were asked a variety of questions about their trip that were used here to describe or provide a profile of such visitors. In this section, each question is presented along with the findings in chart format. Highlights of this section are below.

Highlights

- Over half (51.7%) of overnight backcountry visitors' parties consisted of two people and the average party size was 3.3 people. Overnight backcountry visitors were most frequently travelling with family (41.9%) followed by travelling with friends (27.4%).
- Although on average backcountry respondents planned to stay 6.0 nights in the backcountry, overnight backcountry visitors actually spent 5.6 nights. The most frequent number of nights spent in the backcountry was three (21.4%). Almost 20% of overnight backcountry visitors spent 8 or more nights in the backcountry and 5.7% spent one night.
- Over half (56.3%) of backcountry respondents stayed overnight within park boundaries. Of those who stayed overnight, 34.6% spent one night and 35.4% spent two nights. About 5% spent five or more nights in the park.
- Almost every backcountry respondent engaged in six activities: 1) Viewing wildlife, 2) Kayaking or canoeing, 3) Viewing general scenery, 4) Camping in backcountry, 5) Taking photographs, and 6) Viewing tidewater glaciers. About half of backcountry respondents hiked (54%) and stayed at Bartlett Cove campground (52%).
- Less than half (42%) of backcountry visitors planned their trip to minimize seeing or hearing other vessels and this did not depend on how many one- versus two-cruise ship in the bay days backcountry respondents visited. Of those who did plan their trip to minimize encounters with other vessels, cruise ships (95%) and small cruise ships, tour boats, or large private vessels (65%) were the vessels that backcountry respondents were most commonly planning to avoid.
- A small percentage (14%) of overnight backcountry visitors visited Margerie and Grand Pacific tidewater glaciers during the kayaking/hiking portion of their trips. Other tidewater glaciers were more likely to be visited during the kayaking/hiking portion of the trip. Reid glacier was the most commonly visited (41%) followed by McBride (35%), Johns Hopkins (32%), and Lamplugh (31%). About one-fourth (25%) of backcountry visitors did not visit any of these other tidewater glaciers.
- Backcountry respondents reported experiencing a variety of weather conditions during their trip to Glacier Bay proper. The most common weather reported was "Sunny and/or partly cloudy" (88%) followed closely by "Rain with or without fog" (85%). Overall weather during overnight backcountry visitors' trips was most likely to be a mix that included some rain (79%).
- Backcountry visitors were asked the importance of 8 different possible trip experiences (rated on a five-point scale from 1 = not at all important to 5 = extremely important) and none of these differed for respondents visiting on one- or two-cruise ships days. All 8 trip experience dimensions had an average importance rating between "very important" and "extremely important". The four most important trip dimensions for backcountry visitors were: 1) Experience the scenic beauty, 2) Experiencing the wonder of nature, 3) View wildlife, and 4) Pristine environment. Although solitude was the trip experience with the lowest average importance rating, two-thirds of backcountry respondents rated solitude at least very important (66.0% of respondents scored 4 or higher on the Solitude scale). The findings indicate that the 8 trip

Backcountry Visitor Survey

dimensions identified in the 2007 qualitative survey were generally important for most backcountry visitors.

Party size

Contact sheet

1. How many people are in your personal traveling party?

_____ Number of people

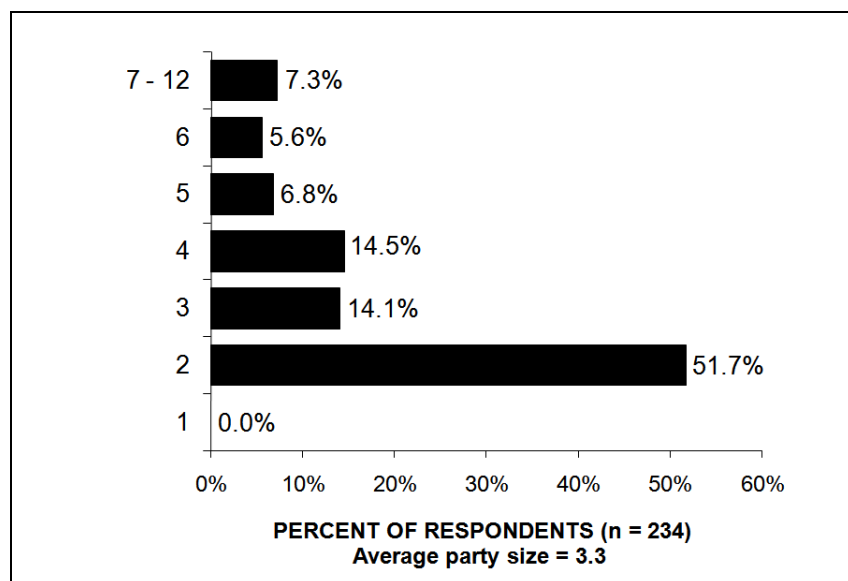


Figure B-8. Party size

Party type

Contact sheet

2. Please check the makeup of your personal traveling party:

- ☐ Individual
- ☐ Family
- ☐ Friends
- ☐ Family and friends
- ☐ Other _____
(please specify)

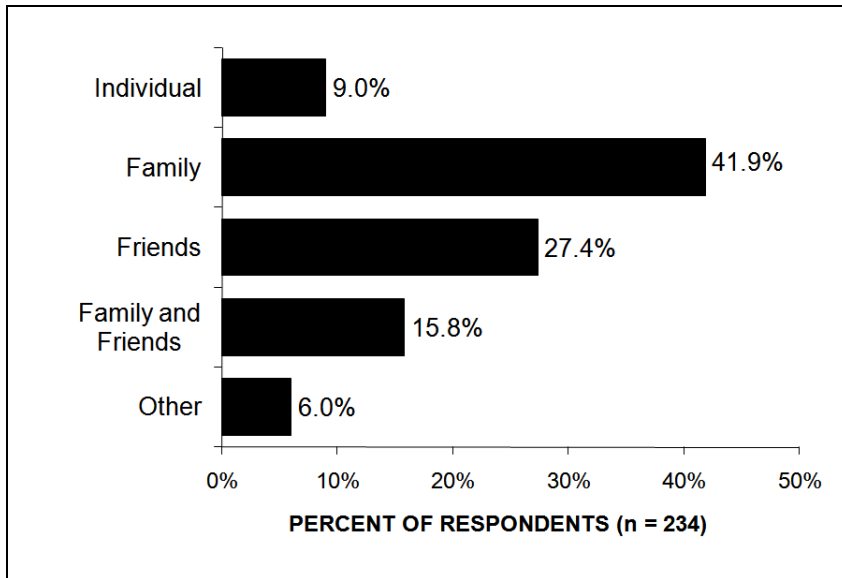


Figure B-9. Type of party

Length of stay

The contact sheet asked overnight backcountry visitors how many nights they planned to spend in the backcountry. The mail survey included questions that asked about how long respondents spent in the park and how long they spent in the backcountry.

Contact sheet

5. How many nights do you plan to spend in the backcountry?

_____ Number of nights in backcountry

Mail Survey

2. On the trip during which you were contacted, how many nights did you stay overnight within park boundaries? (*Glacier Bay Lodge is within park boundaries, but lodging in Gustavus is outside the park.*)

_____ NIGHTS SPENT WITHIN PARK BOUNDARIES

☐ DON'T REMEMBER

3. On the trip during which you were contacted, how long did you spend in the backcountry in Glacier Bay National Park and Preserve?

_____ NUMBER OF NIGHTS SPENT IN BACKCOUNTRY

☐ DON'T REMEMBER

As can be seen in Figure B-10 and Figure B-11, the distribution of nights planned to spend in the backcountry and the actual number of nights spent in the backcountry were very similar. In fact, planned and actual nights spent in the backcountry were strongly correlated, $r(154) = .963, p < .001$.

Backcountry Visitor Survey

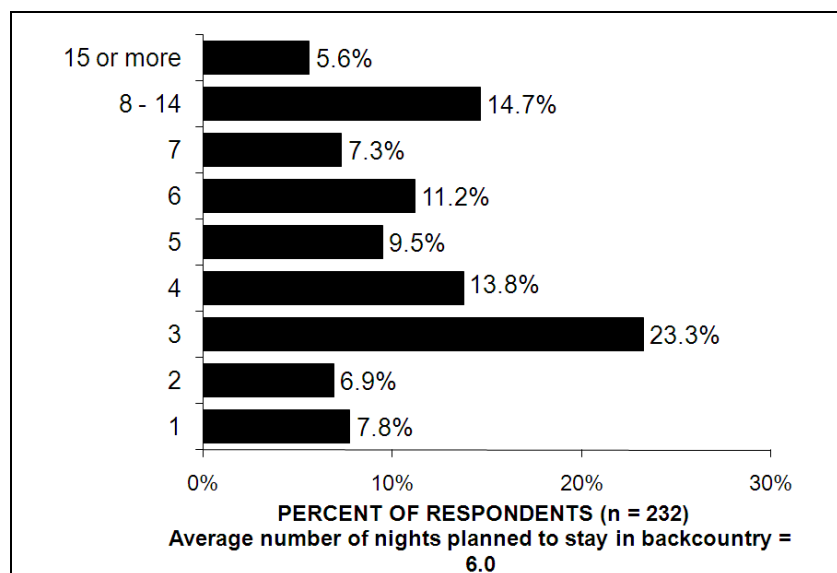


Figure B-10. Number of nights planned to stayed in backcountry

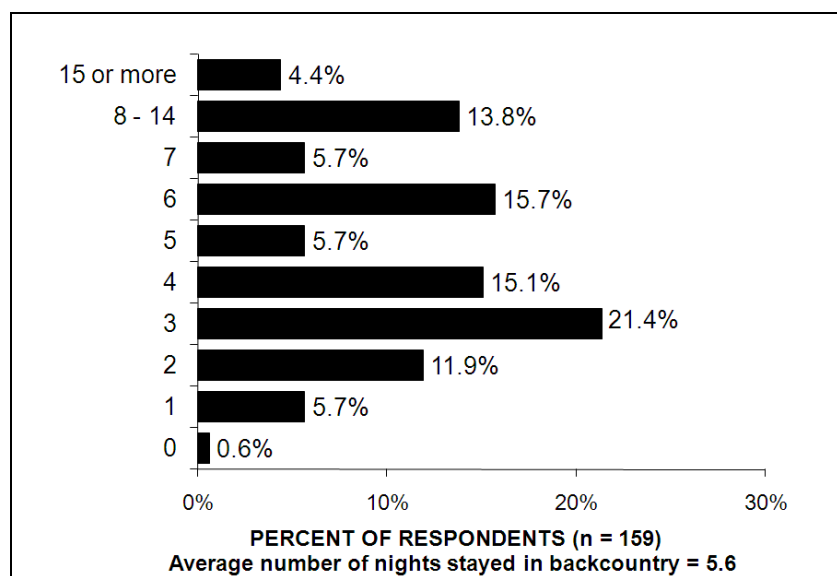


Figure B-11. Number of nights stayed in backcountry

As can be seen in Figure B-12, the distribution of number of nights spent in the park differed from that for the number of nights spent in the backcountry. Whereas on average, overnight backcountry visitors spent 2.5 more nights in the park than in the backcountry, the number of additional nights spent in the park varied and the correlation between these was moderate, $r(154) = .529, p < .001$.

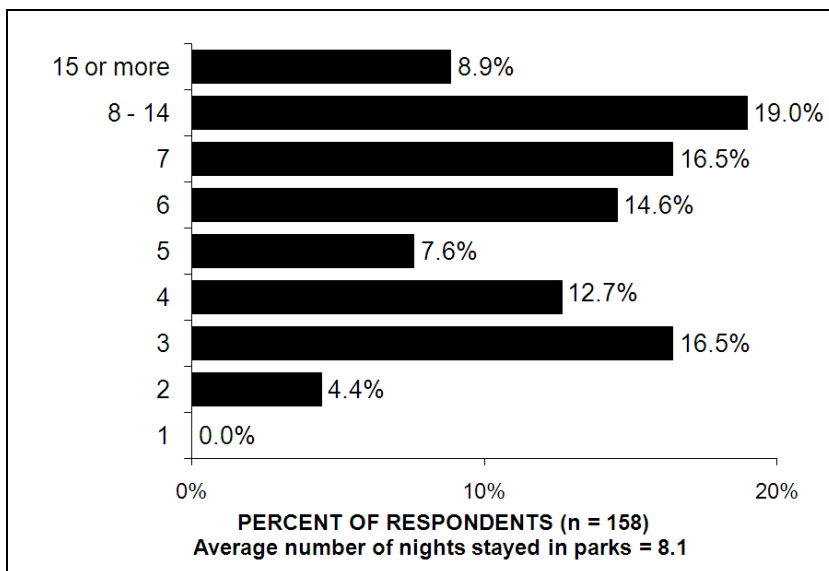


Figure B-12. Number of nights stayed overnight in the park

Planned to take the park day tour boat

Contact sheet

6. Do you plan to take the park day tour boat as part of this kayaking trip in order to view Margerie and Grand Pacific Glaciers?

- ☐ Yes
- ☐ No
- ☐ Don't know

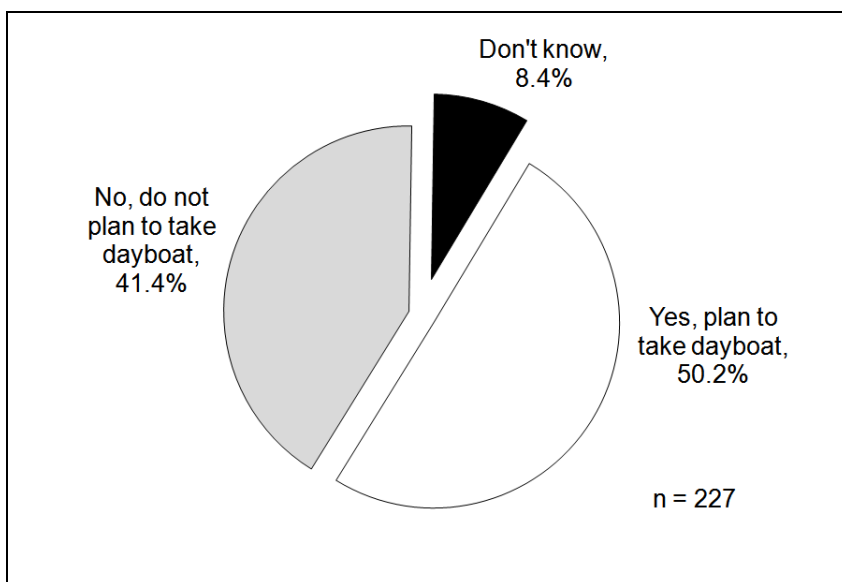


Figure B-13. Planned to take the park day tour boat

Activities engaged in on trip to Glacier Bay National Park

Mail Survey

4. On the trip to Glacier Bay National Park and Preserve during which you were contacted for this survey, which of the following activities did you engage in? *(Circle as many numbers as apply.)*

- 1 Viewing tidewater glaciers
- 2 Viewing wildlife
- 3 Viewing general scenery
- 4 Kayaking or canoeing
- 5 Hiking
- 6 Fishing
- 7 Taking photographs
- 8 Staying at Glacier Bay Lodge (in park)
- 9 Staying at Bartlett Cove campground
- 10 Camping in backcountry
- 11 Other(please specify) _____

Other activities listed were reviewed, and it was found that 2 backcountry respondents engaged in whale watching, 2 in mountain climbing, 3 in guided kayaking or kayaking lessons, and the remaining 7 did miscellaneous activities.

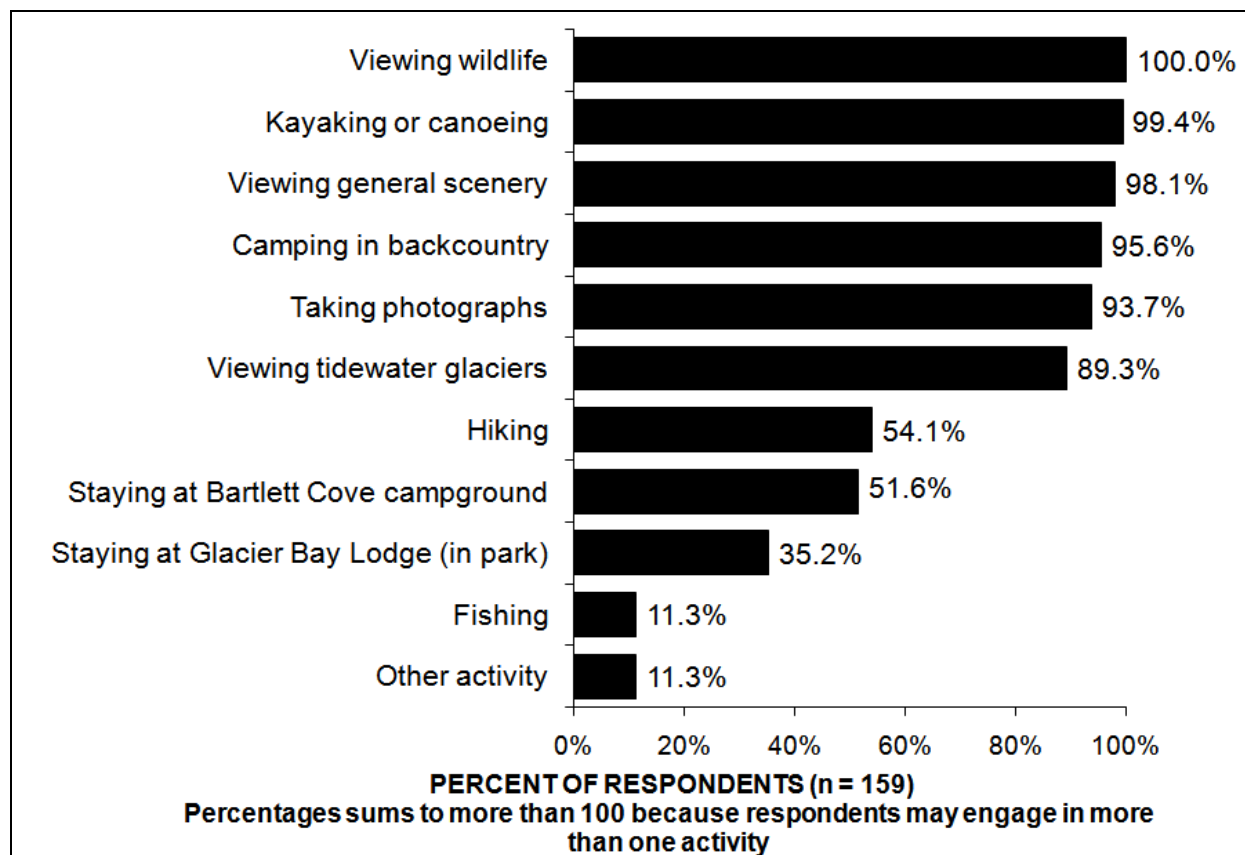


Figure B-14. Activities engaged in on trip to Glacier Bay National Park

See or hear large cruise ships

Mail Survey

8. During the kayaking/hiking portion of your trip in Glacier Bay proper, did you see or hear large cruise ships?
- ☐ No → GO TO QUESTION 9
 - ☐ Don't know → GO TO QUESTION 9
 - ☐ Yes

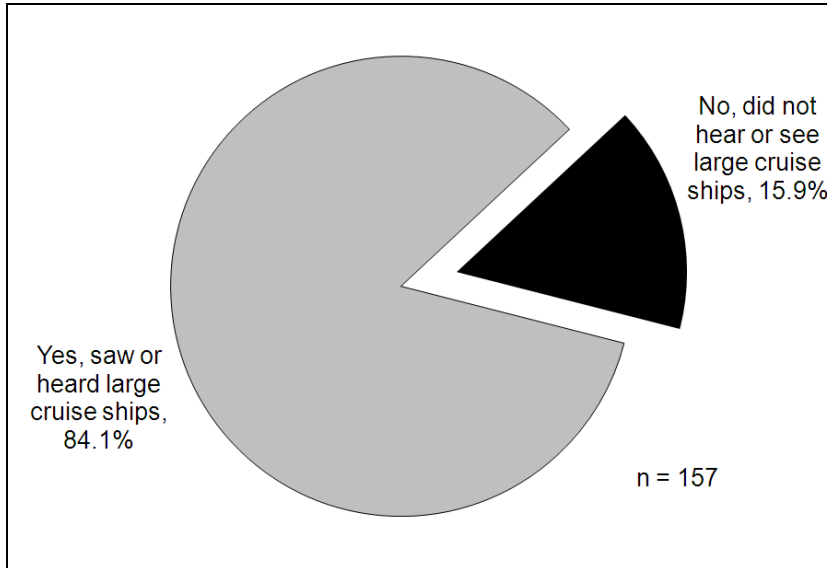


Figure B-15. See or hear large cruise ships

Planned trip to minimize seeing or hearing other vessels

Mail Survey

18. Did you plan your trip to minimize seeing or hearing other vessels?

- ☐ No → GO TO QUESTION 18
- ☐ Yes

18a. Which types of vessels did you plan your trip to minimize seeing or hearing? (*Please check all that apply.*)

- ☐ Large cruise ships
- ☐ Small cruise ships, tour boats, or large private vessels
- ☐ Small motor boats or sailboats
- ☐ Kayaks

18b. Please describe briefly how you planned your trip to minimize seeing or hearing other vessels.

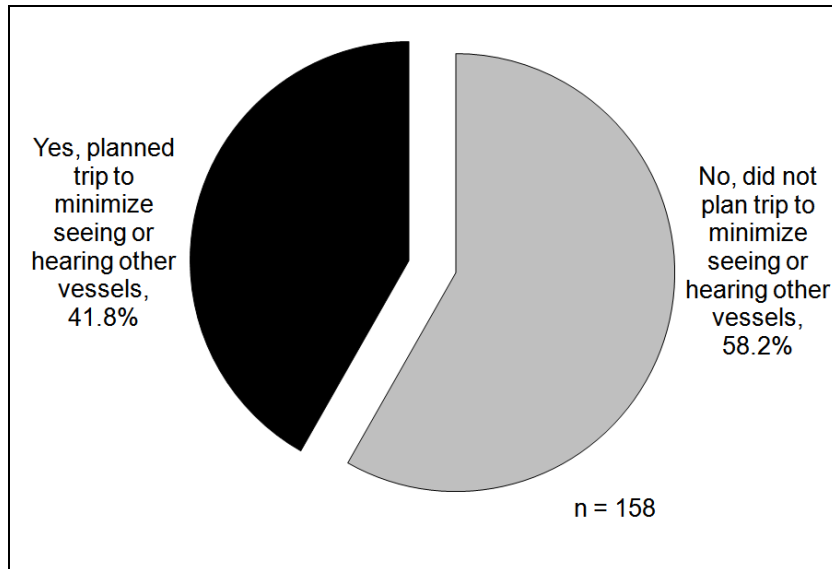


Figure B-16. Planned trip to minimize seeing or hearing other vessels

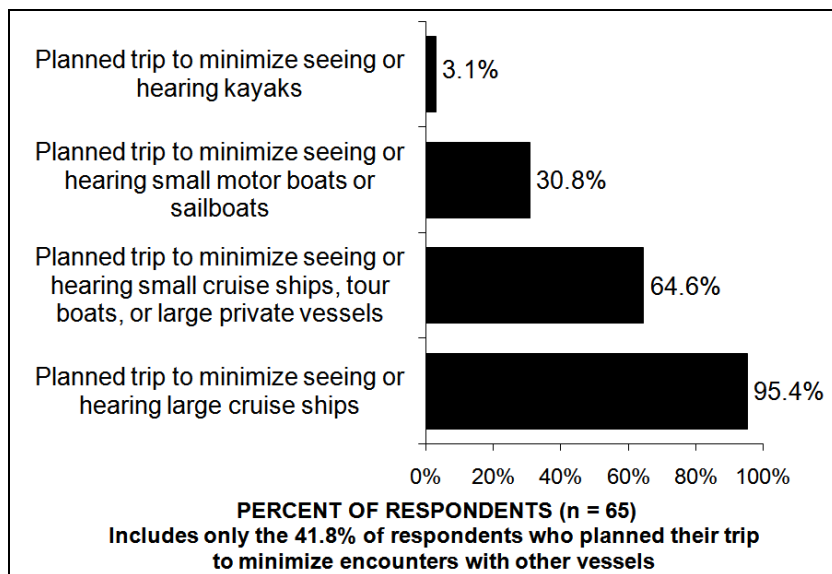


Figure B-17. Planned trip to minimize encounters with different types of vessels

Question 18b asked backcountry respondents to briefly describe how they planned their trips to minimize contact with other vessels. These responses were reviewed and coded for common themes. Of the 64 responses, 61 indicated that they planned to visit areas of the park where large cruise ships do not go (e.g., East Arm, Beardslee Islands, inlets in the West Arm closed to large vessels), 4 indicated they consulted the cruise ship schedule, and 2 relied on guides to minimize encounters.

Importance of different trip experiences

The qualitative interviews conducted during Summer 2007 revealed seven dimensions of visitor experience that were affected by cruise ships. These identified dimensions of visitor experience had significant overlap with dimensions of visitor experience measured by the list of Recreational Experience Preference (REP) items. To have two items for each dimension, 9 REP items were selected and 5 new items were constructed using the REP format (see general Introduction for more detail). Respondents were asked the importance of each of these experiences during their visit to Glacier Bay. Additionally

respondents were asked how hearing or seeing a large cruise ship affected each possible trip experience (see Section VIII).

Cronbach's alpha was calculated for each of the seven dimensions to assess the internal consistency of the two scale items selected to measure the effect of cruise ships on each dimension. George and Mallery (2003) provide the following rules of thumb: “ $\alpha > .9$ – Excellent, $\alpha > .8$ – Good, $\alpha > .7$ – Acceptable, $\alpha > .6$ – Questionable, $\alpha > .5$ – Poor, and $\alpha < .5$ – Unacceptable” (p. 231). As can be seen in Table B-4, Cronbach's alpha was over 0.7 for 5 of the 7 scales indicating acceptable or better reliability of those scales. The Cronbach's alpha for the scale “Intimate experience with nature” was 0.667 indicating questionable reliability. However, because the Cronbach's alpha for this scale was acceptable for all the other user groups and for the detraction items, the items were combined into the scale score to allow comparability across user groups. The Cronbach's alpha for the scale for “Seeing nature” was 0.366 indicating unacceptable reliability. Because it was unlikely that the same latent variable underlies these two items for cruise ship passengers, these two items were treated as two separate scales measuring different dimensions. Thus, a total of 8 scales representing 8 dimensions were used in subsequent analyses. It should be noted that this pattern of findings is analogous to that found for the 14 items measuring detraction of cruise ships on these visitor experience dimensions.

Table B-4. Internal consistency measure (Cronbach's alpha) for each importance dimension

Scale	Items	Cronbach's alpha
Seeing nature		0.366
	View wildlife	
	Experience the scenic beauty	
Experiencing the wonder of nature		0.731
	Be amazed by nature	
	Experience nature's wonders	
Intimate experience with nature		0.667
	Have personal experiences with nature	
	Be close to nature	
Hear the sounds of nature		0.904
	Enjoy the sounds of nature	
	Experience the natural sounds	
Tranquility		0.822
	Experience tranquility	
	Experience peace and calm	
Solitude		0.861
	Experience solitude	
	Feel alone with nature	
Pristine environment		0.733
	Experience a pristine setting	
	Experience nature untouched by humans	

Backcountry Visitor Survey

Mail Survey

7. Some possible experiences of people who visit recreation areas are listed below. How important to you was each of the following experiences during the kayaking/hiking portion of your visit to Glacier Bay proper in which you were contacted? *(Circle one response for each reason.)*

How important to you was each experience during the kayaking/hiking portion of this visit to Glacier Bay proper?

A. EXPERIENCE THE SCENIC BEAUTY	not important	slightly important	moderately important	very important	extremely important
B. EXPERIENCE TRANQUILITY	not important	slightly important	moderately important	very important	extremely important
C. BE AMAZED BY NATURE	not important	slightly important	moderately important	very important	extremely important
D. EXPERIENCE A PRISTINE SETTING	not important	slightly important	moderately important	very important	extremely important
E. ENJOY THE SOUNDS OF NATURE	not important	slightly important	moderately important	very important	extremely important
F. EXPERIENCE SOLITUDE	not important	slightly important	moderately important	very important	extremely important
G. EXPERIENCE NATURE UNTOUCHED BY HUMANS	not important	slightly important	moderately important	very important	extremely important
H. HAVE PERSONAL EXPERIENCES WITH NATURE	not important	slightly important	moderately important	very important	extremely important
I. VIEW WILDLIFE	not important	slightly important	moderately important	very important	extremely important
J. EXPERIENCE NATURE'S WONDERS	not important	slightly important	moderately important	very important	extremely important
K. BE CLOSE TO NATURE	not important	slightly important	moderately important	very important	extremely important
L. FEEL ALONE WITH NATURE	not important	slightly important	moderately important	very important	extremely important
M. EXPERIENCE PEACE AND CALM	not important	slightly important	moderately important	very important	extremely important
N. EXPERIENCE THE NATURAL SOUNDS	not important	slightly important	moderately important	very important	extremely important

The importance of these 8 trip experience dimensions did not differ for backcountry respondents visiting on one- or two-cruise ships days. Table B-5 presents the percent of backcountry respondents with each scale score and the average importance rating for that trip experience dimension. All the trip experience dimensions had average importance ratings above “4 = very important.” The four most important trip dimensions were: 1) Experience the scenic beauty, 2) Experiencing the wonder of nature, 3) View wildlife, and 4) Pristine environment. The trip experience with the lowest average importance rating was “Solitude” and yet, two-thirds of respondents rated solitude at least very important (66.0% of respondents scored 4 or higher on the Solitude scale). The findings indicate that the 8 trip dimensions identified in the qualitative survey were generally important for most backcountry visitors.

Table B-5. Importance ratings for trip experience scales

Trip Experiences	N	Mean	Percent of people rating how important each dimension was to their trip experience in Glacier Bay proper ¹								
			1	1.5	2	2.5	3	3.5	4	4.5	5
Experience the scenic beauty	154	4.69	0.0		0.0		2.6		25.3		72.1
Experiencing the wonder of nature	154	4.46	0.0	0.0	0.6	1.9	1.9	7.1	25.3	14.9	48.1
View wildlife	153	4.46	0.0		1.3		6.5		36.6		55.6
Pristine environment	154	4.43	0.0	0.0	0.6	1.3	3.9	12.3	16.2	18.8	46.8
Intimate experience with nature	153	4.38	0.0	0.0	1.3	0.7	5.9	4.6	28.1	20.3	39.2
Tranquility	154	4.30	0.0	0.0	0.6	4.5	7.8	7.8	20.8	17.5	40.9
Hear the sounds of nature	154	4.27	0.0	0.0	3.2	3.9	9.7	1.9	25.3	12.3	43.5
Solitude	153	4.01	0.7	1.3	3.3	3.9	13.1	11.8	22.2	11.8	32.0

¹The rating scale included for each item was: 1 = Not at all important, 2 = Slightly important, 3 = Moderately important, 4 = Very important, 5 = Extremely important. Scale values that fall between the 5 points on the rating scale are due to averaging the ratings for the two scale items for a dimension.

Visited Margerie and Grand Pacific glaciers

12. During the kayaking/hiking portion of your trip to Glacier Bay proper, did you visit Margerie/Grand Pacific tidewater glaciers? (*Check No if you only visited these glaciers on Glacier Bay Lodge tour boat.*)

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes

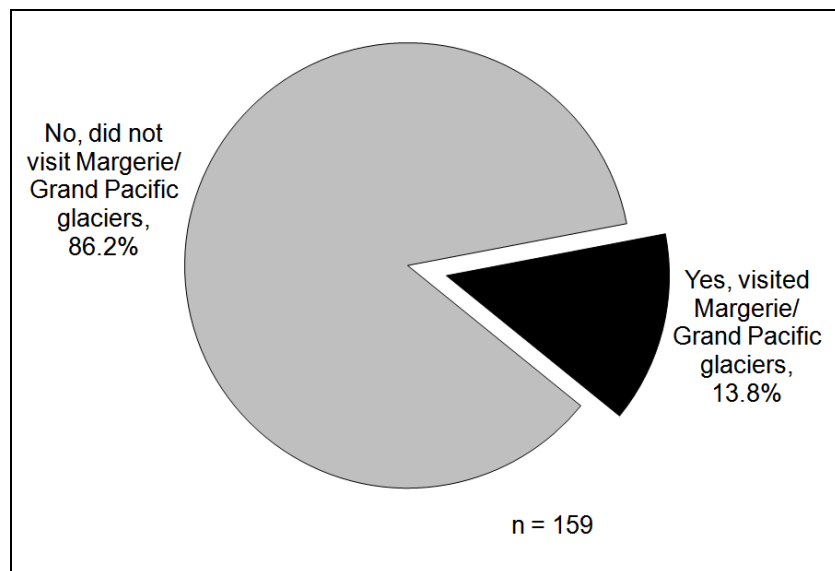


Figure B-18. Percent of respondents who visited Margerie and Grand Pacific glaciers

Other tidewater glacier visited

Mail survey

13. During the kayaking/hiking portion of your trip to Glacier Bay proper, which of the other tidewater glaciers, if any, did you visit?

- ☐ Did not visit any other tidewater glaciers.
- ☐ Johns Hopkins
- ☐ Lamplugh
- ☐ McBride
- ☐ Reid
- ☐ Other (*please specify*) _____
- ☐ Don't know/Don't remember

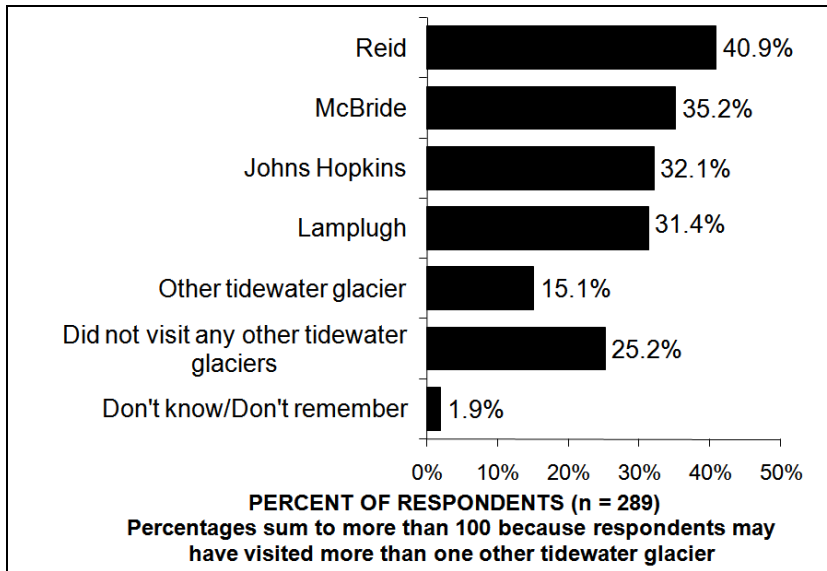


Figure B-19. Other tidewater glaciers visited

Weather

Mail Survey

5. We are interested in the kinds of weather you experienced during the kayaking/hiking portion of your trip in Glacier Bay proper. Please indicate each type of weather you experienced and then estimate the number of hours that weather was present. (*Check as many as apply.*)
- ☐ Sunny and/or partly cloudy → About _____ hours OR Don't remember _____
 - ☐ Cloudy without fog → About _____ hours OR Don't remember _____
 - ☐ Cloudy with fog → About _____ hours OR Don't remember _____
 - ☐ Rain with or without fog → About _____ hours OR Don't remember _____

Backcountry respondents were asked to report about the kinds of weather they experience during their time in Glacier Bay proper. Figure B-20 shows the percent of respondents who experienced each type of weather at some point during their visit.

Backcountry Visitor Survey

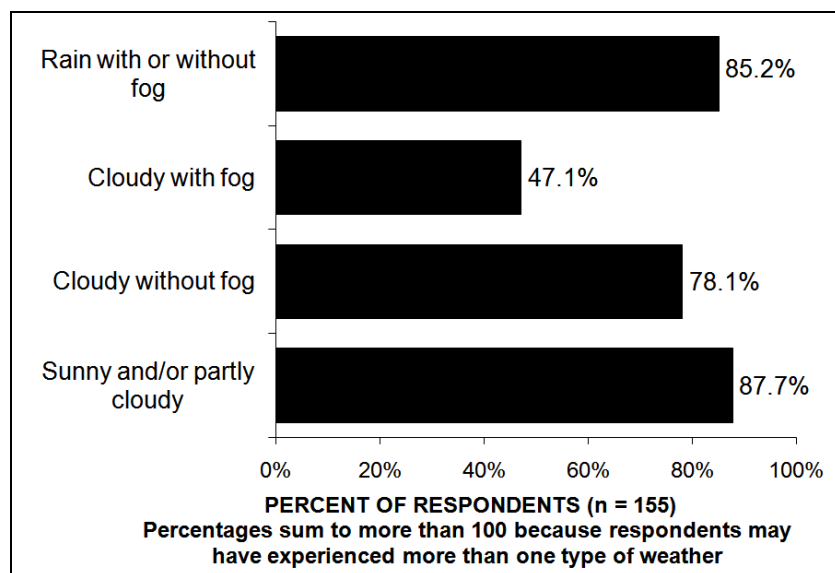


Figure B-20. Percent of respondents who experienced different kinds of weather

Question 4 also asked backcountry respondents to report about how many hours they experienced each type of weather during their trip in Glacier Bay proper. Review of the hour data indicated for many respondents there were missing data or the sum of hours did not correspond to the time spent in the bay. Thus, there is uncertainty as to the extent to which the weather data reported correspond to time actually spent in Glacier Bay proper. Because of this uncertainty and the increased difficulty of accurately recalling times over longer time frames (often multiple days), the hour data are not reported. Instead, a series of mutually exclusive trip weather experience categories were created that generally reflect an ordinal scale of weather experienced during visitors' trips (e.g., mostly sunny to all rain). People were assigned to these categories based on their responses to having experienced each kind of weather listed in Question 4 (see Table B-6).

Table B-6. Trip weather experience categories

Trip weather experience category	Kinds of weather checked in Question 4
Only sunny and/or partly cloudy	Only "Sunny and/or partly cloudy" checked
No fog or rain	"Cloudy without fog" checked, "Sunny and/or partly cloudy" may or may not be checked
Some fog, but no rain	"Cloudy with fog" must be checked, "Sunny and/or partly cloudy" and/or "Cloudy without fog" must also be checked
Some rain	"Rain with or without fog" must be checked and at least one other kind of weather
All fog with or without rain	"Cloudy with fog" must be checked and "Rain with or without fog" may or may not be checked
All rain	Only "Rain with or without fog" checked

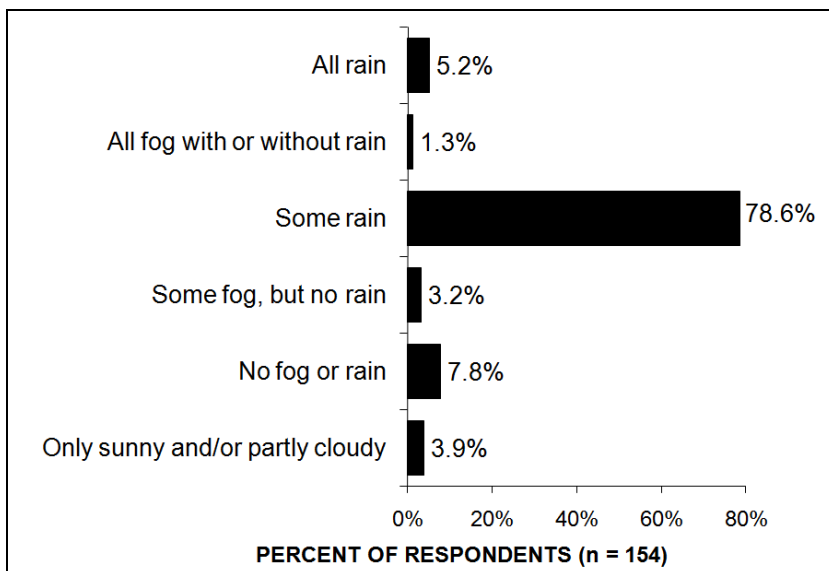


Figure B-21. Trip weather experience categories based on responses to each kind of weather experienced by a visitor

IV. ASSESSING EFFECTS OF PRESENCE OF 2-CRUISE SHIPS IN THE BAY

A 1:2 ratio of 1- to 2-cruise ship in the bay days was fairly evenly spread over the 2008 peak season (June 1 to August 31). Because overnight backcountry visitors spent multiple days visiting Glacier Bay proper that spanned a mix of 1- and 2-cruise ships in the bay days, a simple comparison of one- versus two-cruise ships in the bay days was not appropriate. Two measures of presence of 2-cruise ships in the bay days were derived. 1) Number of visit days that two cruise ships were in the bay was calculated for each respondent. This measure inherently includes a component of time because respondents who have more two-cruise ship in the bay days will have visited for longer periods of time. 2) Percentage of visit days that were two-cruise ship in the bay days was also calculated for each respondent. This measure factors out the time component. For example, respondents who experienced 66% of their days as 2-cruise ship days may have been visiting when 2 out of 3 days were 2-cruise ships in the bay days or when 6 out of 9 days were 2-cruise ships in the bay days.

Analyses assessed whether presence of 2-cruise ships in the bay (as measured above) affected the different measures of encounters and the effects of encounters for the different craft. Because the number of visit days there were two-cruise ships in the bay included a time element, when significant results were found for it, additional analyses were done that included the number of nights spent in the backcountry. These analyses allowed a means to determine if the observed effect was due to differences in the number of cruise ships in the bay each day or whether it was due to simply spending more time in the bay.

Table B-7 summarizes the variables that had significant effects of number of visit days that were 2-cruise ship in the bay days and whether those results remained significant when taking into account the number of nights visitors spent in the backcountry. Of the 18 observed significant effects for number of visit days that were 2-cruise ship in the bay days, only two remained significant when nights spent in the backcountry was included in the analyses to separate out the effect due to length of stay in the backcountry. These two effects were reported with the results for their respective questions in the following sections because they suggested an effect due to differences in the number of cruise ships in the bay.

Analyses that examined whether the percentage of 2-cruise ship in the bay days affected the different measures of encounters were also conducted. Any significant effects observed for the percentage of 2-cruise ship in the bay days were reported in the following sections where the results for each question are presented.

The focus on presenting results related to the number of cruise ships in the bay each day rather than for time spent in Glacier Bay proper was because park managers are more likely to control the number of cruise ships in the bay each day than to strictly regulate the number of days people can visit the backcountry.

Table B-7. Effects of number of visit days there were 2-cruise ships in bay: Alone and when controlling for nights spent in backcountry

Variable	Analyses for Number of visit days there were 2-cruise ships in bay (<i>p</i> -value)	Analyses with a) Number of visit days there were 2-cruise ships in bay and b) Nights spent in backcountry	
		<i>p</i> -value for number of visit days that were 2-cruise ships	<i>p</i> -value for nights spent in backcountry
Saw or heard cruise ship	.041	.147	.018
Hours saw or heard cruise ship	< .001	<.001	.112
Days saw or heard cruise ship	<.001	.662	.003
Saw or heard propeller-driven airplanes	.030	.873	.373
Saw or heard helicopters	.011	.148	.030
Hours saw or heard motorized water craft other than large cruise ships	.009	.651	.509
Number of motorized water craft other than large cruise ships	<.001	.944	.035
Visited Margerie/Grand Pacific glaciers	.001	.243	.992
Did not visit any other tidewater glaciers	<.001	.898	.003
Visited John Hopkins	.006	.795	.495
Visited Lamplugh	.012	.929	.352
Visited McBride	<.001	.567	.100
Visited Reid	.004	.320	.050
Visited other tidewater glaciers	.013	.994	.407
Don't know/Don't remember if cruise ships affected viewing of land animals	.026	.035	.132
Heard propeller-driven airplanes	.044	.361	.977
Heard helicopters	.005	.220	.040
Effect of engines of boats other than large cruise ships	.033	.373	.904

V. ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS

Backcountry respondents were asked about encounters with cruise ships and other motorized craft. Some questions asked about seeing or hearing different kinds of craft for their trip as a whole and other questions focused on seeing or hearing different kinds of craft while they were at Margerie and Grand Pacific glaciers. This section reports the findings about encounters during their time at Margerie and Grand Pacific glaciers.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question (see Section IV for details). When significant differences due to the number of cruise ships in the bay were found, they are reported. If findings related to number of cruise ships in the bay are not discussed, readers can assume that analyses found no significant effects for differences in the number of cruise ships in the bay each day.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences of presence of 2-cruise ships in the bay were found (see Assessing effects of presence of 2-cruise ships in the bay, p. 28).

Highlights

- Of the 14% of backcountry visitors who visited Margerie and Grand Pacific glaciers during the kayaking/hiking portion of their trip, 86% reported seeing other craft when at the glaciers. About 30% of backcountry visitors who visited the glaciers when kayaking reported seeing one cruise ship and 18% reported seeing two cruise ships at the glaciers. Over one-fourth (27%) of backcountry visitors who visited the glaciers when kayaking reported seeing no cruise ships there. The average number of cruise ships seen by backcountry visitors when kayaking at the glaciers was 1.4.
- The same percentage of backcountry visitors (72.7%) reported seeing cruise ships as seeing other motorized water craft when kayaking at Margerie and Grand Pacific glaciers. However, backcountry visitors on average saw more other motorized craft than cruise ships ($M = 2.0$ vs. $M = 1.4$, respectively).
- Propeller-driven airplanes were more likely to be seen at the Margerie and Grand Pacific glaciers than helicopters by overnight backcountry visitors who visited the glaciers during the kayaking/hiking portion of their trips (27% vs. 10%)

Mail Survey

12. During the kayaking/hiking portion of your trip to Glacier Bay proper, did you visit Margerie/Grand Pacific tidewater glaciers? *(Check No if you only visited these glaciers on Glacier Bay Lodge tour boat.)*

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes



12a. At any time during the kayaking/hiking portion of your trip while you were at the Margerie/Grand Pacific tidewater glaciers, did you see one or more other water or air craft present (besides your own)?

- ☐ No → GO TO QUESTION 12
- ☐ Don't remember → GO TO QUESTION 12
- ☐ Yes



12b. Please indicate how many of each type of craft was present (excluding your own vessel) while you were at the Margerie/Grand Pacific tidewater glaciers.

- _____ Large cruise ships
- _____ Motorized water craft other than large cruise ships
- _____ Kayaks (excluding your own)
- _____ Propeller-driven airplanes
- _____ Helicopters

Visited Margerie and Grand Pacific glaciers

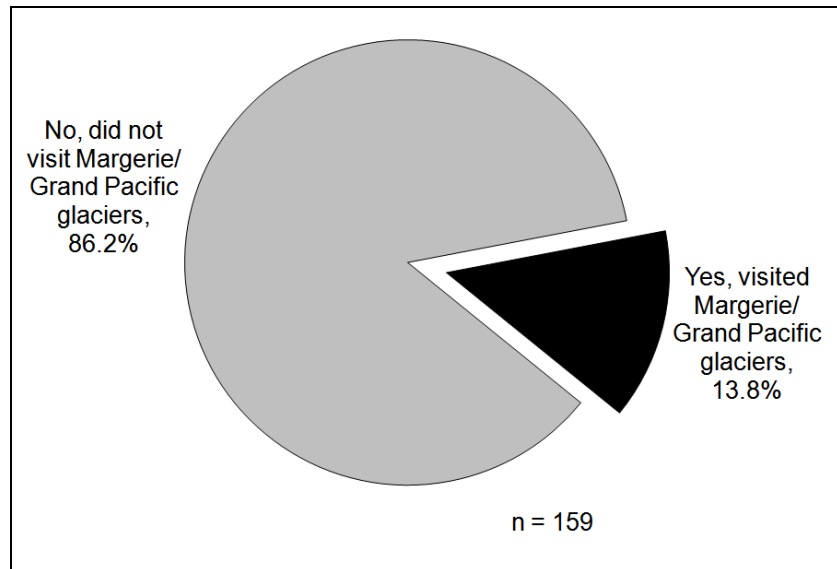


Figure B-22. Percent of respondents who visited Margerie and Grand Pacific glaciers

Saw other craft at Margerie and Grand Pacific glaciers

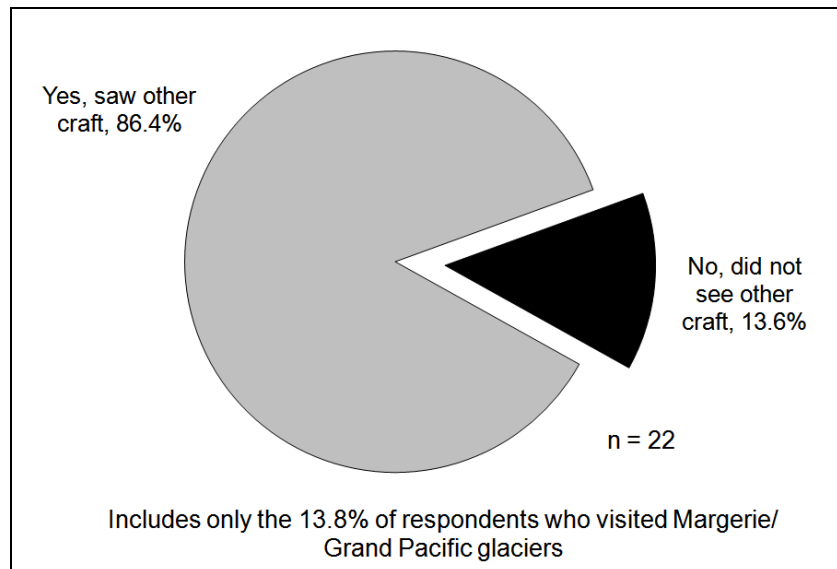


Figure B-23. Percent of respondents who saw other craft at Margerie and Grand Pacific glaciers

Number of different types of craft seen at Margerie and Grand Pacific glaciers

As can be seen in Figure B-24, 27% of overnight backcountry visitors who visited Margerie and Grand Pacific glaciers were there when no cruise ships were present. Two backcountry respondents reported seeing more than two cruise ships when visiting Margerie and Grand Pacific glaciers. Because two is the maximum number of cruise ships allowed to enter the park, these respondents most likely included smaller cruise ships, tour boats, or large private vessels in this response despite the vessel identification instructions. Figure B-24 and Figure B-25 indicated that the same percentage of backcountry visitors reported seeing cruise ships as other motorized water craft at Margerie and Grand Pacific glaciers (72.7% and 72.7%, respectively). However, backcountry visitors on average saw more other motorized craft than cruise ships ($M = 2.0$ vs. $M = 1.4$, respectively).

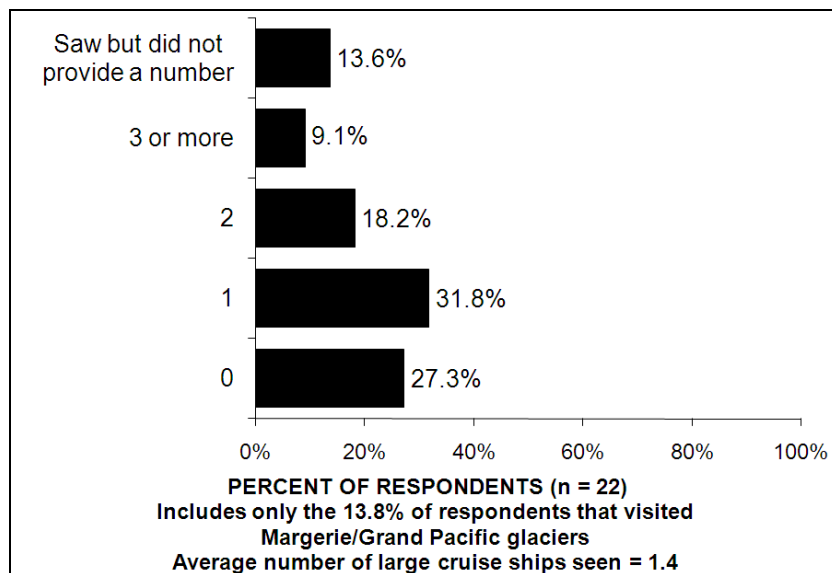


Figure B-24. Number of large cruise ships seen at Margerie and Grand Pacific glaciers

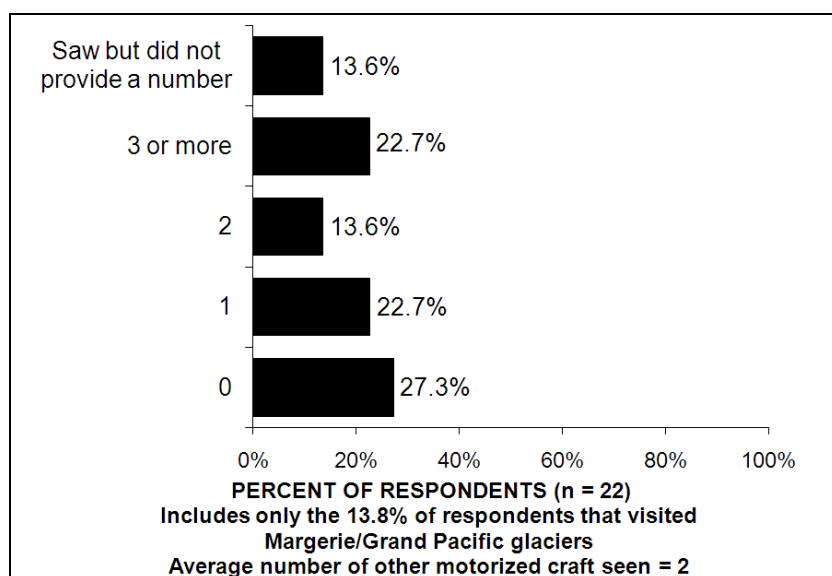


Figure B-25. Number of motorized craft other than large cruise ships seen at Margerie and Grand Pacific glaciers

Backcountry Visitor Survey

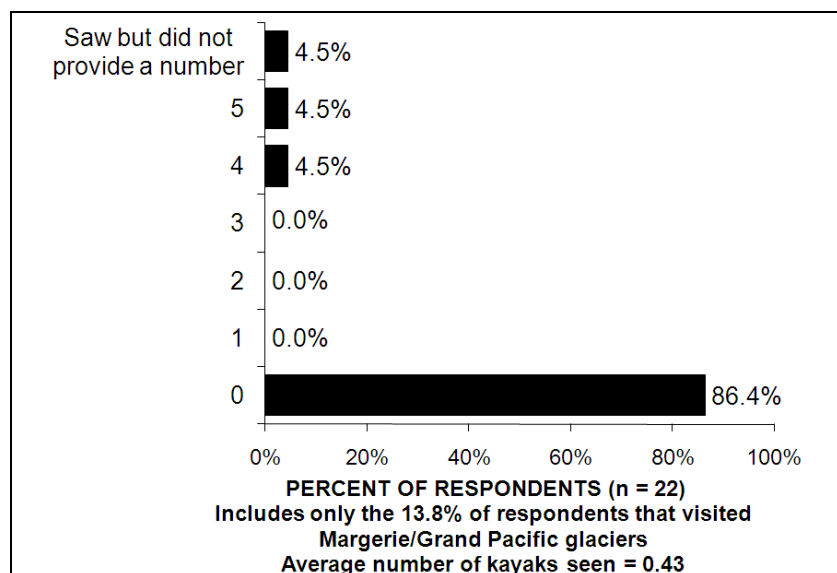


Figure B-26. Number of kayaks seen at Margerie and Grand Pacific glaciers

Propeller-driven airplanes were reported being seen at Margerie and Grand Pacific glaciers by 27.3% of overnight backcountry visitors who visited the glaciers whereas helicopters were reported being seen at Margerie and Grand Pacific glaciers by less than 10%.

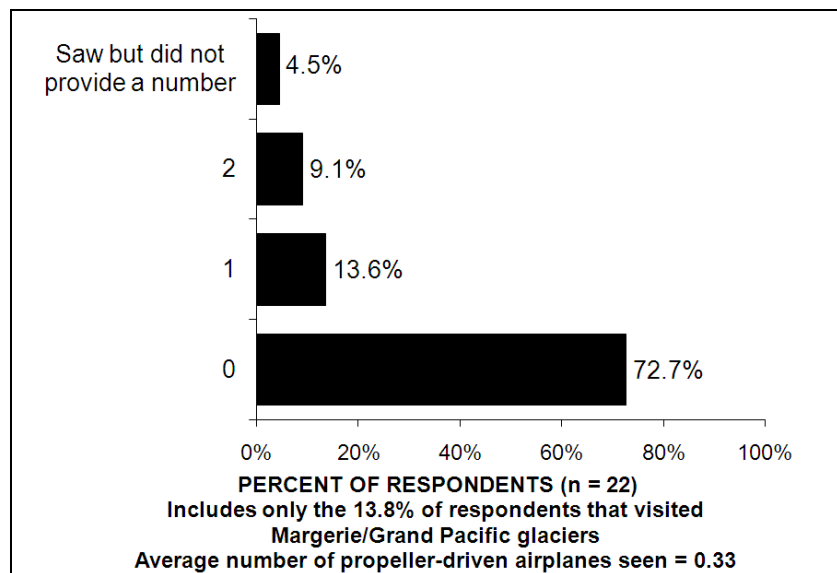


Figure B-27. Number of propeller-driven airplanes seen at Margerie and Grand Pacific glaciers

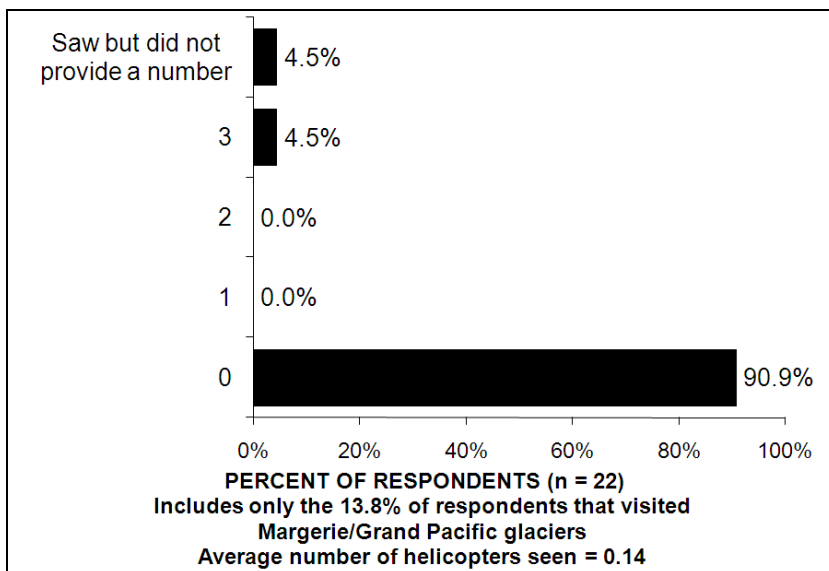


Figure B-28. Number of helicopters seen at Margerie and Grand Pacific glaciers

VI. ENCOUNTERS: ENTIRE TRIP

Backcountry respondents were asked about encounters with cruise ships and other motorized craft. Some questions asked about seeing or hearing different kinds of craft for their trip as a whole and other questions focused on seeing or hearing different kinds of craft while they were at Margerie and Grand Pacific glaciers. This section reports the findings about encounters for the trip as a whole.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question (see Section IV for details). When significant differences due to the number of cruise ships in the bay were found, they are reported. If findings related to number of cruise ships in the bay are not discussed, readers can assume that analyses found no significant effects for differences in the number of cruise ships in the bay each day.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences of presence of 2-cruise ships in the bay were found (see Assessing effects of presence of 2-cruise ships in the bay, p. 28).

Highlights

- The majority (84.1%) of backcountry respondents reported seeing or hearing large cruise ships during their trip. Of those backcountry respondents who saw large cruise ships, two was the most common number of days cruise ships were seen (29.2% of respondents) followed by four (17.7% of respondents). The average number of days cruise ships were seen was 3.8 which was about half the average length of stay (average number of nights spent in the backcountry = 6.0).
- The total length of time overnight backcountry visitors saw or heard large cruise ships was related to the number of two-cruise ships in the bay days even when controlling for number of nights spent in the backcountry. Under current conditions the average total number of hours large cruise ships were heard or seen by backcountry visitors was 5.2. It was predicted that large cruise ships would be heard or seen by backcountry visitors 7.2 hours under the maximum allowed conditions of 2-cruise ships in the bay every day.
- Three-fourths of overnight backcountry visitors saw or heard cruise ships for between a half-hour and three hours on the day they saw or heard the most cruise ships. The average length of time overnight backcountry visitors saw or heard large cruise ships on the day they saw or heard the most cruise ships was 1.6 hours.
- Of the different types of craft seen by backcountry respondents, large cruise ships were the third most frequently heard or seen type of craft (84.1%) following closely behind motorized water craft excluding large cruise ships (90.6%) and propeller-driven aircraft (84.8%). However, the number of hours that cruise ships were heard or seen by backcountry respondents was more than other motorized water craft or propeller-driven airplanes ($M = 4.84$ & 1.37 vs. $M = 5.23$, respectively).

Question 8 of the mail survey asked about seeing or hearing large cruise ships while Question 10 asked about hearing and seeing other types of craft (see questions below).

Mail Survey

8. During the kayaking/hiking portion of your trip in Glacier Bay proper, did you see or hear large cruise ships?

- ☐ No → GO TO QUESTION 10
- ☐ Don't know → GO TO QUESTION 10
- ☐ Yes

8a. During the kayaking/hiking portion of your trip in Glacier Bay proper, how long did you see or hear large cruise ships?

_____ NUMBER OF HOURS SAW OR HEARD LARGE CRUISE SHIPS IN GLACIER BAY (*Please list partial hours as 1/4, 1/2, etc.*)

- ☐ DON'T KNOW/DON'T REMEMBER

8b. During the kayaking/hiking portion of your trip in Glacier Bay proper, on how many days did you see or hear large cruise ships?

_____ NUMBER OF DAYS SAW OR HEARD LARGE CRUISE SHIPS IN GLACIER BAY

- ☐ DON'T KNOW/DON'T REMEMBER

8c. On the day you saw or heard the **most** large cruise ships during the kayaking/hiking portion of your trip in Glacier Bay proper, how long did you see or hear large cruise ships?

_____ NUMBER OF HOURS SAW OR HEARD LARGE CRUISE SHIPS ON DAY HEARD/SAW MOST LARGE CRUISE SHIPS DURING KAYAKING/HIKING PORTION OF TRIP IN GLACIER BAY (*Please list partial hours as 1/4, 1/2, etc.*)

- ☐ I ONLY SAW CRUISE SHIP(S) ONE DAY (SO SAME ANSWER AS QUESTION 8A.)
- ☐ DON'T KNOW/DON'T REMEMBER

Backcountry Visitor Survey

Mail Survey

10. During the kayaking/hiking portion of your trip in Glacier Bay proper, you may have seen or heard different kinds of motorized craft. For each type of craft, please indicate if you heard or saw it during the kayaking/hiking portion of your trip in Glacier Bay proper. Then, report the total time you heard or saw that type of craft and how many different craft of that type you saw or heard. *(Please do not include your own vehicle.)*

During your time in Glacier Bay proper...			
Type of craft	Did you hear or see? <i>(Circle one for each type)</i>	Total hours heard or seen <i>(Report partial hours as ¼, ½, etc.)</i>	Number of craft heard or seen
A. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	YES→ No DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW
B. PROPELLER-DRIVEN AIRPLANES	YES→ No DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW
C. HELICOPTERS	YES→ No DON'T KNOW	_____ Total hrs ☐ DON'T KNOW	_____ # of craft ☐ DON'T KNOW

This section will report the findings in the following order: 1) large cruise ship encounters, 2) comparison of large cruise ship encounters with other motorized craft encounters, and 3) detail of other motorized craft encounters.

Saw or heard large cruise ships

As seen in Figure B-29, the majority (84.1%) of respondents reported seeing or hearing large cruise ships during their trip.

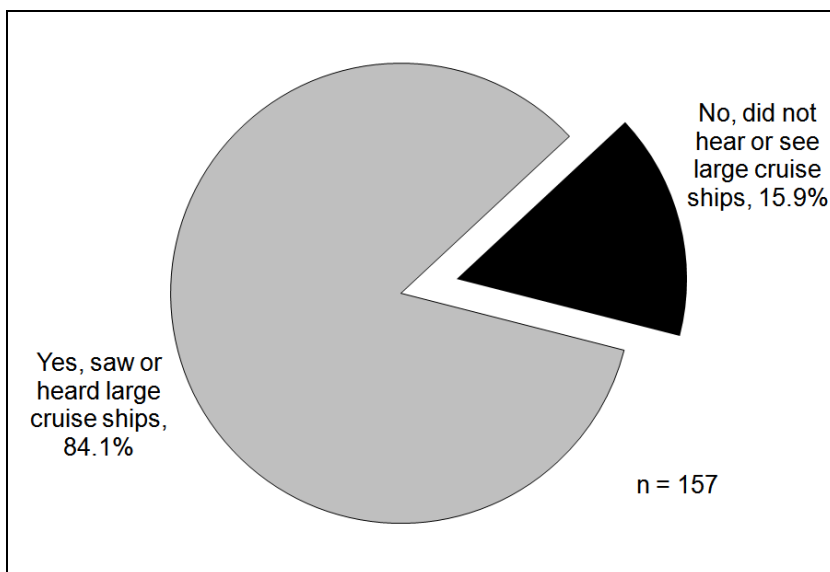


Figure B-29. Percent of respondents who saw or heard large cruise ships

Number of days saw or heard large cruise ships

Of those backcountry respondents who saw large cruise ships, two was the most common number of days cruise ships were seen (29.2% of respondents) followed by four (17.7% of respondents). The average number of days cruise ships were seen was 3.8 which was about half the average length of stay (average number of nights spent in the backcountry = 6.0).

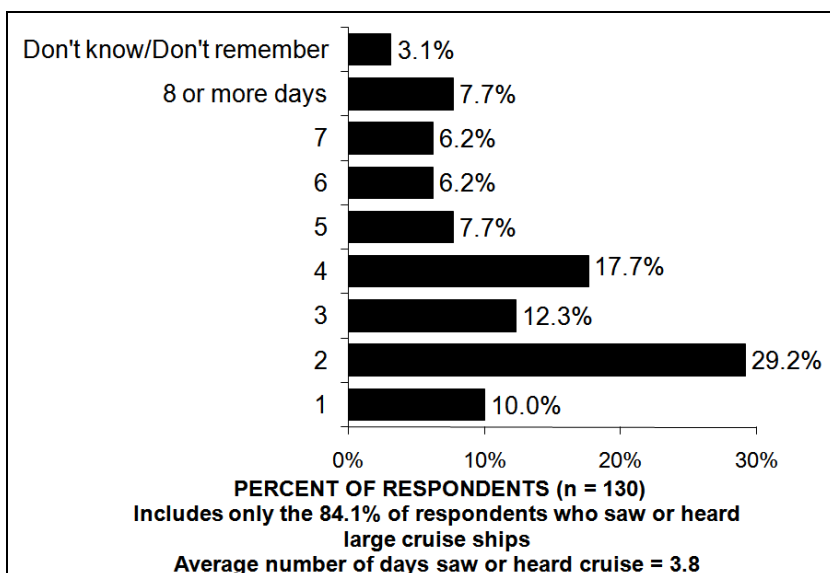


Figure B-30. Number of days respondents saw cruise ships in Glacier Bay proper

Total length of time saw or heard large cruise ships

Backcountry respondents were asked to report the number of hours they saw or heard large cruise ships during their stay in Glacier Bay proper. Although this measure of exposure is more subjective than number of cruise ships in the bay per day, it provided more detailed information about exposure to cruise ships. Whereas the number of hours cruise ships were heard or seen may vary by the number of cruise ships in the bay for overnight backcountry visitors, it may also be that the total amount of time that cruise ships were heard or seen affects overnight backcountry visitors' experiences regardless of how many ships were in the bay on the days they visited. These analyses are described and reported in Section XI Length of Exposure Effects on Visitor Experience.

Analyses were conducted to determine if presence of cruise ships in the bay was related to the total number of hours respondents saw or heard cruise ships. Two variables were used as measures of presence of cruise ships in the bay: 1) the percentage of visit days that were 2-cruise ships in the bay days, and 2) the number of visit days there were 2 cruise ships in the bay. The number of hours large cruise ship were heard or seen was not related to the percentage of visit days that were 2-cruise ships in the bay days. However, the number of visit days that were two-cruise ships days was correlated with the number of hours saw or heard large cruise ships, $r(n = 122) = .482, p < .001$. Regression analyses conducted to determine if this effect was due simply to the amount of time spent in the backcountry revealed that when the number of nights spent in the backcountry was included, the number of visit days that were two-cruise ship in the bay days continued to be significantly related to the number of hours respondents saw or heard cruise ships, $t(119) = 3.68, p < .001$ (significance test for coefficient)¹.

The analysis that included number of nights spent in the backcountry and number of 2 cruise ship in the bay days as predictors was used to predict the average number of hours large cruise ships would be heard or seen if two cruise ships were in the bay every day. It was assumed that there would be no change in the average length of stay (5.6 days). The regression equation predicted that for a stay of 5.6 days and 2 cruise ships in the bay everyday that overnight backcountry visitors would hear or see large cruise ships for 7.2 hours, an increase of 2 hours from current conditions.

¹ This analysis included number of visit days that were 2-cruise ship days and number of nights spent in the backcountry as two distinct variables thus, differences in visitors experiences for those who saw cruise ships on 2 of 3 visit days and visitors who saw cruise ships on 4 of 6 visit days would be captured. In the analysis using percentage of visit days that are 2-cruise ships these visitors would be in the same group (i.e., 66% of visit days were 2-cruise ship days) and therefore the analysis was not as sensitive.

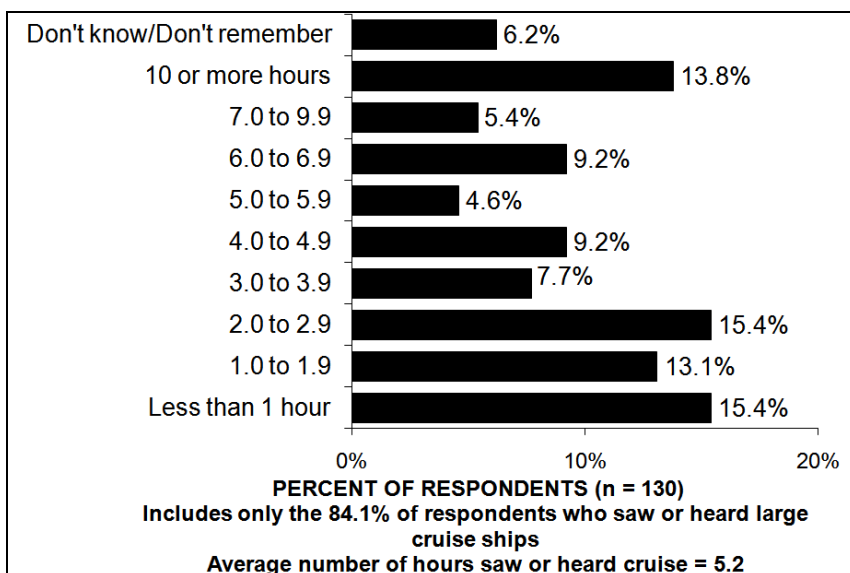


Figure B-31. Total number of hours saw or heard large cruise ships in Glacier Bay proper: Current conditions

Length of time saw or heard large cruise ships on day saw or heard most cruise ships

Backcountry respondents were also asked to report the number of hours they heard or saw cruise ships on the day that they saw or heard the most cruise ships. Although the total number of hours backcountry respondents heard or saw cruise ships varied by the number of visit days that were two cruise ships in the bay days, the number of hours respondents saw or heard large cruise ships on the day they saw or heard the most cruise ships did not depend on exposure to two-cruise ship in the bay days. Figure B-32 shows that over three-fourths of backcountry respondents saw cruise ships for between a half-hour and three hours on the day they saw or heard the most cruise ships. About 3% reported seeing or hearing cruise ships for 5 or more hours and 4.6% reported hearing or seeing them for less than a half-hour.

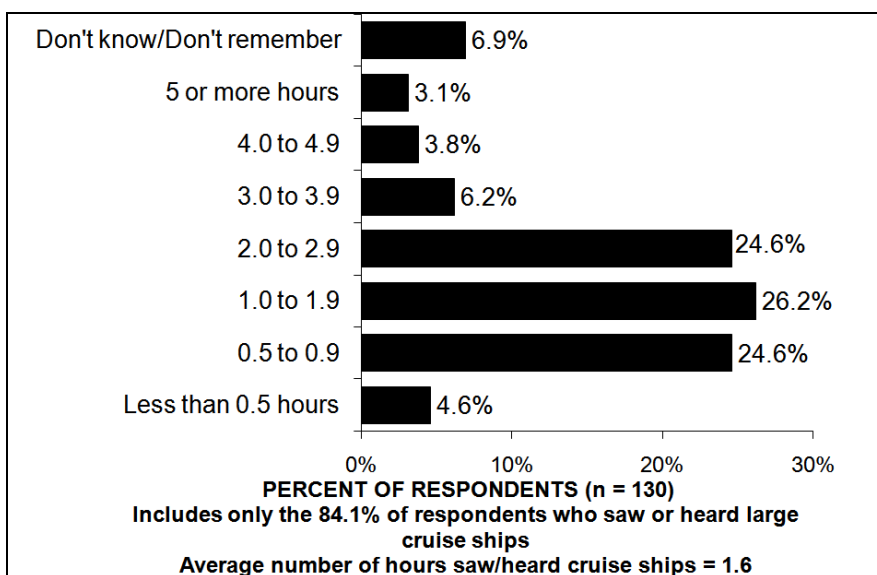


Figure B-32. Number of hours saw or heard large cruise ships on day saw or heard most cruise ships

Comparison of large cruise ship and other motorized craft encounters

Backcountry respondents were asked about encounters with other motorized craft to provide a context for the findings regarding large cruise ships. This section compares the findings from large cruise ships with those of other motorized craft. The detail findings including charts for other motorized craft are presented in the following section.

Table B-8 summarizes the percent of backcountry respondents who saw or heard the different types of craft. The percent of backcountry respondents who saw or heard the different kinds of craft did not differ by the number of cruise ships in the bay when length of visit was taken into account. As can be seen in Table B-8, large cruise ships were the third most frequently heard or seen type of craft (84.1%) following closely behind motorized water craft excluding large cruise ships (90.6%) and propeller-driven aircraft (84.8%). Helicopters were heard by substantially fewer backcountry respondents.

Table B-8. Percent of backcountry respondents who encountered different kinds of craft.

Type of craft	Heard or saw craft (percent of respondents)		
	Yes	No	Don't know
Large cruise ship (n = 157)	84.1%	15.9%	0.0%
Motorized water craft other than large cruise ships (n = 159)	90.6%	8.8%	0.6%
Propeller-driven airplanes (n = 158)	84.8%	12.7%	2.5%
Helicopters (n = 157)	26.1%	65.6%	8.3%

Although cruise ships were heard or seen by fewer backcountry respondents than other motorized watercraft or propeller-driven airplanes, the number of hours that cruise ships were heard or seen was more ($M = 4.84$ & 1.37 vs. $M = 5.23$, respectively; see Table B-9). Helicopters were present for less than an hour.

Table B-9. Number of hours different kinds of craft were heard or seen

Type of craft	Average hours
Large cruise ship (n = 132)	5.23
Motorized water craft other than large cruise ships (n = 144)	4.84
Propeller-driven airplanes (n = 134)	1.37
Helicopters (n = 41)	0.71

Motorized water craft other than large cruise ships: Length of time and number heard or seen

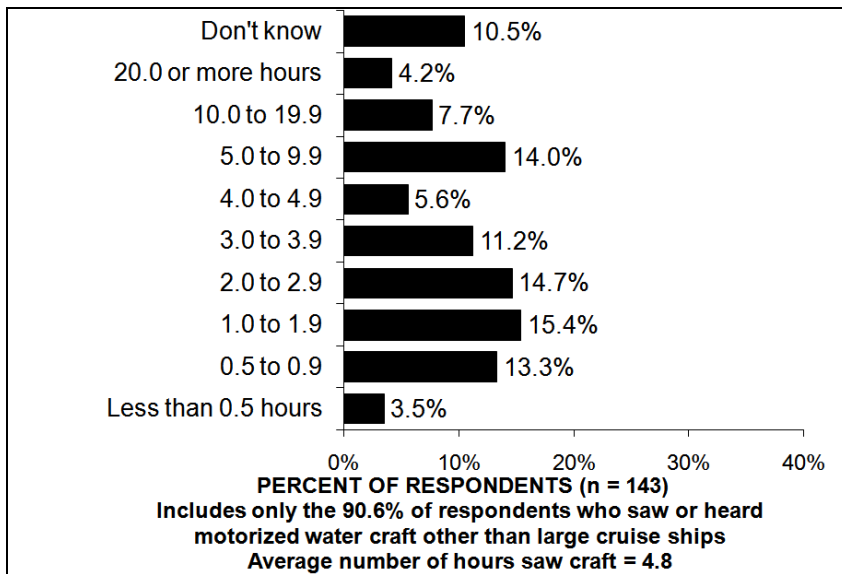


Figure B-33. Number of hours motorized craft other than large cruise ships were heard or seen

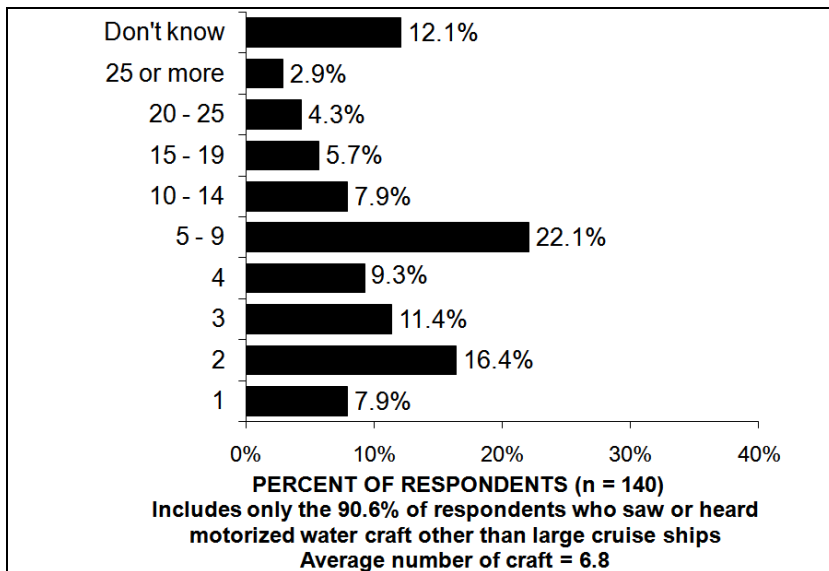


Figure B-34. Number of motorized craft other than large cruise ships heard or seen

Propeller-driven airplanes: Length of time and number heard or seen

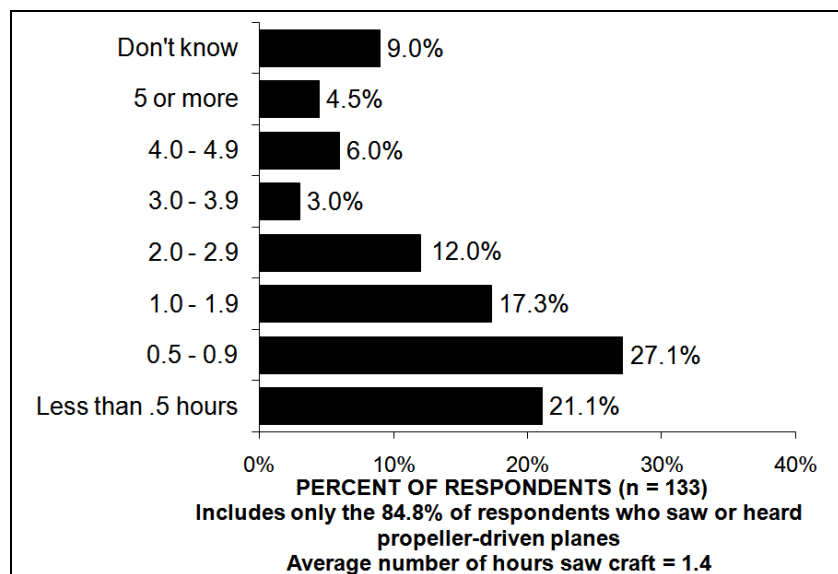


Figure B-35. Length of time propeller-driven airplanes were heard or seen

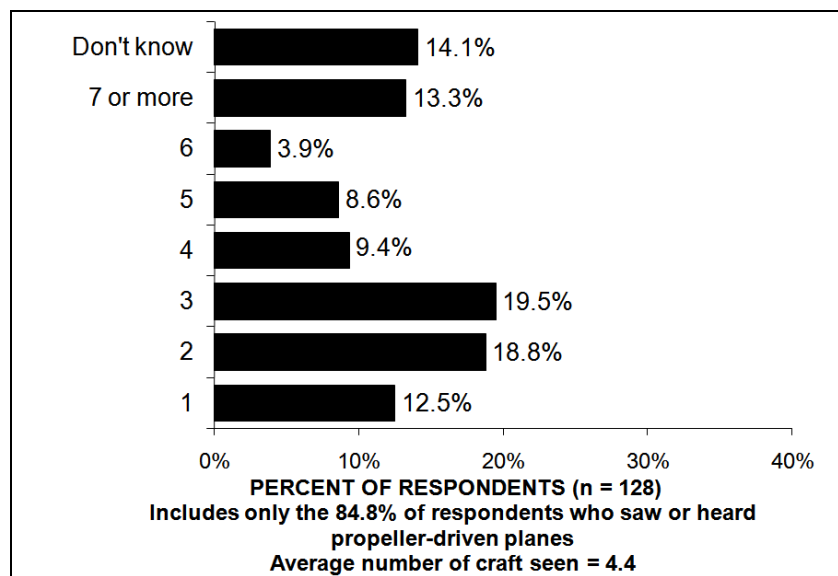


Figure B-36. Number of propeller-driven airplanes heard or seen

Helicopters: Length of time and number heard or seen

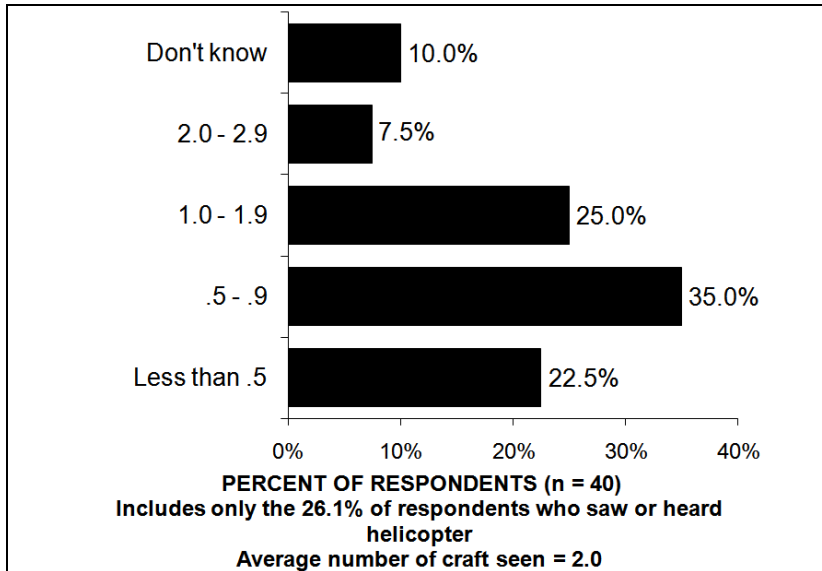


Figure B-37. Number of hours helicopters were heard or seen

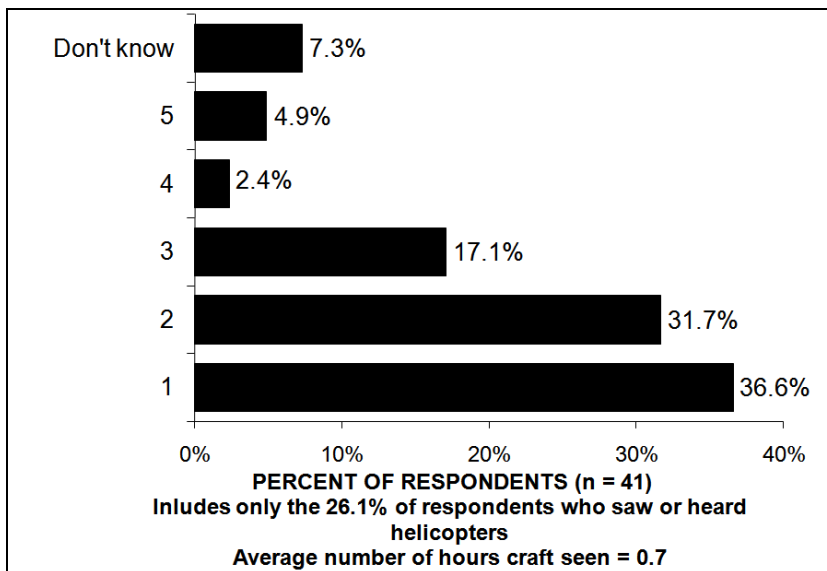


Figure B-38. Number of helicopters heard or seen

VII. EXPERIENCES WITH HAZE, PUBLIC ADDRESS SYSTEMS, AND ENGINE SOUNDS

Some aspects of encounters with different craft that may affect the quality of visitors' trip experiences in Glacier Bay National Park include haze and sounds from public address systems and engines. Backcountry visitors were asked about whether they experienced these different aspects and the effect these aspects had on their enjoyment of Glacier Bay proper. This section reports the findings related to these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question (see Section IV for details). When significant differences due to the number of cruise ships in the bay were found, they are reported. If findings related to number of cruise ships in the bay are not discussed, readers can assume that analyses found no significant effects for differences in the number of cruise ships in the bay each day.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences of presence of 2-cruise ships in the bay were found (see Assessing effects of presence of 2-cruise ships in the bay, p. 28).

Highlights

- The majority of overnight backcountry visitors did not see haze (67% or more). Haze from large cruise ships was seen by 22.8% of overnight backcountry respondents and 8.9% reported seeing haze from unidentified vessels. No one reported seeing haze from small cruise ships or tour boats.
- Haze from large cruise ships had more negative impact on backcountry visitors' trip enjoyment than haze from unidentified vessels. Of those who saw haze from large cruise ships, 72.2% reported that it detracted somewhat and 19.4% reported that it detracted greatly. Of those who saw haze from unidentified vessels, 42.9% reported that it detracted somewhat and 21.4% reported that it detracted greatly.
- Public address systems from large cruise ships were heard by twice as many overnight backcountry visitors as public address systems from small cruise ship or tour boats (42.4% versus 19.7%). A small percent of overnight backcountry visitors reported hearing public address systems from unidentified vessels (5.7%).
- Large cruise ships' public address systems were more likely to detract from overnight backcountry visitors' trip enjoyment than public address systems from small cruise ships, tour boats or unidentified vessels. Of those who heard large cruise ships' public address systems, 53.7% reported that they detracted somewhat and 37.3% reported that they detracted greatly. Of those who heard small cruise ships' public address systems, 67.7% reported that they detracted somewhat and 12.9% reported that they detracted greatly. Less than 10% reported that these public address systems added to their trip enjoyment. Public address systems from unidentified vessels were the most likely to detract greatly (55.6%) from trip enjoyment, although only a small percentage of overnight backcountry visitors reported hearing these PA systems.
- Large cruise ship engines were heard by fewer backcountry respondents (54.7%) than small cruise ship or tour boat engines (78.6%). Propeller-driven aircraft engines were heard by 81.1% of backcountry respondents and helicopter engines were heard by 23.4% of backcountry respondents.

- Although large cruise ship engines can be experienced as quieter than small cruise ship and tour boat engines, overnight backcountry visitors were slightly more likely to report that large cruise ship engines detracted from their trip enjoyment. Of those who heard large cruise ship engines, 63.2% reported that they detracted somewhat from their trip enjoyment and 20.7% reported they detracted greatly from their trip enjoyment. In comparison, of those who heard small cruise ship or tour boat engines, 59.7% reported they detracted somewhat from their trip enjoyment and 16.9% reported they detracted greatly from their trip enjoyment.
- Engines from aircraft were somewhat less likely to detract from backcountry visitors' trip enjoyment (totals of 75% and 69% reported detraction) than engines from watercraft.

Backcountry Visitor Survey

Mail survey

17. During the kayaking/hiking portion of your trip to Glacier Bay proper during which you were contacted for this survey, a variety of events may have occurred. For each event below, please indicate if it occurred and then circle how it affected your trip enjoyment of Glacier Bay proper.

	Did it occur?	How did the event affect your trip enjoyment of Glacier Bay proper?				
		↓	↓	↓	↓	↓
<u>EXPERIENCES WITH HAZE.</u>						
A. Haze from large cruise ship exhaust affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
B. Haze from small cruise ship or tour boat exhaust affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
C. Haze from unidentified vessel affected my views in some manner.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
<u>EXPERIENCES WITH PUBLIC ADDRESS SYSTEMS</u>						
D. Heard sound from large cruise ship public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
E. Heard sound from small cruise ship or tour boat public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
F. Heard sound from unidentified public address system	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
<u>EXPERIENCES WITH ENGINE SOUNDS</u>						
G. Heard large cruise ship engines.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
H. Heard engines of boats other than large cruise ships.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
I. Heard propeller-driven airplanes.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
J. Heard helicopters.	YES→ NO	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly

Experiences with haze

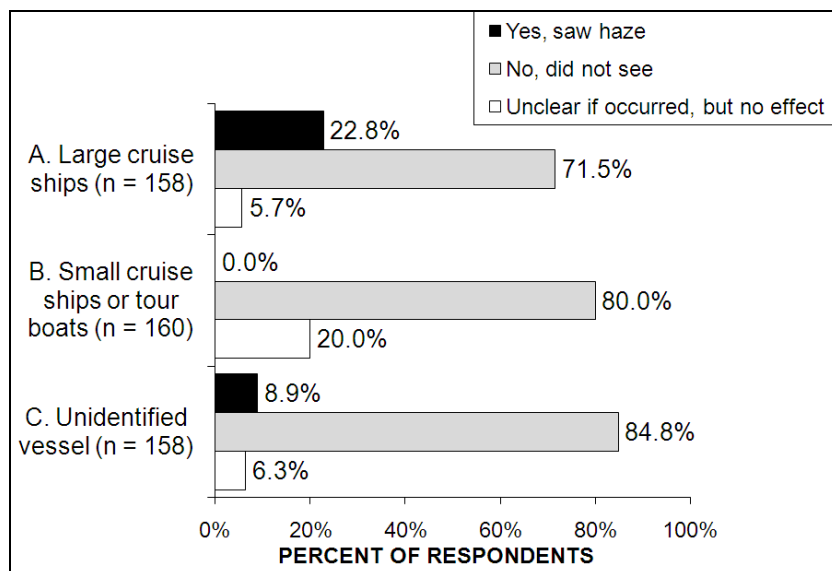


Figure B-39. Percent of respondents who experienced haze from different types of vessels

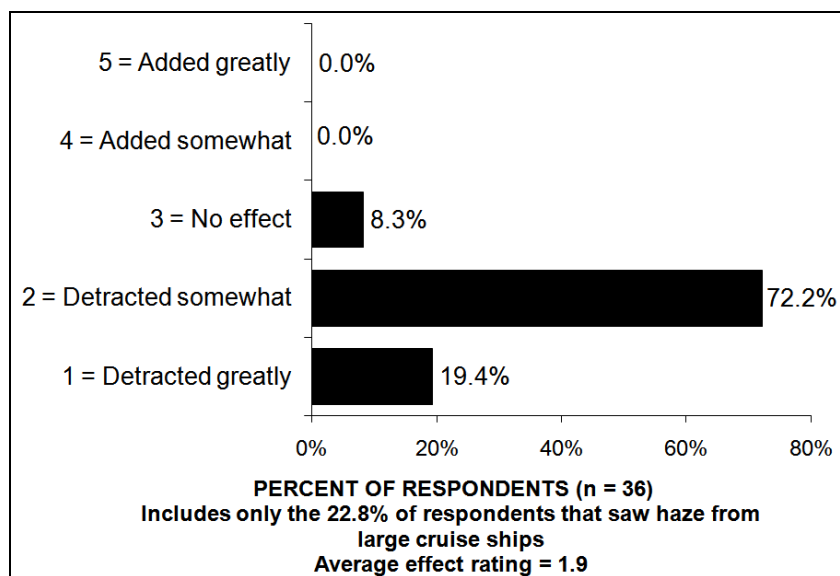


Figure B-40. Effect of experience of haze from large cruise ships on trip enjoyment

Backcountry Visitor Survey

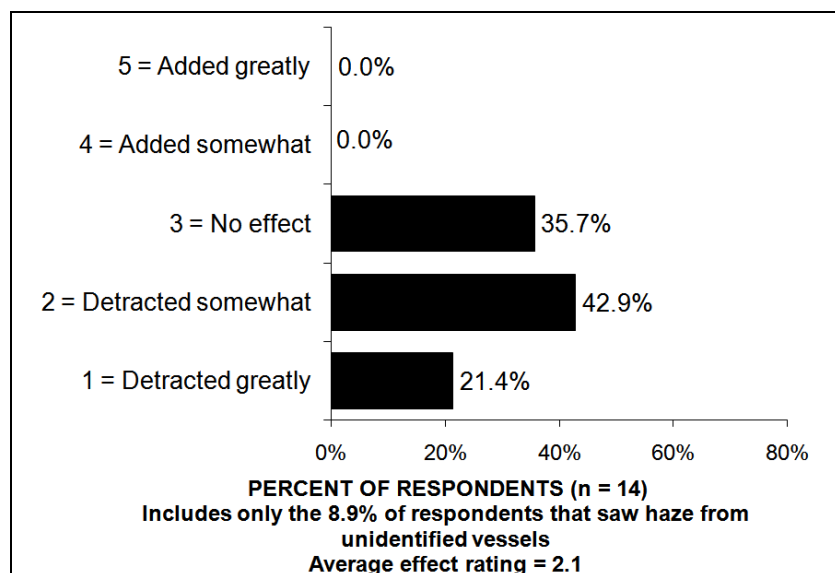


Figure B-41. Effect of experience of haze from unidentified vessels on trip enjoyment

Experiences with public address systems

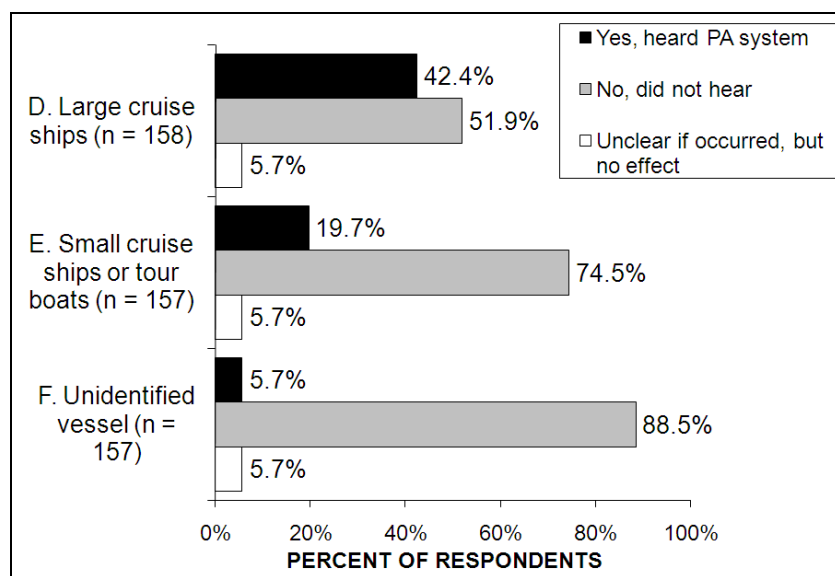


Figure B-42. Percent of respondents who experiences public address systems from different types of vessels

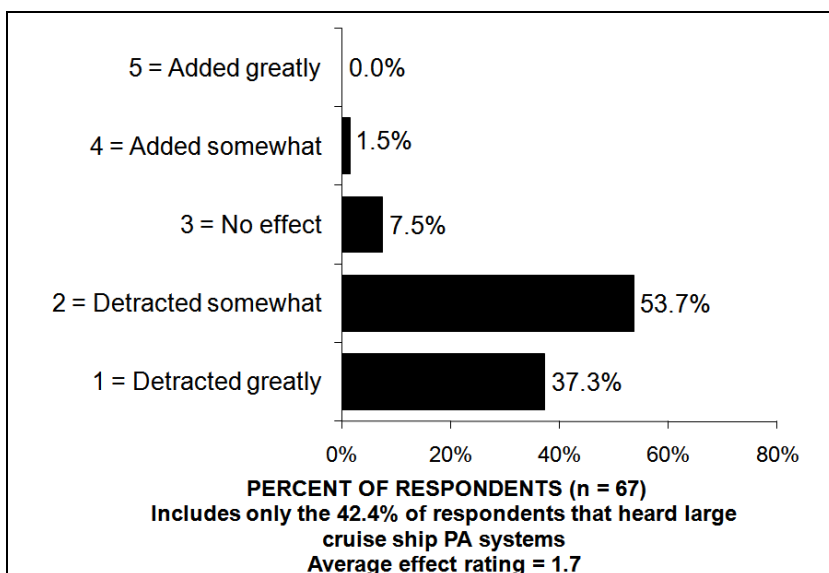


Figure B-43. Effect of large cruise ship public address systems on trip enjoyment

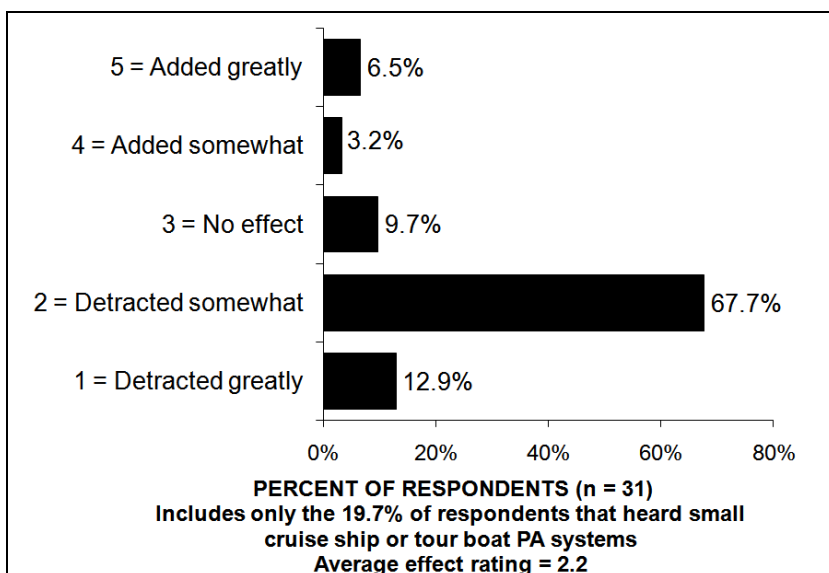


Figure B-44. Effect of small cruise ship or tour boat public address systems on trip enjoyment

Backcountry Visitor Survey

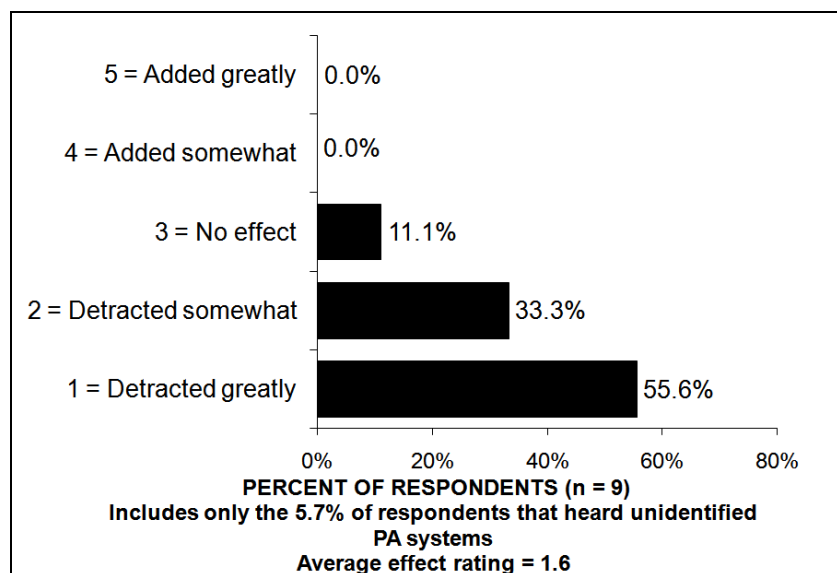


Figure B-45. Effect of unidentified public address systems on trip enjoyment

Experiences with engine sounds

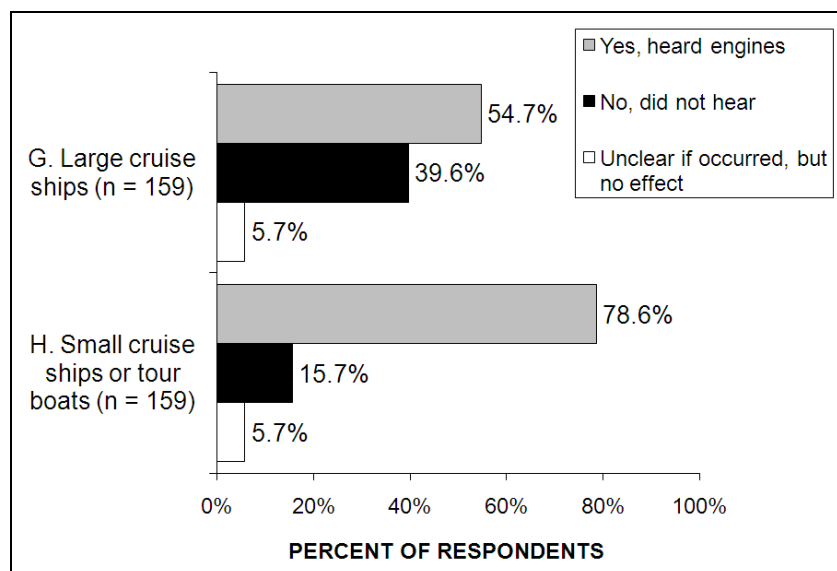


Figure B-46. Experiences with engine sounds from watercraft

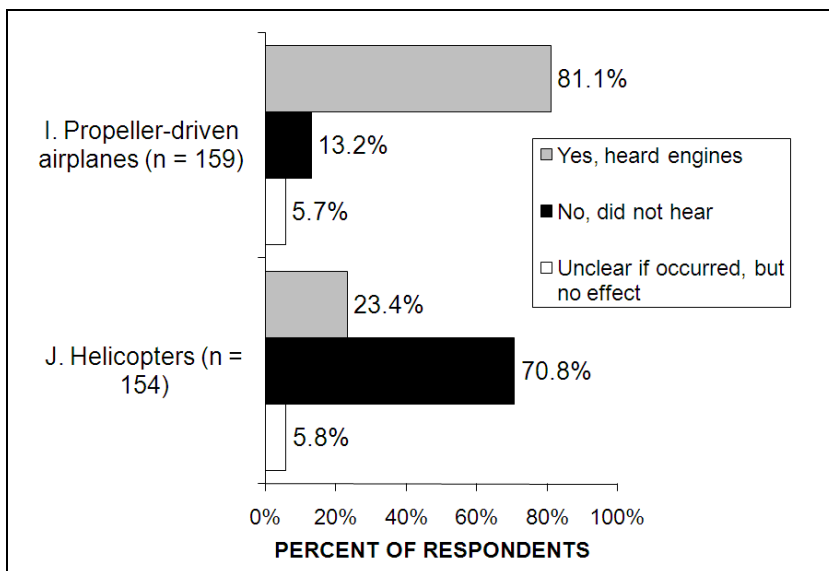


Figure B-47. Experience with engine sounds from aircraft

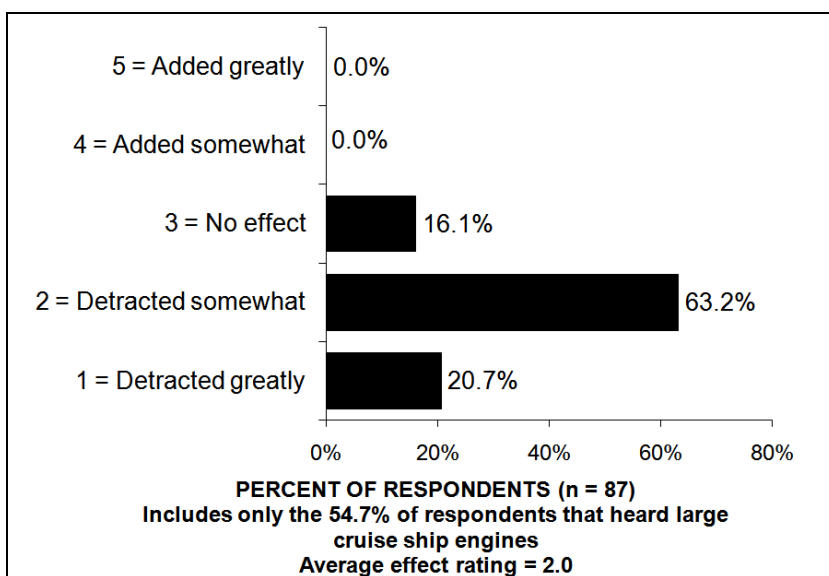


Figure B-48. Effect of hearing large cruise ship engines on trip enjoyment

Backcountry Visitor Survey

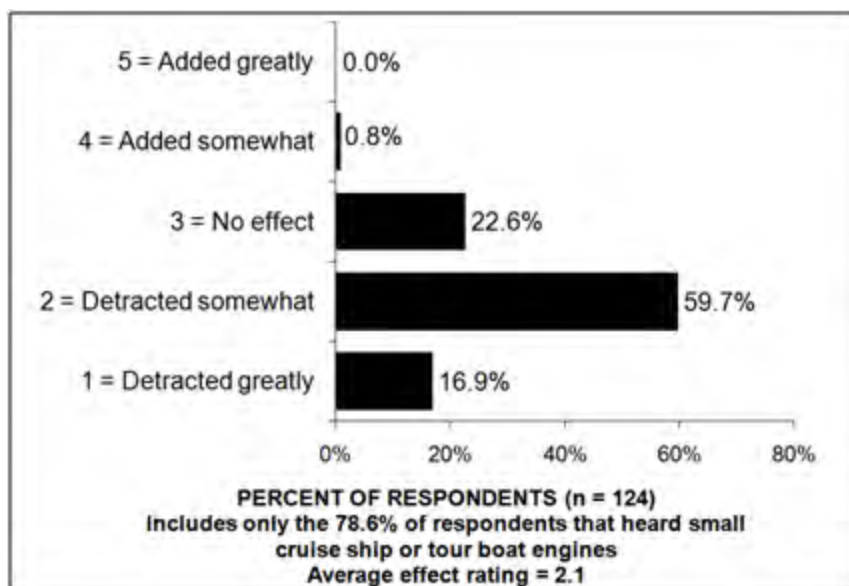


Figure B-49. Effect of hearing small cruise ship or tour boat engines on trip enjoyment

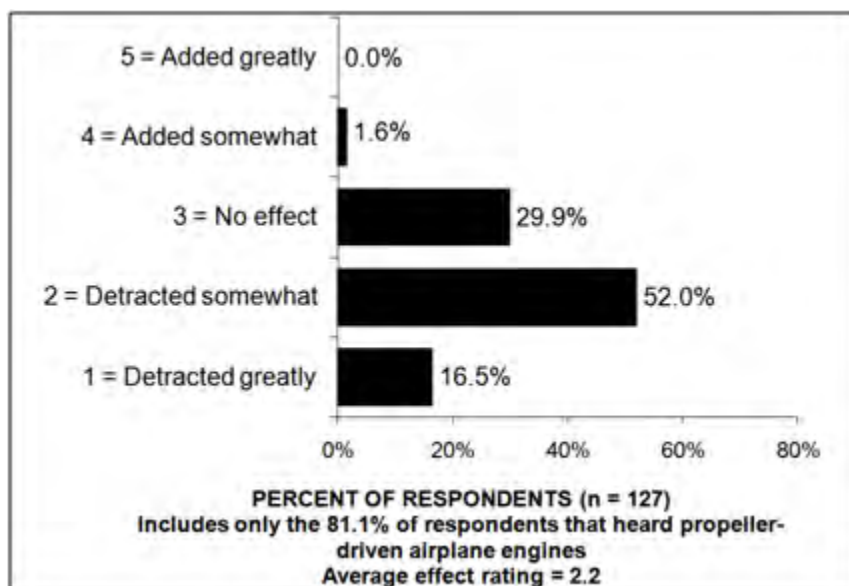


Figure B-50. Effect of hearing propeller-driven airplane engines on trip enjoyment

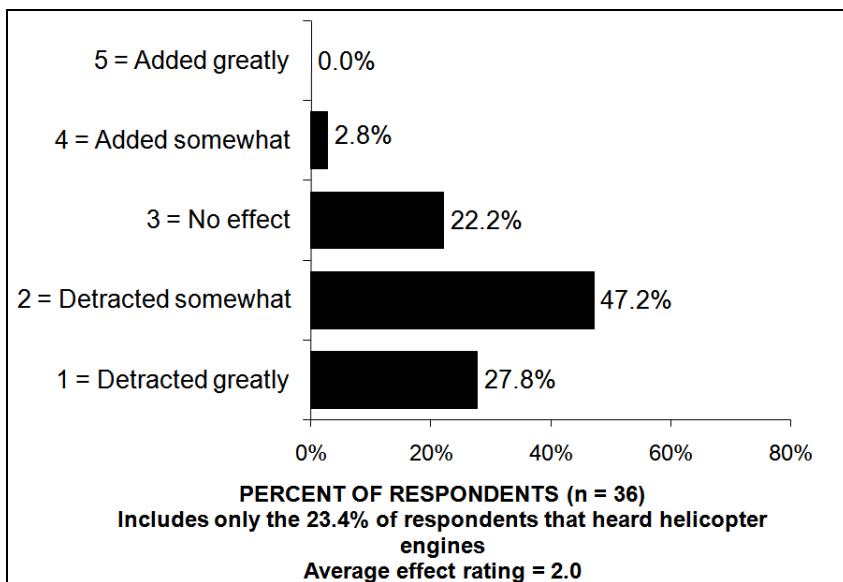


Figure B-51. Effect of helicopter engines on trip enjoyment

VIII. EFFECTS OF ENCOUNTERS: MARGERIE AND GRAND PACIFIC GLACIERS

Backcountry respondents were asked about encounters with cruise ships and other motorized craft when they were at Margerie and Grand Pacific glaciers. Respondents were asked how the presence of each type of craft present at the glaciers affected their enjoyment of the Margerie and Grand Pacific glaciers. This section reports the effects of encounters at Margerie and Grand Pacific glaciers.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question (see Section IV for details). When significant differences due to the number of cruise ships in the bay were found, they are reported. If findings related to number of cruise ships in the bay are not discussed, readers can assume that analyses found no significant effects for differences in the number of cruise ships in the bay each day.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences of presence of 2-cruise ships in the bay were found (see Assessing effects of presence of 2-cruise ships in the bay, p. 28).

Highlights

- Of the different types of craft seen by overnight backcountry respondents who visited Margerie and Grand Pacific glaciers, large cruise ships were the most likely to detract from backcountry visitors' enjoyment of the Margerie and Grand Pacific glaciers (47.6%). Motorized craft other than cruise ships (28.6%) was second.
- A small percent (9.5%) of overnight backcountry respondents who visited Margerie and Grand Pacific glaciers indicated that large cruise ships added to their enjoyment of the glaciers and 14.3% reported they had no effect on their enjoyment of Margerie and Grand Pacific glaciers.
- Kayaks were the most likely to add (13.6%) to overnight backcountry respondents' enjoyment of the Margerie and Grand Pacific glaciers.
- Helicopters had the highest rates of detracting for backcountry respondents who saw them at Margerie and Grand Pacific glaciers, however less than 10% of overnight backcountry respondents saw helicopters at Margerie and Grand Pacific glaciers.

Presence of different types of craft affected enjoyment of Margerie and Grand Pacific glaciers

Mail survey

12c. How did the presence of each type of craft affect your enjoyment of the Margerie/Grand Pacific tidewater glaciers during the kayaking/hiking portion of your trip?

How did the presence of each type of craft affect your enjoyment of Margerie/Grand Pacific glaciers during the kayaking/hiking portion of your trip?						
	↓	↓	↓	↓	↓	↓
	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
A. LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
B. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
C. KAYAKS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
D. PROPELLER-DRIVEN AIRPLANES	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
E. HELICOPTERS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly

As Q-12c was asked only of backcountry respondents who saw craft when visiting Margerie and Grand Pacific glaciers, backcountry respondents who saw no craft when visiting Margerie and Grand Pacific glaciers would not be included in the “did not see” category for these items presenting a distorted picture. To provide more meaningful results, backcountry respondents who visited Margerie and Grand Pacific glaciers and did not see any craft were included in the “did not see” category and the percentages for each response option reflect the increase in total n.

The data for Question 12c are presented in two ways: Table B-10 presents the effect ratings as a percent of all backcountry respondents who visited Margerie and Grand Pacific glaciers and Table B-11 presents the effect ratings as a percent of backcountry respondents who saw the craft when visiting Margerie and Grand Pacific glaciers.

As can be seen in Table B-10, of all the different types of craft, large cruise ships detracted from the enjoyment of the most overnight backcountry respondents who visited Margerie and Grand Pacific glaciers. Motorized craft other than large cruise ships was second. These two types of craft were also those most likely to be seen by overnight backcountry respondents when visiting Margerie and Grand Pacific glaciers.

Table B-11 presents the effects of the different type of craft for only those backcountry respondents who saw that type of craft when visiting the Margerie and Grand Pacific glaciers. These results show that seeing or hearing helicopters at Margerie and Grand Pacific glaciers have the greatest detraction rate of all craft whereas large cruise ships and propeller-driven aircraft were effectively tied for second.

Table B-10. Effects of different types of craft for backcountry respondents who visited Margerie and Grand Pacific glaciers

Type of craft	Percent of all respondents who visited Margerie and Grand Pacific glaciers					
	Did not see/ Don't know	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
Large cruise ships	28.6%	14.3%	33.3%	14.3%	9.5%	0.0%
Motorized craft other than large cruise ships	28.6%	4.8%	23.8%	38.1%	4.8%	0.0%
Kayaks	86.4%	0.0%	0.0%	0.0%	13.6%	0.0%
Propeller-driven aircraft	72.7%	0.0%	18.2%	9.1%	0.0%	0.0%
Helicopters	90.9%	4.5%	4.5%	0.0%	0.0%	0.0%

Table B-11. Effects of different types of craft for backcountry respondents who saw/heard craft at Margerie and Grand Pacific glaciers

Type of craft	Saw craft at glaciers	Percent of respondents who saw/heard type of craft at Margerie/Grand Pacific glaciers						
		<i>n</i>	Average effect rating	1 = Detracted greatly	Detracted somewhat	No effect	Added somewhat	5 = Added greatly
Large cruise ships	71.4%	15	2.3	20.0%	46.7%	20.0%	13.3%	0.0%
Motorized craft other than large cruise ships	71.4%	15	2.6	6.7%	33.3%	53.3%	6.7%	0.0%
Kayak	13.6%	3	4.0	0.0%	0.0%	0.0%	100%	0.0%
Propeller-driven aircraft	27.3%	6	2.3	0.0%	66.7%	33.3%	0.0%	0.0%
Helicopters	9.1%	2	1.5	50.0%	50.0%	0.0%	0.0%	0.0%

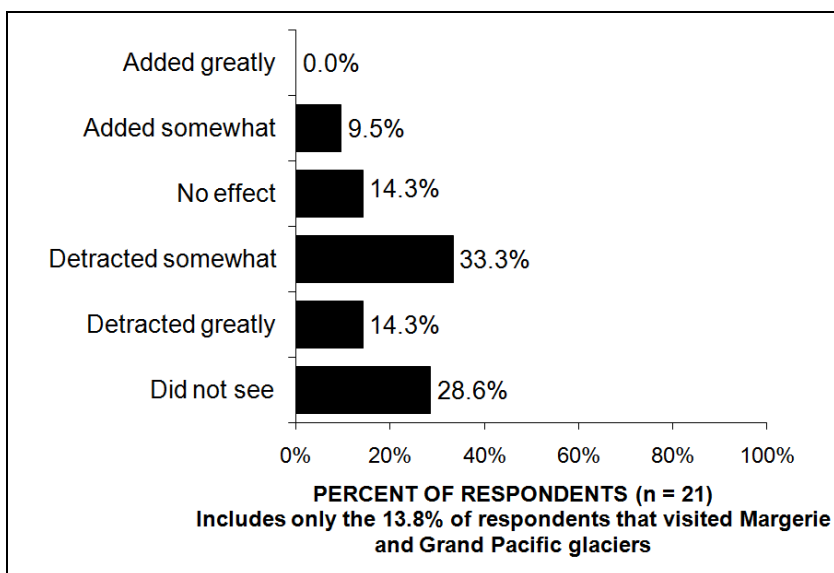


Figure B-52. Effect of seeing large cruise ships at Margerie and Grand Pacific glaciers

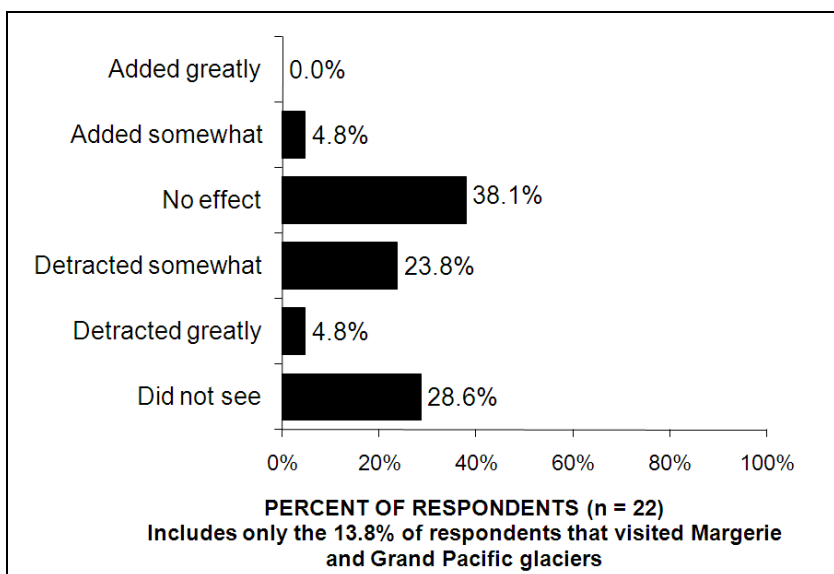


Figure B-53. Effect of seeing motorized water craft other than large cruise ships at Margerie and Grand Pacific glaciers

Backcountry Visitor Survey

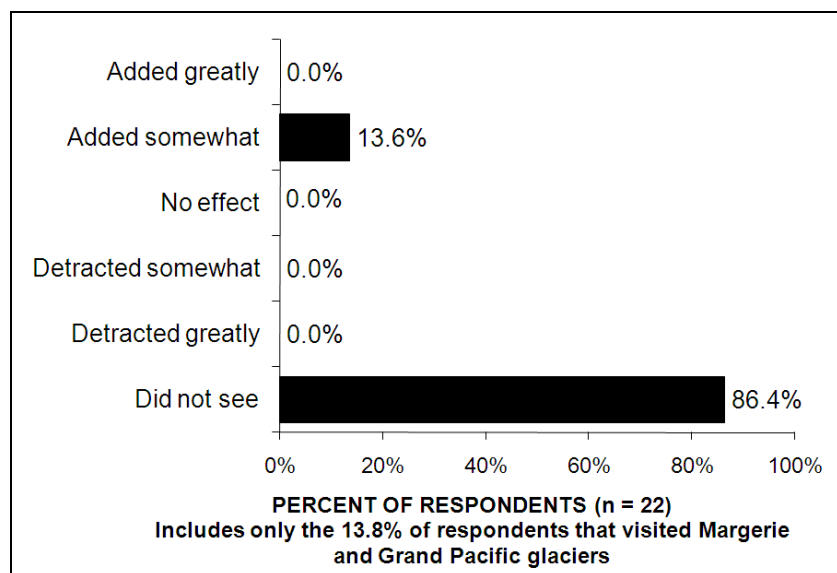


Figure B-54. Effect of seeing kayakers at Margerie and Grand Pacific glaciers

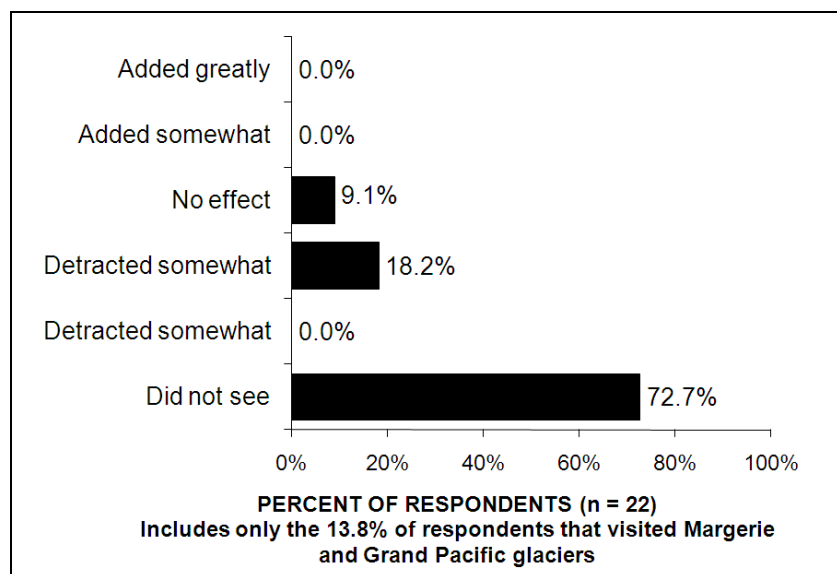


Figure B-55. Effect of seeing propeller-driven airplanes at Margerie and Grand Pacific glaciers

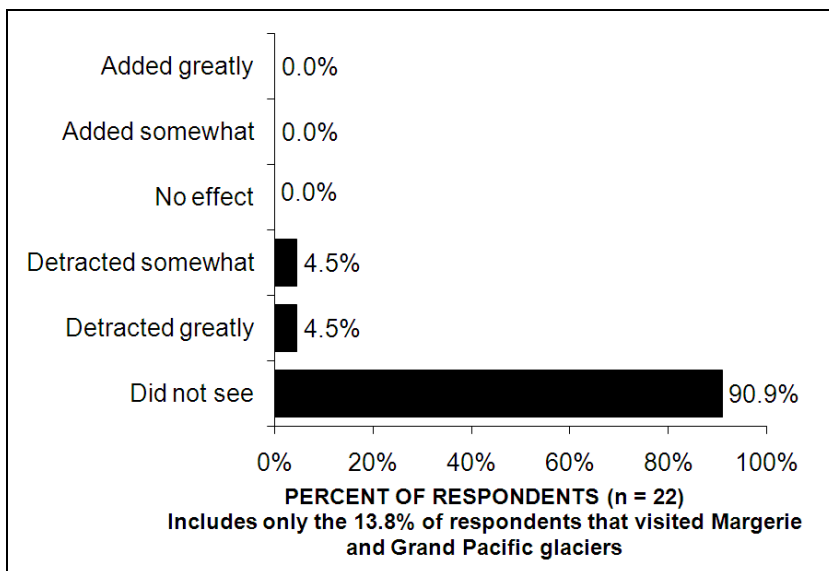


Figure B-56. Effect of seeing helicopters at Margerie and Grand Pacific glaciers

IX. EFFECTS OF ENCOUNTERS: ENTIRE TRIP

Backcountry respondents were asked about encounters with cruise ships and other motorized craft during their whole trip. Respondents were asked about the effects of these encounters on 1) enjoyment of Glacier Bay proper, 2) specific aspects of trip experience, and 3) on future recommendations. This section reports the findings for these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question (see Section IV for details). When significant differences due to the number of cruise ships in the bay were found, they are reported. If findings related to number of cruise ships in the bay are not discussed, readers can assume that analyses found no significant effects for differences in the number of cruise ships in the bay each day.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences of presence of 2-cruise ships in the bay were found (see Assessing effects of presence of 2-cruise ships in the bay, p. 28).

Highlights

- Of all motorized craft, large cruise ships detracted from the highest percentage (66.5%) of all overnight backcountry visitors' enjoyment of Glacier Bay proper. This effect was not due to more overnight backcountry visitors seeing cruise ships. Of backcountry respondents who saw each type of craft, backcountry respondents who saw large cruise ships had the highest detraction rates.
- Motorized craft other than large cruise ships and helicopters were tied for the second highest rate of detraction for backcountry visitors. These findings indicated that the low overall detraction rate for helicopters was due to a low encounter rate rather than the helicopters being innocuous. Thus, increases in helicopter traffic would increase the overall levels of negative effects from these craft.
- Of 8 possible trip experiences that backcountry visitors may have in Glacier Bay proper, large cruise ships detracted from those most related to wilderness experiences as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). Specifically, trip experiences most affected by seeing or hearing large cruise ships were 1) Solitude and 2) Pristine environment.
- There was a slight relationship between the importance of a trip experience and the effect of large cruise ships upon it for backcountry visitors. This relationship however was such that items that were more important were less affected by cruise ships. The three dimensions that were most affected, "Solitude," "Tranquility," and "Pristine Environment," were the least important, the second least important, and the fourth most important, respectively. The three most important dimensions of "Scenic beauty," "Wonder of nature," and "View wildlife" were the fifth, sixth, and eighth most affected dimensions, respectively.
- The majority of overnight backcountry visitors reported that encounters with large cruise ships had no effect on the viewing of land (80%) and marine (74%) animals. A small percentage of overnight backcountry visitors reported that large cruise ships made animals move to where they could not see them easily (5% for land animals and 8% for marine animals). Large cruise ships blocked the view of animals for a small number of overnight backcountry visitors (1% for land animals and 5% for marine animals).

- Most (79.9%) overnight backcountry visitors reported being very likely to recommend family or friends kayak or hike Glacier Bay. Experience with the different types of craft had no effect on the likelihood of making a recommendation for the majority of overnight backcountry visitors (60% or more for each type of craft). Of the different types of craft, experiences with large cruise ships was the most likely to decrease the likelihood that backcountry visitors recommend others kayak or hike Glacier Bay.
- Overall ratings of the time spent boating/cruising in Glacier Bay proper indicated that 56% of overnight backcountry visitors' time was "extremely good" and 34% of overnight backcountry visitors' time was "very good." Less than 1% of overnight backcountry visitors rated their time spent boating/cruising in Glacier Bay proper as poor, very poor, or extremely poor.

Effect of encounters of different types of craft on enjoyment of Glacier Bay proper

Mail Survey

11. During the kayaking/hiking portion of your trip in which you were contacted, how did seeing or hearing (other than your own transport) each type of motorized craft affect your enjoyment of Glacier Bay proper?

	How did seeing or hearing the following vehicles affect your enjoyment of Glacier Bay proper?					
	↓	↓	↓	↓	↓	↓
A. LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
B. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
C. PROPELLER-DRIVEN AIRPLANES	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly
D. HELICOPTERS	Did not see	Detracted greatly	Detracted somewhat	No Effect	Added somewhat	Added greatly

The data for Question 11 are presented in two ways: Table B-12 presents the effect ratings as a percent of all respondents and Table B-13 presents the effect ratings as a percent of those who saw the craft. As can be seen in Table B-12, large cruise ships were the third most commonly seen or heard type of craft by overnight backcountry visitors although they resulted in the highest rates of detraction from enjoyment of Glacier Bay proper. Motorized craft other than large cruise ships were the second most likely to detract from overnight backcountry visitors' enjoyment of Glacier Bay proper.

Looking at Table B-13, it was clear that the higher rates of detraction for large cruise ships was not due to just more overnight backcountry visitors seeing or hearing large cruise ships. Of backcountry respondents who saw each type of craft, those who saw large cruise ships reported the highest rates of detraction. However, Table B-13 also shows that motorized craft other than large cruise ships and helicopters were tied for the second highest rate of detraction among backcountry visitors. These findings indicate that the low level of overall detraction rate for helicopters was due to low encounter rates rather than the helicopters being innocuous. Thus, increases in helicopter traffic would increase the overall levels of negative effects from these craft.

Table B-12. Effect of different craft on enjoyment of Glacier Bay proper: Percent of all respondents

Type of craft	Percent of all respondents					
	Did not see/ Don't know	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
Large cruise ships	16.5%	22.2%	44.3%	15.8%	1.3%	0.0%
Motorized craft other than large cruise ships	9.4%	10.1%	54.1%	22.6%	3.8%	0.0%
Propeller-driven aircraft	15.2%	11.4%	42.4%	29.1%	1.9%	0.0%
Helicopters	73.5%	4.5%	14.2%	5.8%	1.9%	0.0%

Table B-13. Effect of different craft on enjoyment of Glacier Bay proper: Percent who saw craft

Type of craft	Saw craft	<i>n</i>	Average effect rating	Percent of respondents who saw craft				
				1 = Detracted greatly	Detracted somewhat	No effect	Added somewhat	5 = Added greatly
Large cruise ships	83.5%	132	2.0	26.5%	53.0%	18.9%	1.5%	0.0%
Motorized craft other than large cruise ships	90.6%	144	2.2	11.1%	59.7%	25.0%	4.2%	0.0%
Propeller-driven aircraft	84.8%	134	2.3	13.4%	50.0%	34.3%	2.2%	0.0%
Helicopters	26.5%	41	2.2	17.1%	53.7%	22.0%	7.3%	0.0%

Effect of encounters with large cruise ships on different trip experiences

The qualitative interviews conducted during Summer 2007 revealed seven dimensions of visitor experience that were affected by cruise ships. These identified dimensions of visitor experience had significant overlap with dimensions of visitor experience measured by the list of Recreational Experience Preference (REP) items. To have two items for each dimension, 9 REP items were selected and 5 new items were constructed using the REP format (see general Introduction for more detail). Respondents were asked the importance of each of these experiences during their visit to Glacier Bay (see page 20). Additionally respondents were asked how hearing or seeing a large cruise ship affected each possible trip experience.

Backcountry Visitor Survey

Mail survey

9. How did hearing or seeing a large cruise ship affect each of the following aspects of your kayaking/hiking experience in Glacier Bay proper? <i>(Circle one response for each aspect of your experience.)</i>		How did hearing or seeing a large cruise ship affect each of the following aspects of your kayaking/hiking experience? ↓ ↓ ↓ ↓ ↓				
A.	EXPERIENCE THE SCENIC BEAUTY	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
B.	EXPERIENCE TRANQUILITY	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
C.	BE AMAZED BY NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
D.	EXPERIENCE A PRISTINE SETTING	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
E.	ENJOY THE SOUNDS OF NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
F.	EXPERIENCE SOLITUDE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
G.	EXPERIENCE NATURE UNTOUCHED BY HUMANS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
H.	HAVE PERSONAL EXPERIENCES WITH NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
I.	VIEW WILDLIFE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
J.	EXPERIENCE NATURE'S WONDERS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
K.	BE CLOSE TO NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
L.	FEEL ALONE WITH NATURE	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
M.	EXPERIENCE PEACE AND CALM	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly
N.	EXPERIENCE THE NATURAL SOUNDS	Detracted greatly	Detracted somewhat	No effect	Added somewhat	Added greatly

Cronbach's alpha was calculated for each of the seven dimensions to assess the internal consistency of the two scale items selected to measure the effect of cruise ships on each dimension. George and Mallery (2003) provide the following rules of thumb: “_ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and < .5 – Unacceptable” (p. 231). As can be seen in Table B-14, Cronbach's alpha was over 0.8 for 6 of the 7 scales indicating good reliability of those scales. The Cronbach's alpha for the scale for “Seeing nature” was 0.599 indicating poor reliability. Because it was unlikely that the same latent variable underlies these two items for backcountry visitors, these two items were treated as two separate scales measuring different dimensions. Thus, a total of 8 scales representing 8 dimensions were used in subsequent analyses.

Table B-14. Internal consistency measure (Cronbach's alpha) for each dimension

Scale	Items	Cronbach's alpha
Seeing nature		0.599
	View wildlife	
	Experience the scenic beauty	
Experiencing the wonder of nature		0.876
	Be amazed by nature	
	Experience nature's wonders	
Intimate experience with nature		0.857
	Have personal experiences with nature	
	Be close to nature	
Hear the sounds of nature		0.938
	Enjoy the sounds of nature	
	Experience the natural sounds	
Tranquility		0.890
	Experience tranquility	
	Experience peace and calm	
Solitude		0.864
	Experience solitude	
	Feel alone with nature	
Pristine environment		0.828
	Experience a pristine setting	
	Experience nature untouched by humans	

Table B-15 reveals that the trip experiences most affected by seeing or hearing a large cruise ship were: 1) Solitude and 2) Pristine environment. Review of all items suggests that the presence of large cruise ships affected the ratings on the items that most strongly represent wilderness experience as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). Furthermore, for each item, the most frequent scale score indicated “No effect.” A few backcountry visitors indicated for each trip experience that large cruise ships “Added somewhat” or “Added greatly” to their experience. All 8 of the trip experiences average effect ratings were below 3, the “No effect” point on the scale.

Backcountry Visitor Survey

Table B-15. Effects of large cruise ships on trip experiences

Trip Experiences	N	Mean	Percent of people rating effect of seeing/hearing large cruise ship during this trip to Glacier Bay proper on experiences ¹								
			1	1.5	2	2.5	3	3.5	4	4.5	5
Solitude	134	1.81	30.6	17.2	29.1	6.7	15.7	0.7	0.0	0.0	0.0
Pristine environment	134	1.97	23.1	15.7	29.1	10.4	20.9	0.0	0.0	0.7	0.0
Experience the scenic beauty	133	2.20	15.8		52.6		28.6		2.3		0.8
Tranquility	134	1.96	22.4	13.4	35.1	9.0	19.4	0.0	0.7	0.0	0.0
Experiencing the wonder of nature	133	2.48	7.5	7.5	21.1	12.0	48.9	3.0	0.0	0.0	0.0
Intimate experience with nature	132	2.48	7.6	4.5	22.0	17.4	47.7	0.8	0.0	0.0	0.0
Hear the sounds of nature	132	2.15	20.5	6.1	31.8	8.3	32.6	0.0	0.8	0.0	0.0
View wildlife	133	2.59	8.3		24.1		67.7		0.0		0.0

¹The rating scale included for each item was: 1 = Detracted greatly, 2 = Detracted somewhat, 3 = No effect, 4 = Added somewhat, 5 = Added greatly. Scale values that fall between the 5 points on the rating scale are due to averaging the ratings for the two scale items for a dimension.

Backcountry respondents were asked about the importance of each of these 8 trip experiences as well (see page 20). To see whether the important trip experiences were more (or less) likely to be affected by large cruise ships, the average importance ratings were plotted against the average detraction ratings. As shown in Figure B-57, points of greatest concern would be those that fell in the lower right-hand quadrant of the plot. This area corresponds to important trip experiences from which cruise ships detracted. The area denoted by the dotted line corresponds to the area presented in Figure B-58 showing the average importance ratings by average detraction ratings for backcountry visitors.

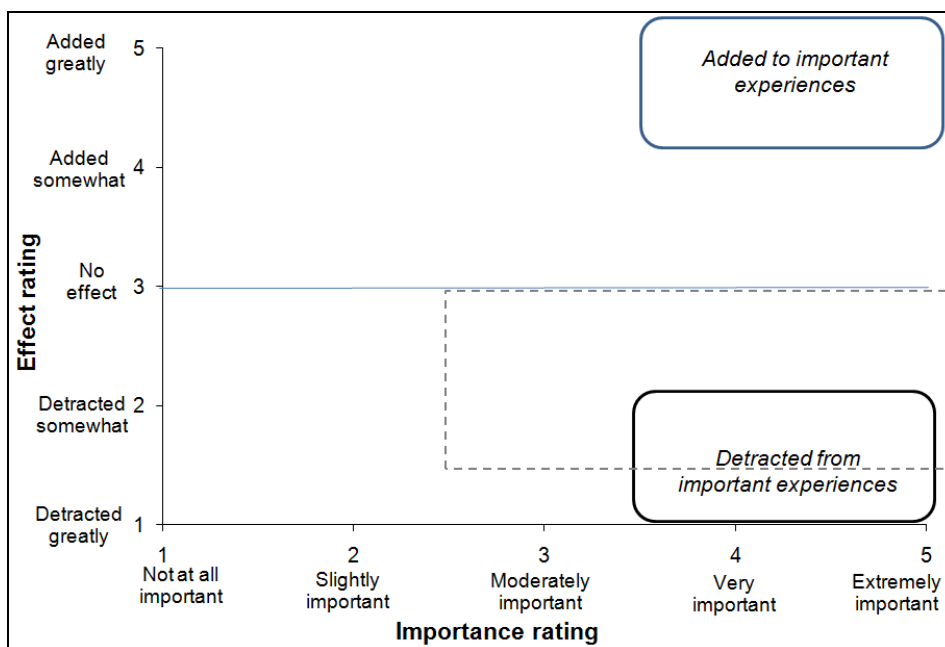


Figure B-57. Average importance ratings by average effect ratings for each type of trip experience

As can be seen in Figure B-58, for backcountry visitors there was a slight relationship between the importance of a trip experience and the effect of large cruise ships upon it. This relationship however was such that items that were more important were less affected by cruise ships. The three dimensions that were most affected, “Solitude,” “Tranquility,” and “Pristine Environment,” were the least important, the second least important, and the fourth most important, respectively. The three most important dimensions of “Scenic beauty,” “Wonder of nature,” and “View wildlife” were the fifth, sixth, and eighth most affected dimensions, respectively.

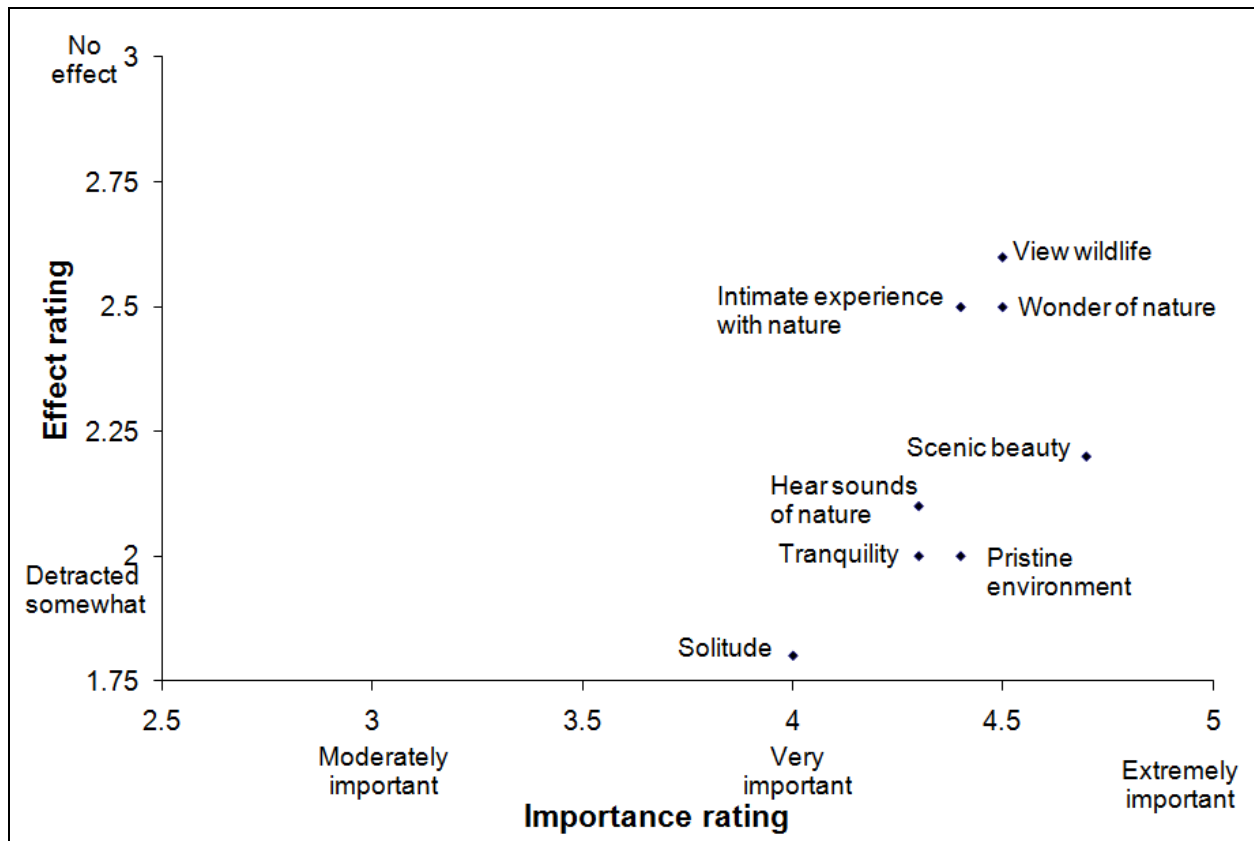


Figure B-58. Average importance ratings by average effect ratings for each trip experience dimension

Effect of encounters with large cruise ships on viewing land animals

Mail survey

14. During the kayaking/hiking portion of your trip to Glacier Bay proper, how did large cruise ships affect your viewing of **land animals** (e.g., bear, moose, etc.)? (*Check all that apply*)

- ☐ Large cruise ships blocked my view of land animals.
- ☐ Large cruise ships made land animals move to where I could easily see them.
- ☐ Large cruise ships made land animals move to where I could not easily see them.
- ☐ Large cruise ships had no effect.
- ☐ Don't know/Don't remember.

Responses to “Don’t know/Don’t remember” were significantly related to number of days there were 2-cruise ships in the bay even when adjusting for number of nights spent in the backcountry, $p = .035$ (significance of coefficient from logistic regression analysis). The analysis that included number of nights spent in the backcountry and number of 2 cruise ship in the bay days as predictors was used to predict the likelihood that respondents would not know or remember if large cruise ships affected their viewing of land animals. It was assumed that there would be no change in the average length of stay (5.6 days) and that every day there were 2-cruise ships in the bay. The logistic regression equation predicted that for a stay of 5.6 days and 2 cruise ships in the bay everyday that 20% of overnight respondents would report “Don’t know/don’t remember” if large cruise ships affected the viewing of land animals, an increase of 6 percentage points from 13.7% under current conditions. Although analyses suggest a shift in

“Don’t know/Don’t remember” responses under the 2 cruise ships in the bay every day scenario, it is not clear why this shift might occur.

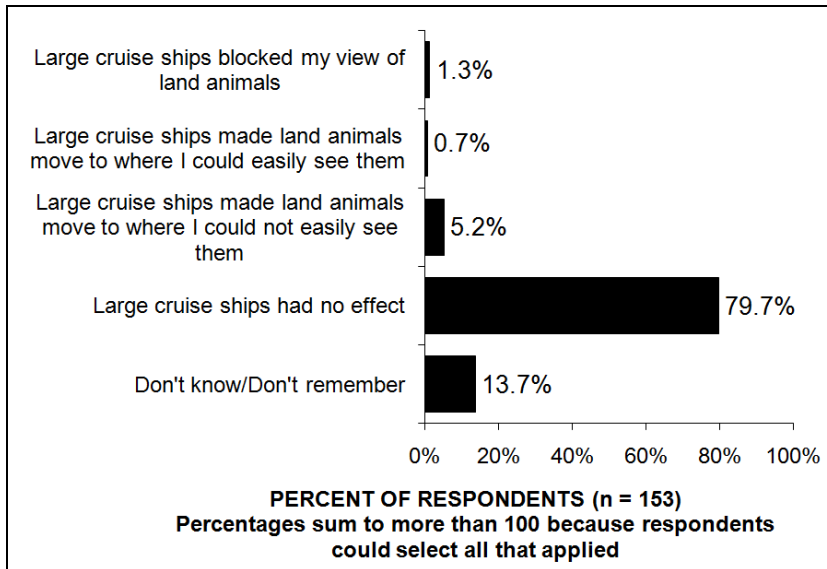


Figure B-59. Effect of large cruise ships on viewing land animals

Effect of encounters with large cruise ships on viewing marine animals

Mail survey

15. During the kayaking/hiking portion of your trip to Glacier Bay proper, how did large cruise ships affect your viewing of **marine animals** (e.g., whales, sea lions, etc.)? (*Check all that apply*)

- ☐ Large cruise ships blocked my view of marine animals.
- ☐ Large cruise ships made marine animals move to where I could easily see them.
- ☐ Large cruise ships made marine animals move to where I could not easily see them.
- ☐ Large cruise ships had no effect.
- ☐ Don't know/Don't remember.

Backcountry Visitor Survey

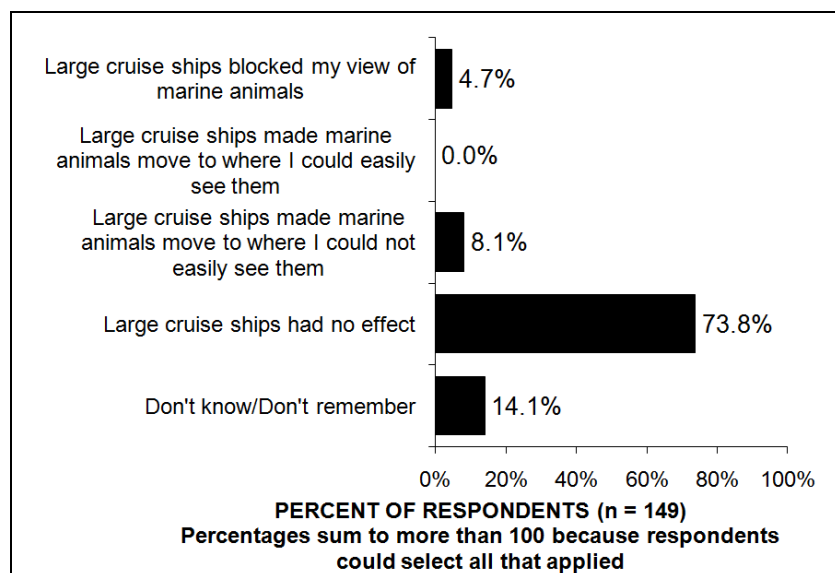


Figure B-60. Effect of large cruise ships on viewing marine animals

Future recommendations to visit Glacier Bay

Given their trip experience, overnight backcountry respondents were asked how likely they would be to recommend a friend or family member kayak or hike Glacier Bay (Q-19). A follow-up question asked how their experience with different kinds of craft affected their likelihood of recommending a similar visit (Q-20).

Mail Survey

19. Based on your trip experience kayaking/hiking in Glacier Bay, how likely would you be to recommend that a friend or family member kayak/hike Glacier Bay?

- ☐ Very likely to recommend visiting Glacier Bay.
- ☐ Somewhat likely to recommend visiting Glacier Bay.
- ☐ No opinion
- ☐ Somewhat unlikely to recommend visiting Glacier Bay.
- ☐ Very unlikely to recommend visiting Glacier Bay.

20. How did your experience (or lack of it) with each of the following types of craft affect whether you would recommend that a friend or family member kayak/hike Glacier Bay proper?

	How did your experience (or lack of) with each craft affect whether you recommend others kayak/hike Glacier Bay?				
	↓	↓	↓	↓	↓
A. LARGE CRUISE SHIPS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
B. MOTORIZED WATER CRAFT OTHER THAN LARGE CRUISE SHIPS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
C. PROPELLER-DRIVEN AIRPLANES	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely
D. HELICOPTERS	A lot less likely	Somewhat less likely	No Effect	Somewhat more likely	A lot more likely

As can be seen in Figure B-61, 79.9% of overnight backcountry visitors reported being very likely to recommend a friend or family member kayak or hike Glacier Bay. A small percentage (5.1%) of overnight backcountry visitors said they would be somewhat or very unlikely to recommend kayaking/hiking Glacier Bay. As can be seen in Table B-16, experience with the different types of craft had no effect for the majority of overnight backcountry visitors on their likelihood of recommendation. Experience with large cruise ships was the most likely to decrease the likelihood that people recommend others kayak or hike Glacier Bay followed by experience with motorized craft other than large cruise ships.

Backcountry Visitor Survey

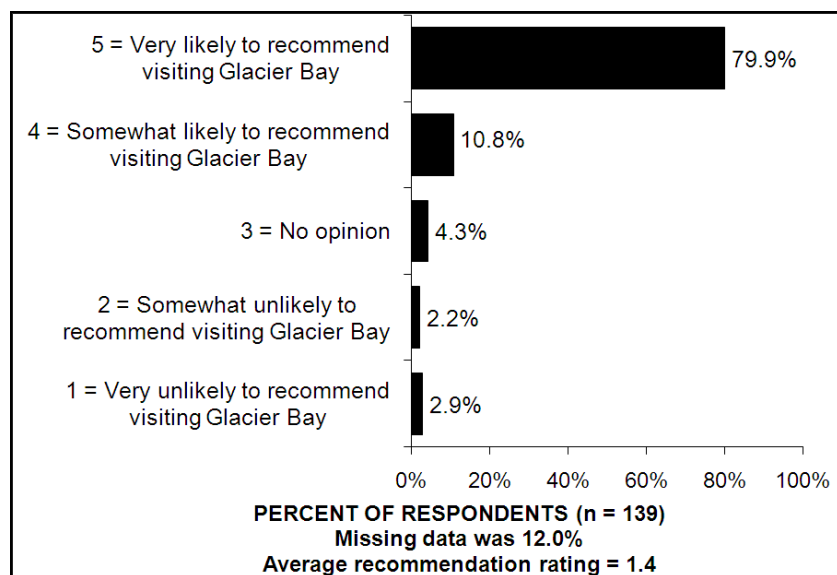


Figure B-61. Likelihood of recommending a friend or family member kayak/hike Glacier Bay

Table B-16. Effect of experience with different craft on future recommendations

Type of craft	Percent of all respondents				
	A lot less likely	Somewhat less likely	No effect	Somewhat more likely	A lot more likely
Large cruise ships	8.3%	22.9%	62.4%	3.8%	2.5%
Motorized craft other than large cruise ships	3.2%	16.5%	74.7%	4.4%	1.3%
Propeller-driven aircraft	2.5%	10.2%	84.1%	1.9%	1.3%
Helicopters	1.9%	7.1%	87.0%	1.9%	1.9%

Overall rating of time spent boating/cruising in Glacier Bay proper

Overnight backcountry visitors were asked to rate overall the time they spent boating/cruising in Glacier Bay proper. This question served as a global measure of effect of cruise ships on visitor experience. As can be seen in Figure B-62, 56.2% of overnight backcountry visitors rated their time boating or cruising in Glacier Bay proper as “Extremely good” and 34.0% rated the time as “Very good”.

Mail Survey

21. Overall, how would you rate the time you spent boating/cruising in Glacier Bay proper during your trip?
(Check one box.)

- ☐ Extremely poor
- ☐ Very poor
- ☐ Poor
- ☐ Good
- ☐ Very good
- ☐ Extremely good

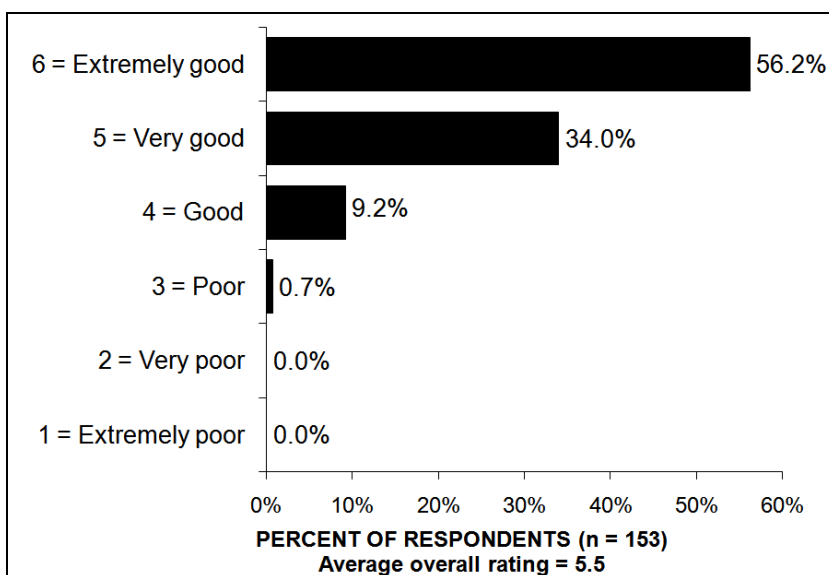


Figure B-62. Overall rating of time spent boating/cruising in Glacier Bay proper

X. OPINIONS REGARDING CRUISE SHIPS IN GLACIER BAY PROPER

Respondents were asked the extent to which they agreed with four statements regarding the presence of cruise ships in Glacier Bay proper (see Q-16 below). This section reports the findings from these questions.

Because encounters with cruise ships and other motorized craft may differ when one versus two cruise ships are in the bay, differences due to the number of cruise ships in the bay were examined for each question (see Section IV for details). When significant differences due to the number of cruise ships in the bay were found, they are reported. If findings related to number of cruise ships in the bay are not discussed, readers can assume that analyses found no significant effects for differences in the number of cruise ships in the bay each day.

Estimates for variables under current and maximum allowed seasonal use levels are provided when significant differences of presence of 2-cruise ships in the bay were found (see Assessing effects of presence of 2-cruise ships in the bay, p. 28).

Mail survey

16. Please indicate the extent to which you agree or disagree with each of the following statements.						
		Do you agree or disagree with this statement?				
		↓	↓	↓	↓	↓
A.	LARGE CRUISE SHIPS IN GLACIER BAY PROPER ARE MAJESTIC.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
B.	LARGE CRUISE SHIPS PROVIDED A SENSE OF SCALE WHEN VIEWING SCENERY IN GLACIER BAY	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
C.	LARGE CRUISE SHIPS ARE A GOOD WAY FOR A LARGE NUMBER OF PEOPLE TO VISIT GLACIER BAY PROPER	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
D.	IT IS INAPPROPRIATE FOR LARGE CRUISE SHIPS TO BE IN GLACIER BAY PROPER	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Highlights

- Of the four statements, overnight backcountry visitors were most likely to agree with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper” (54.1%) and to disagree with “Large cruise ships in Glacier Bay proper are majestic” (81.1%).
- Overnight backcountry visitors were equally likely to agree as disagree with two of the statements: “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay” and “It is inappropriate for large cruise ship to be in Glacier Bay proper.”
- Responses to these four statements were correlated (r 's ranged from .45 to .63).

Agreement with “Large cruise ships in Glacier Bay proper are majestic.”

The majority (81.1%) of overnight backcountry visitors disagreed or strongly disagreed that large cruise ships in Glacier Bay proper are majestic. A small number (5.7%) of overnight backcountry visitors felt that large cruise ships in Glacier Bay proper were majestic.

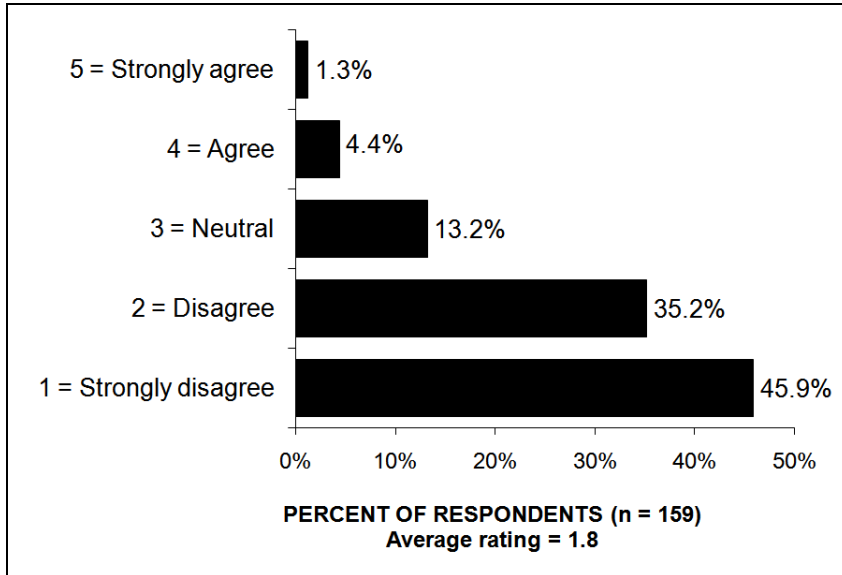


Figure B-63. Agreement with “Large cruise ships in Glacier Bay proper are majestic”

Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay.”

Overnight backcountry visitors were equally likely to agree or strongly agree (37.7%) as to disagree or strongly disagree (36.4%) that large cruise ships provided a sense of scale when viewing scenery in Glacier Bay.

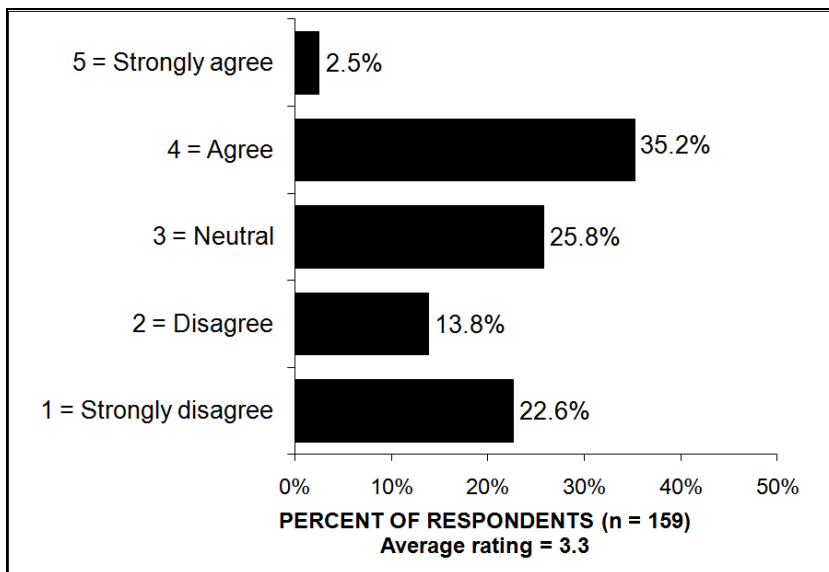


Figure B-64. Agreement with “Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay”

Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.

More than twice as many overnight backcountry visitors agreed as disagreed (54.1% vs. 23.1%) with the statement, “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.”

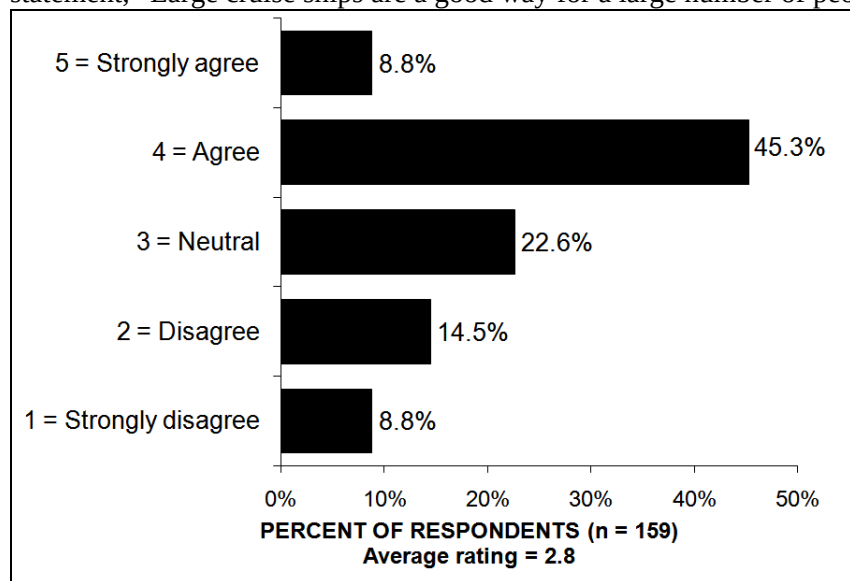


Figure B-65. Agreement with “Large cruise ships are a good way for a large number of people to visit Glacier Bay proper”

Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper.”

Overnight backcountry visitors were equally likely to agree or strongly agree (35.3%) as disagree or strongly disagree (35.7%) with the statement, “It is inappropriate for large cruise ships to be in Glacier Bay proper.”

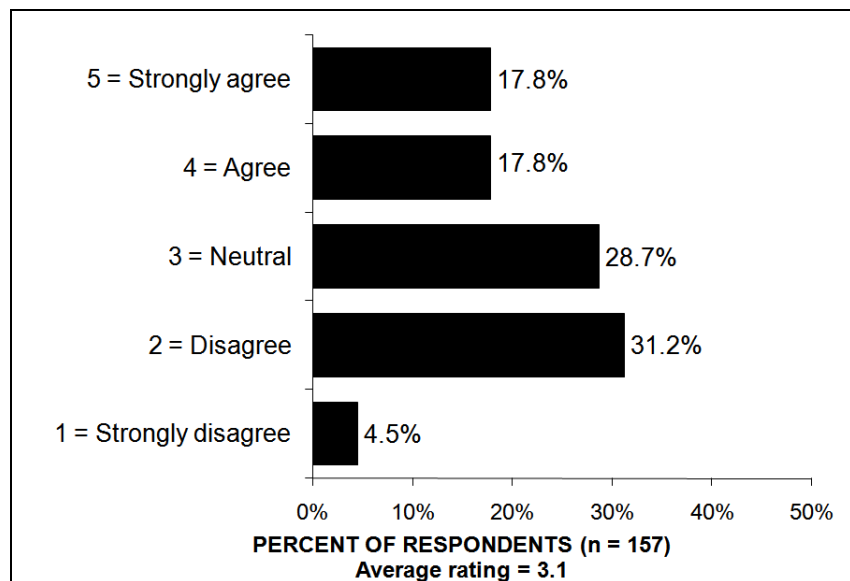


Figure B-66. Agreement with “It is inappropriate for large cruise ships to be in Glacier Bay proper”

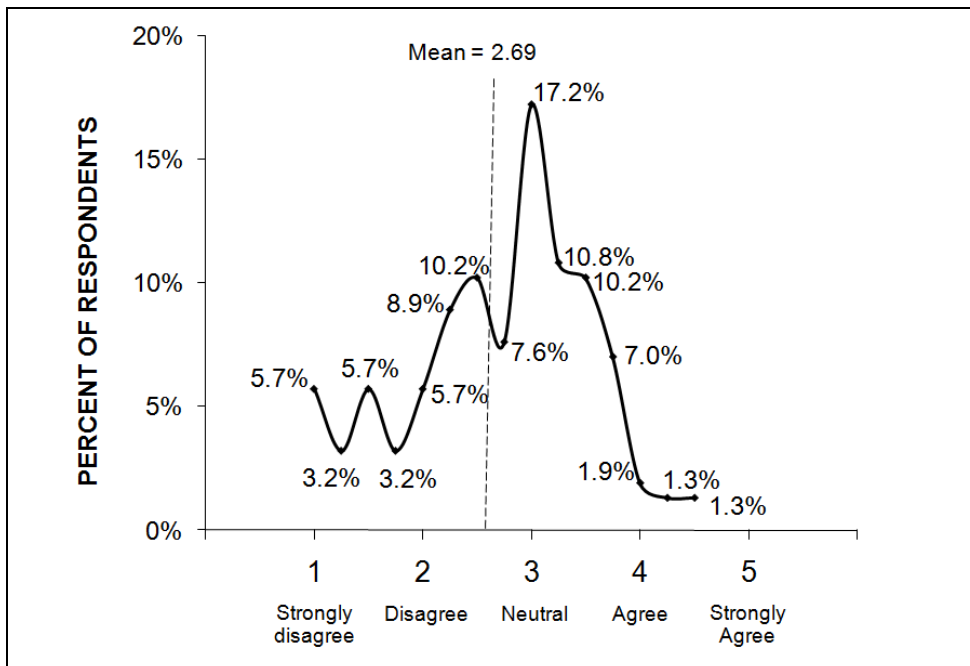
Table B-17. Correlations among agreement with opinion statements

Variable		A	B	C	D
A	Large cruise ships in Glacier Bay proper are majestic	--			
B	Large cruise ships provided a sense of scale when viewing scenery in Glacier Bay	.52	--		
C	Large cruise ships are a good way for a large number of people to visit Glacier Bay proper.	.51	.48	--	
D	It is inappropriate for large cruise ships to be in Glacier Bay proper	-.53	-.45	-.63	--

Opinion Scale

A scale measure that consists of multiple items (i.e., responses) with internal consistency is a more reliable measure than any of the individual items. Cronbach's alpha was calculated to assess the internal consistency of these four items as a measure of opinions about large cruise ships in Glacier Bay proper. George and Mallery (2003) provide the following rules of thumb: " $\alpha > .9$ – Excellent, $\alpha > .8$ – Good, $\alpha > .7$ – Acceptable, $\alpha > .6$ – Questionable, $\alpha > .5$ – Poor, and $\alpha < .5$ – Unacceptable" (p. 231). The Cronbach's alpha for backcountry visitors was .741 indicating a scale that has acceptable reliability. Because it is useful to be able to compare across the user groups and because the reliability for these four items was just below the acceptable range for only one user group (cruise ship passengers), it was decided to compute a single opinion scale for these four items for all user groups. The opinion scale score was computed by averaging the responses to the four individual opinion items. Because of the increased reliability, the opinion scale was used in subsequent analyses rather than the individual items.

Figure B-67 shows the distribution of opinion scale scores for backcountry visitors. The mean for all backcountry visitors on the opinion scale was 2.69 indicating that on average backcountry visitors slightly disagreed with large cruise ships being in Glacier Bay proper.

**Figure B-67. Distribution of opinion scale scores**

XI. LENGTH OF EXPOSURE EFFECTS ON VISITOR EXPERIENCE

Backcountry respondents were asked to report the number of hours they saw or heard large cruise ships during their stay in Glacier Bay proper. Although a more subjective measure of exposure than number of cruise ships in the bay per day and one that park managers have considerably less control over, this measure provided more detailed information about exposure to cruise ships. It may be that the effect of cruise ships heard or seen depended on the length of time that overnight backcountry visitors heard or saw cruise ships regardless of the number of cruise ships in the bay the days they visited. These analyses are described and reported in this section.

Length of exposure was the total number of hours that backcountry respondents reported seeing cruise ships during their kayaking or hiking portion of their trip in Glacier Bay proper. Along with individuals who did not see or hear cruise ships, individuals who did not know or remember the hours they saw or heard cruise ships were excluded from these analyses. The effect of length of exposure to cruise ships was examined for the following measures of effects of cruise ships on visitor experience: 1) cruise ship detraction ratings for each of the eight visitor experience dimensions, 2) likelihood of future recommendations and the effect of seeing large cruise ships on the likelihood of future recommendations, 3) overall enjoyment ratings, 4) effect of cruise ships on trip enjoyment, 5) effect of cruise ships on enjoyment of Margerie and Grand Pacific glaciers), and 6) the four opinion measures.

Of the 17 measures examined, total number of hours heard or saw cruise ships was significantly related to two measures (see Table B-18). As can be seen in Table B-18, higher total number of hours heard or saw cruise ships were associated with greater negative effects of cruise ships for each measure. The largest correlation observed was $-.186$ and that equates to 3.5% of the variance in scores being explained by the relationship between total number of hours saw or heard cruise ships and effect of cruise ships on trip enjoyment. Thus, for backcountry visitors who saw or heard cruise ships, the total number of hours cruise ships were seen or heard was not strongly predictive of reported effects of cruise ships on overnight backcountry visitors' experience in Glacier Bay proper.

Table B-18. Significant correlations between total number of hours heard or saw cruise ships and different measures of effects of cruise ships

Measure	Correlation (<i>r</i>)	<i>p</i> -value
Cruise ships effect on experiencing the wonder of nature scale	$-.186$	.041
Cruise ships effect on experiencing tranquility scale	$-.172$	.034

XII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM CHARACTERISTICS OF ENCOUNTERS WITH CRUISE SHIPS

This section examines whether there were particular features of cruise ships (e.g., haze, public address system, etc.) that were associated with effects of cruise ships on backcountry visitors. Knowing whether certain characteristics of cruise ships are more predictive of effects on backcountry visitors can provide insights into possible mitigation strategies, if needed.

A total of 132 (84.1%) backcountry visitors reported hearing or seeing cruise ships during the kayaking/hiking portion of their visit to Glacier Bay proper. The data from these individuals were used in the following analyses and thus, the results reflect only those individuals who had experience with cruise ships during the kayaking/hiking portion of the trip in which they were contacted to participate in the survey.

Characteristics of encounters with cruise ships measured

As part of the mail survey, backcountry visitors were asked to report about different characteristics of their encounters with large cruise ships. These characteristics were captured by the nine variables listed in Table B-19.

Table B-19. Characteristics of cruise ships used as predictors in regression analyses

Number of visit days that were 2 cruise ships in the bay days
Percent of visit days that were 2 cruise ships in the bay days
Total length of time saw or heard large cruise ships
Haze from large cruise ship exhaust affected my views in some manner.
Heard sound from large cruise ship public address system.
Heard large cruise ship engines.
Number of large cruise ships seen at Margerie and Grand Pacific glaciers
Large cruise ships had no effect on viewing land animals
Large cruise ships had no effect on viewing marine animals

Measures of effect of cruise ships on visitor experience

A number of measures of effects of cruise ships on backcountry visitors' experience were included in the survey: 1) effects of cruise ships on different dimensions of visitor experience, 2) effect of cruise ships on trip enjoyment, 3) likelihood of future recommendations, and 4) overall ratings of trip enjoyment. To determine if there were common factors underlying responses on these measures, an exploratory factor analysis was done.² Likelihood of future recommendations and overall ratings of trip enjoyment used different response scales than the other measures and were not included in the factor analysis. The results of the factor analysis revealed a single factor underlying responses to these measures and explained 67.6% of the variance. The measures of cruise ships effects on 8 dimensions of trip experience and the measure of effect of cruise ships on trip enjoyment had factor loadings ranging from .645 to .891. A factor scale score was computed by averaging the scores on each measure which had a factor loading over

² In the exploratory factor analysis, the factors were extracted using maximum likelihood and oblimin rotation. The scree test was used to determine the appropriate number of factors to retain by selecting and interpreting the number of factors above the bend in the curve. This approach to exploratory factor analysis is consistent with "best practices" outlined in Costello and Osborne (2005).

0.3.³ This computed factor score will be referred to as the cruise ship effect score and it is a continuous measure of effects of cruise ships ranging from 1 = “detracted greatly” to 5 = “added greatly.” Analyses that use this continuous measure as the dependent variable will show which variables predict different levels of effects of cruise ships ranging from detracted greatly to added greatly.

It may also be useful for park managers to understand how changes in significant predictors can affect the likelihood that visitors report cruise ships detract from their enjoyment. To obtain this information, a dichotomous variable, cruise ships detracted, was created from the continuous cruise ship effect factor score. Individuals who had a cruise ship effect factor score ranging from 1.0 to 2.9 were classified as “cruise ships detracted from experience” whereas individuals who had cruise ship effect factor scores of 3 were classified as “no effect.” Individuals with cruise ship effect factor scores above 3.0 were excluded from the analyses as these individuals reported that cruise ships added to their trip enjoyment. One backcountry visitor (0.8%) had a cruise ship effect score over 3.0 and thus, was excluded from analyses using the cruise ships detracted score. Analyses that use this dichotomous measure as the dependent variable will show which variables predict changes in the likelihood that cruise ships detract from backcountry visitors’ enjoyment.

Individual relationships between characteristics of cruise ship encounters and the effect of cruise ships

Analyses were conducted to determine whether any of the nine measured characteristics of cruise ship encounters were related to the effect of cruise ships on backcountry visitors experience as measured by the cruise ship effect score (the continuous dependent measure). For characteristics of cruise ship encounters that were continuous in nature, correlations were calculated. For characteristics of cruise ship encounters that were nominal in nature, t-tests or one-way ANOVAs were calculated.

Analyses indicated that five of the nine measured characteristics of cruise ship encounters were significant predictors of the effect of cruise ships as measured by the cruise ship effect score: 1) Haze from large cruise ship exhaust affected my views in some manner, 2) Heard sound from large cruise ship public address system, 3) Heard large cruise ship engines, 4) Large cruise ships had no effect on viewing land animals, and 4) Large cruise ships had no effect on viewing marine animals.

Table B-20 summarizes the characteristics of cruise ships that were found to be significant predictors of the effect of cruise ships as measured by the cruise ship effect score. The findings below indicate that cruise ships detracted more (lower scores on the cruise ship effect score) from backcountry visitors’ trip experience:

1. if backcountry visitors reported that haze from large cruise ship exhaust affected their views in some manner,
2. if backcountry visitors heard large cruise ships’ public address systems,
3. if backcountry visitors heard large cruise ships’ engines,
4. if backcountry visitors reported large cruise ships affected their viewing of land animals, and
5. if backcountry visitors reported large cruise ships affected their viewing of marine animals.

³ The factor scale score based on the average of the items loading on the factor was compared to the factor score derived based on the factor score coefficients. The two scores were correlated at 0.997. The factor scale score based on the average of the items was used for the following reasons: 1) the scale for the factor score was the same as the original items, 2) analyses indicated that the detraction factor score for the other user groups could be computed using the average and still achieve high correlations, thus allowing a way to compare across user groups if desired.

Table B-20. Characteristics of cruise ships that were significant predictors of effects of cruise ships

Predictor variable	<i>r</i>	<i>p</i> -value
Haze from large cruise ship exhaust affected my views in some manner.	-.226	.013
Heard sound from large cruise ship public address system.	-.265	.003
Heard large cruise ship engines	-.397	<.001
Other large cruise ships had no effect on viewing land animals	.328	<.001
Other large cruise ships had no effect on viewing marine animals	.493	<.001

NOTE: Higher scores of the cruise ship effect score reflect more positive effects of cruise ships.

To understand the unique relationship of each of the predictor variables with the effects of cruise ships on backcountry visitors' experience, a regression was performed that included the five significant variables as predictor variables. A stepwise procedure was adopted to determine the best fitting model. The final model included two of the five variables (see Table B-21). The omnibus test of the model was significant, $F(2, 109) = 27.98$, $p < .001$, and the R^2 indicated that 33.9% of the variance in cruise ship effect scores was explained by the model.

Table B-21. Summary of model for effects of cruise ships measured by cruise ship effect score for backcountry visitors

Predictor Variable	B	S.E.	<i>t</i>	<i>p</i> -value
Other large cruise ships had no effect on viewing marine animals	.586	.104	5.63	<.001
Heard large cruise ship engines	-.380	.097	-3.92	<.001
Constant	2.01	.119	16.85	<.001

The regression equation associated with the above model is below.

$$\text{Cruise ship effect score} = 1.42 + (0.586 * \text{Cruise ships had no effect on viewing marine animals}) + (-.380 * \text{Heard cruise ship engines})$$

The regression coefficients (B) show the change in one variable given that all other variables are held constant. For example, for people not hearing large cruise ship engines, having a large cruise affect the viewing of marine animals will decrease the cruise ship effect score by .586 points compared to those who experience no effect of large cruise ships on their viewing of marine animals.

Because the predictor variables are both dichotomous categorical variables, it is possible to compute the predicted cruise ship effect score for the different combinations of potential experiences with cruise ships using the above regression equation. Table B-22 shows the predicted cruise ship effect score for the four possible scenarios. As can be seen in Table B-22, the greatest detraction (i.e., lowest score) is predicted under Scenario 4 when cruise ship engines are heard and cruise ships affect the viewing of marine animals. Currently, 17.9% of backcountry visitors have this mix of experience. The predicted cruise ship effect score of 1.63 is between detracted greatly and detracted somewhat.

Comparing scenarios 2 and 3 indicates that cruise ships affecting viewing of marine animals was more detracting than hearing large cruise ship engines (2.01 vs. 2.22, respectively). Under current conditions,

Backcountry Visitor Survey

more backcountry visitors reported that they heard sounds from large cruise ships engines than reported large cruise ships affected the viewing of marine animals (41.4% vs. 8.9%, respectively).

Scenario 1 where cruise ships have no effect on viewing marine animals and their engines are not heard is the second most commonly reported mix of experiences for backcountry visitors (34%) and this mix of experiences predicts a cruise ship effect score of 2.60 indicating a slight detracting effect of large cruise ships on visitor experience.

Table B-22. Predicted cruise ship effect scores for the four possible scenarios

Scenario		Cruise ships had no effect on viewing of marine animals ¹	Heard sound from large cruise ships engines ²	Cruise ship effect score ³
1	No effects experienced	1	0	2.60
2	Only heard cruise ship engines	1	1	2.22
3	Only affected viewing of marine animals	0	0	2.01
4	Affected viewing of marine animals and heard cruise ship engines	0	1	1.63

¹ Values for this variable are 1 = agreement with statement (i.e., no effect of cruise ships on viewing) and 0 = disagreement with statement (i.e., effect of cruise ships on viewing)

² Values for this variable are 0 = Did not hear, and 1 = Heard

³ The cruise ship effect score ranges from 1 to 5 with the following demarcations: 1 = Detracted greatly, 2 = Detracted somewhat, 3 = No effect, 4 = Added somewhat, 5 = Added greatly

Individual relationships between characteristics of cruise ship encounters and the likelihood that cruise ships detract from trip enjoyment

Analyses were conducted to determine whether any of the measured characteristics of cruise ship encounters were related to the likelihood cruise ships detract from backcountry visitors experience as measured by the cruise ship detracted score (the dichotomous dependent measure). Logistic regression analysis was used to determine whether any of the measured characteristics of cruise ship encounters (see Table B-19) predicted who was negatively affected by cruise ships. Logistic regression is a form of linear regression used when the dependent variable is dichotomous (e.g., cruise ships detracted: yes or no)⁴. In logistic regression, predictor variables may be either categorical (e.g., heard cruise ship engines: yes or no) or continuous (e.g., total length of time heard or saw large cruise ships).

In logistic regression there are multiple ways to evaluate whether the generated model is good fit to the data. The first is the omnibus chi-square test of the model coefficients. A significant chi-square indicates that the coefficients in the model as a whole significantly predict the dependent variable. When a model has only one predictor variable, a significant model chi-square indicates that the predictor variable significantly predicted the dependent variable. Second, the Hosmer and Lemeshow Goodness of Fit test statistic⁵ can be computed when the predictor variables are continuous. The Hosmer and Lemeshow

⁴Discriminant function analysis may also be used to predict membership in two or more groups. Given that there were only two groups, logistic regression was selected over discriminant function analysis because it requires fewer assumptions in theory, is more statistically robust in practice and easier to use and understand.

⁵ The Hosmer and Lemeshow Goodness of Fit test examines the null hypothesis that the data were generated by the model fitted by the researcher. The test divides subjects in to deciles based on predicted probabilities, and then computes a chi-square from observed and expected frequencies. If the computed test statistic has a probability of .05 or less, the null hypothesis that there is no difference between the observed and model-predicted values of the dependent variable is rejected. Well-fitting models generate data that do not differ from what was observed and their Hosmer and Lemeshow Goodness of Fit Test statistic is not significant.

Goodness of Fit test statistic is a measure of the difference between the data predicted by the model and the observed data. A significant Hosmer and Lemeshow Goodness of Fit test statistic indicates that the data predicted by the model differ significantly from the observed data and thus, the model is not a good fit. Third, examining the percent of cases correctly classified by the model provides information on the goodness of fit of the model. Higher percentages correctly classified indicate a better fitting model.

Predicting for whom cruise ships detracted from trip enjoyment

A separate logistic regression was run for each predictor variable listed in Table B-19 with cruise ships detracted (detracted vs. not effected) as the dependent variable. The maximum number of observations for these analyses was 128, as 1 backcountry respondent indicated that cruise ships added to his enjoyment and was thus, excluded from these analyses. Of the nine variables, one resulted in a model with a significant model chi-square indicating it was a significant predictor of cruise ships detracting from trip enjoyment: Heard large cruise ship engines. Although this variable was a statistically significant predictor, it was not sufficiently strong to improve upon prediction based on selecting the most common condition of “detracted.” Thus, the model will not be considered a good fit because the variable was not a strong predictor. No further analyses were done. Table B-23 contains the results of this logistic regression.

Table B-23. Model summary for predicting likelihood that cruise ships detracted from trip enjoyment

Predictor Variable	Constant	B ¹	Chi-Sq p-value	Hosmer & Lemeshow	% classified
Heard large cruise ship engines	1.18	1.80	.004	nc	89.7 ²

¹In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

²The percent classified correctly did not exceed that based on selecting the most common condition of “no effect, and thus, the model will not be considered a good fit as the variable is not a strong predictor.

Summary

Two characteristics of encounters with cruise ships were found to predict effects of cruise ships as measured by the continuous dependent measure, cruise ship effect scale: 1) Heard large cruise ship engines and 2) Cruise ships had no effect on viewing of marine animals. Analyses using the dichotomous dependent measure, cruise ships detracted (yes or no) found no significant predictors.

The model for the continuous measure explained about 1/3 of the variance although there was a lack of sufficiently strong predictors for the dichotomous measure. Review of the data indicated that while backcountry visitors reported a range of effects of experiences with large cruise ships, when these effects were captured in a dichotomous variable 90% of backcountry visitors reported cruise ships detracted from their trip enjoyment. Thus, there was less variability in experience when measured by the dichotomous variable. Overall, these findings suggest that under current conditions, characteristics of cruise ships were not strongly predictive of cruise ship effects on backcountry visitors.

It should be noted that findings from stepwise procedures are exploratory in nature. The results of stepwise procedures can be affected by meaningless patterns unique to a particular sample. Thus, the findings can be used to develop theory that would then be tested directly in future research.

XIII. PREDICTING EFFECTS OF CRUISE SHIPS ON VISITOR EXPERIENCE FROM VISITOR CHARACTERISTICS

The experience backcountry visitors have with cruise ships may also be affected by some characteristic(s) associated with them. For example, visitors for which it was important to experience a pristine environment may react more negatively to their encounters with cruise ships than visitors for which experiencing a pristine environment was not as important. Knowing whether certain characteristics of backcountry visitors are more predictive of effects of cruise ships on backcountry visitors can provide insights to park managers. For some visitor characteristics (e.g., gender, age) that may be significant predictors, park managers have few options for mitigating their impacts. For others (e.g., importance of different trip dimensions, attitudes toward cruise ships), park managers may be able to design mitigation efforts such as managing expectations to match the most likely visitor experience.

A total of 132 (84.1%) backcountry visitors reported hearing or seeing cruise ships during the kayaking/hiking portion of their visit to Glacier Bay proper. The data from these individuals were used in the following analyses and thus, the results reflect only those individuals who had experience with cruise ships during the kayaking/hiking portion of the trip in which they were contacted to participate in the survey.

Characteristics of backcountry visitors measured

As part of the mail survey, backcountry respondents were asked to report about different characteristics of themselves. These characteristics were captured by the 18 variables listed in Table B-24.

Table B-24. Visitor characteristics used as predictors in regression analyses

Gender	Hispanic (yes or no)
Age	First trip to GLBA
Education level (years of schooling)	Type of party
Residence	Party size
Caucasian (White: yes or no)	
Importance of experiencing the wonder of nature	Importance of experiencing solitude
Importance of intimate experience with nature	Importance of experiencing pristine environment
Importance of hearing the sounds of nature	Importance of experiencing the scenic beauty
Importance of experiencing tranquility	Importance of viewing wildlife
Opinion scale re: large cruise ships in Glacier Bay proper	

Measures of effect of cruise ships on visitor experience

A number of measures of effects of cruise ships on backcountry visitor experience were included in the survey: 1) effects of cruise ships on different dimensions of visitor experience, 2) effect of cruise ships on trip enjoyment, 3) likelihood of future recommendations, and 4) overall ratings of trip enjoyment. As described in the previous section, two composite measures were calculated. The first was a continuous measure of the effects of cruise ships on visitor experience based on the results of a factor analysis (see above for complete description). The range of the cruise ship effect factor score was from 1 “detracted greatly” to 5 “added greatly.” The second was a dichotomous measure of whether cruise ships detracted from trip experience (detracted versus no effect) based on the continuous measure cruise ships effects factor score (see section above for complete description).

Individual relationships between characteristics of backcountry visitors and the effect of cruise ships

Analyses were conducted to determine whether any of the measured characteristics of backcountry visitors were related to the effect of cruise ships on their experience as measured by the cruise ship effect score. For characteristics of visitors that were continuous in nature, correlations were calculated. For characteristics of visitors that were nominal in nature, *t*-tests or one-way ANOVAs were calculated.

Table B-25 summarizes the seven characteristics of backcountry visitors that were found to be significant predictors of the effect of cruise ships as measured by the cruise ship effect score. Backcountry visitors that were white were more likely to report less detracting of cruise ships. Five trip dimension scales were significant predictors indicating for each that the more important the trip dimension was the more cruise ships detracted from trip experience. The more visitors agreed with cruise ships being in Glacier Bay proper the more positive effects cruise ships had on backcountry visitors' experiences. Because the opinion scale items were asked in the mail back questionnaire, it is possible that the opinion scale reflects backcountry visitors' experiences with cruise ships during their trips. Thus, while the opinion scale and effects of cruise ships are related, there was no way from the current data to determine 1) whether visitor opinions shaped the perception of the experience, 2) whether the experience shaped visitors' opinions, or 3) whether some other more complex relationship underlies the observed correlation.

Table B-25. Backcountry visitor characteristics that were significant predictors of effects of cruise ships

Predictor variable	<i>r</i>	<i>p</i> -value
White (no/yes)	.249	.005
Importance of intimate experience with nature	-.214	.016
Importance of hearing the sounds of nature	-.320	<.001
Importance of experiencing tranquility	-.291	.001
Importance of experiencing solitude	-.285	.001
Importance of experiencing pristine environment	-.215	.015
Opinion re: large cruise ships in Glacier Bay proper	.596	<.001

NOTE: Higher scores of the cruise ship effect score reflect more positive effects of cruise ships.

To understand the unique relationship of each of the predictor variables with the effects of cruise ships on backcountry visitors' experience, a stepwise regression was performed that included all seven variables as predictor variables. A stepwise procedure was adopted to determine the best fitting model. The final model included three of the seven variables (see Table B-26). The omnibus test of the model was significant, $F(3, 115) = 35.54$, $p < .001$, and the R^2 indicated that 48.1% of the variance in cruise ship effect scores was explained by the model.

Table B-26. Summary of model for effects of cruise ships measured by cruise ship effect score for backcountry visitors

Predictor Variable	B	S.E.	<i>t</i>	<i>p</i>
White	.854	.308	2.77	.007
Importance of experiencing tranquility	-.139	.053	-2.62	.010
Opinion re: large cruise ships in Glacier Bay proper	.445	.052	8.51	<.001
Constant	.736	.412	1.79	.077

The regression equation associated with the above model is below.

Cruise ship effect score = $0.736 + (.854 * \text{White}) + (-.139 * \text{Importance of experiencing tranquility}) + (.445 * \text{Opinion regarding large cruise ships in Glacier Bay proper})$

The regression coefficients (B) show the change in one variable given that all other variables are held constant. For example, for people who rated the importance of experiencing tranquility “very important” and were white, a shift from “agreed somewhat” to “agreed strongly” with large cruise ships being in Glacier Bay proper results in a .445 higher cruise ship effect score indicating less detracted due to cruise ships (cruise ship effect score ranges from 1 = detracted greatly to 5 = added greatly).

The regression equation above was used to calculate predicted cruise ship effect scores for several scenarios (see Table B-27). Scenario 1 used common values obtained in the current sample for each of the variables: 1) neutral opinions regarding large cruise ships in Glacier Bay proper, 2) white, and 3) importance of tranquility score of 5 which indicates it was extremely important. The predicted cruise ship effect score was 2.2, slightly better than somewhat detracted (2 = somewhat detracted). Scenario 2 was the same as Scenario 1 except that the respondent was not white. The predicted cruise ship effect score was 1.4 or 0.8 points toward “detracted greatly” compared to Scenario 1. In the current sample, there were three non-white respondents. Scenario 3 was identical to Scenario 1 except for the importance of tranquility scale score going from 5 = Extremely important to 4 = Very important. The predicted cruise ship effect score was 2.4 or 0.2 points toward neutral compared to Scenario 1. Scenario 4 was identical to Scenario 1 except that the individual somewhat disagreed with large cruise ships being in Glacier Bay proper. The predicted cruise ship effect score was 1.8 or 0.4 points toward “detracted greatly.” Taken together these scenarios suggest that with the exception of white, a one unit change in the other variables results in limited changes in the predicted cruise ship effect score.

Table B-27. Predicted cruise ship effect score for potential scenarios

Scenario		Opinion Scale	White	Importance of tranquility scale	Predicted cruise ship effect score
1	Common values for each variable	3 = Neutral	1	5 = Extremely important	2.2
2	Respondent was not white	3 = Neutral	0	5	1.4
3	Importance of tranquility scale goes down by one to “Very important”	3	1	4 = Very important	2.4
4	Opinion scale goes down by one to “Somewhat disagree”	2	1	5	1.8

Because so few backcountry respondents were not white (3 individuals), the analysis was re-run excluding white as a variable. The results of that model were similar to the above model with the exception that white was not included. The only variables that were significant predictors were 1) importance of tranquility scale, and 2) opinion re: large cruise ships in Glacier Bay proper.

Individual relationships between characteristics of backcountry visitors and the likelihood that cruise ships detract from trip enjoyment

Analyses were conducted to determine whether any of the measured characteristics of backcountry visitors were related to the likelihood cruise ships detract from visitors experience as measured by the cruise ship detracted score (the dichotomous dependent measure). Logistic regression analysis was used to determine whether any of the measured characteristics of backcountry visitors (see Table B-24) predicted who was negatively affected by cruise ships. Logistic regression is a form of linear regression used when the dependent variable is dichotomous (e.g., cruise ships detracted: yes or no)⁶. In logistic

⁶Discriminant function analysis may also be used to predict membership in two or more groups. Given that there were only two groups, logistic regression was selected over discriminant function analysis because it requires fewer assumptions in theory, is more statistically robust in practice and easier to use and understand.

regression, predictor variables may be either categorical (e.g., gender: male or female) or continuous (e.g., age).

In logistic regression there are multiple ways to evaluate whether the generated model is good fit to the data. The first is the omnibus chi-square test of the model coefficients. A significant chi-square indicates that the coefficients in the model as a whole significantly predict the dependent variable. When a model has only one predictor variable, a significant model chi-square indicates that the predictor variable significantly predicted the dependent variable. Second, the Hosmer and Lemeshow Goodness of Fit test statistic⁷ can be computed when the predictor variables are continuous. The Hosmer and Lemeshow Goodness of Fit test statistic is a measure of the difference between the data predicted by the model and the observed data. A significant Hosmer and Lemeshow Goodness of Fit test statistic indicates that the data predicted by the model differ significantly from the observed data and thus, the model is not a good fit. Third, examining the percent of cases correctly classified by the model provides information on the goodness of fit of the model. Higher percentages correctly classified indicate a better fitting model.

Predicting for whom cruise ships detracted from trip enjoyment

A separate logistic regression was run for each predictor variable listed in Table B-24 with cruise ships detracted (detracted vs. not effected) as the dependent variable. The maximum number of observations for these analyses was 128. Of the 18 variables, one resulted in a model with a significant model chi-square indicating it was a significant predictor of cruise ships detracting from trip enjoyment: Opinion scale re: large cruise ships being in Glacier Bay proper. This model did not have a significant Hosmer and Lemeshow's Goodness of Fit test statistic indicating that the model predicted values significantly different from what they ought to be (i.e. from the observed values), and therefore, was not a good fit. However, the model did not improve upon prediction above selecting the most common condition "detracted" and thus, the model will not be considered a good fit because of insufficient predictive ability. No further analyses were conducted. Table B-28 contains the result of this logistic regression.

Table B-28. Model summary for predicting likelihood that cruise ships detracted from trip enjoyment based on backcountry visitor characteristics

Predictor Variable	Constant	B ¹	Chi-Sq p-value	Hosmer & Lemeshow	% classified
Opinion re: large cruise ships in Glacier Bay proper	5.31	-1.05	.019	.738	90.2% ²

¹In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

²The percent classified correctly did not exceed that based on selecting the most common condition of "no effect, and thus, the model will not be considered a good fit as the variable is not a strong predictor.

Summary

Three characteristics of visitors were found to predict effects of cruise ships as measured by the continuous dependent measure: 1) white or not, 2) importance of experiencing tranquility, and 3) opinion regarding large cruise ships in Glacier Bay proper. No individual characteristics were significant

⁷ The Hosmer and Lemeshow Goodness of Fit test examines the null hypothesis that the data were generated by the model fitted by the researcher. The test divides subjects in to deciles based on predicted probabilities, and then computes a chi-square from observed and expected frequencies. If the computed test statistic has a probability of .05 or less, the null hypothesis that there is no difference between the observed and model-predicted values of the dependent variable is rejected. Well-fitting models generate data that do not differ from what was observed and their Hosmer and Lemeshow Goodness of Fit Test statistic is not significant.

Backcountry Visitor Survey

predictors of the dichotomous dependent measure. These findings suggest that being white (or not), importance of tranquility, and opinions regarding cruise ships being in Glacier Bay proper were able to predict both smaller effects of cruise ships on visitor experience but not effects captured by the dichotomous measure.

Review of the data indicated that while backcountry visitors reported a range of effects of experiences with large cruise ships, when these effects were captured in a dichotomous variable 90% of backcountry visitors reported cruise ships detracted from their trip enjoyment. Furthermore, backcountry visitors were fairly similar in the personal traits. Thus, the lack of many predictive relationships may be due to the similarity of backcountry visitors on the characteristics measured in this study and their experiences with cruise ships.

It should be noted that findings from stepwise procedures are exploratory in nature. The results of stepwise procedures can be affected by meaningless patterns unique to a particular sample. Thus, the findings can be used to develop theory that would then be tested directly in future research.

XIV. EXPERIENCES WITH DIFFERENT FORMS OF TRANSPORT

When backcountry visitors are visiting Glacier Bay, evidence of human presence is generally limited to the other visitors in the bay, and the forms of transport used by those visitors.⁸ Although this report focuses on the effects of cruise ships on backcountry visitor experiences, survey questions also asked about encounters with other forms of transport. There were two primary reasons for considering the effects of other forms of transport: 1) to set the effect of cruise ships in a context relative to the effects of those other forms, and 2) to determine whether visitors' experiences with multiple forms of transport affect the degree to which those encounters (including encounters with cruise ships) detract from their experiences.

Effects of cruise ships relative to other forms of transport

Tables B-10 to B-13 in chapters VIII and IX above summarized the detraction ratings for different forms of transport encountered at Margerie/Grand Pacific glaciers and during the entire trip. Table B-29 shows that for both situations, cruise ships detracted from more backcountry visitor experiences than any other single form of visitor transport.

Table B-29. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip

Type of craft	Percent who said craft detracted (somewhat or greatly) from enjoyment of Margerie/Grand Pacific glaciers ¹	Percent who said craft detracted (somewhat or greatly) from enjoyment of Glacier Bay proper ²
Large cruise ships	47.6%	66.5%
Motorized craft other than large cruise ships	28.6%	64.2%
Propeller-driven aircraft	18.2%	53.8%
Helicopters	9.0%	18.7%

¹ These summary data were derived from those presented in **Error! Reference source not found..**

² These summary data were derived from those presented in **Error! Reference source not found..**

Most backcountry visitors encountered cruise ships and other motorized watercraft during their trip (see Chapter V). When detraction was calculated only for the respondents who saw each form of transport, cruise ships were the form most likely to detract from backcountry visitor experiences (see Table B-30; considering only reliable percentages).

⁸ Exceptions would be NPS staff or scientific researchers and commercial jetliners at high altitudes.

Table B-30. Detraction of different craft from enjoyment of Margerie/Grand Pacific glaciers and enjoyment of entire trip

Type of craft	Percent of respondents who encountered each form of transport that said craft detracted (somewhat or greatly)	
	Detracted from enjoyment of Margerie/Grand Pacific glaciers ¹	Detracted from enjoyment of Glacier Bay proper ²
Large cruise ships	66.7%	79.5%
Motorized craft other than large cruise ships	40.0%	70.8%
Propeller-driven aircraft	66.7%*	63.4%
Helicopters	100.0%*	70.8%

¹ These summary data were derived from those presented in **Error! Reference source not found..**

² These summary data were derived from those presented in **Error! Reference source not found..**

*These percentages are unreliable because so few backcountry visitors saw aircraft at Margerie/Grand Pacific Glaciers.

In sum, cruise ships were the form of mechanized transport that had the greatest detracting effect on the experiences of backcountry visitors. Other types of craft also detracted from the experiences of a majority of backcountry visitors. Aircraft were encountered less frequently resulting in lower overall detraction rates whereas other motorized craft were encountered more frequently than cruise ships but had less effect on those who encountered them.

Does the number of cruise ships affect encounters with other forms of transport and ratings of their detraction?

One indirect way in which cruise ships could affect visitor experiences is by altering the number of encounters visitors have with other forms of transport. For example, if captains of smaller vessels planned their trips to the tidewater glaciers for days when only one cruise ship visits Glacier Bay, then encounters with those motorized vessels would be higher on 1-cruise ship days. Analyses of the survey data found no evidence of such indirect effect. Encounters with all types of craft other than cruise ships were no different for days with 1 versus 2 cruise ships, and none of the detraction measures differed for 1 and 2-cruise ship days.

The survey results showed that encounters with other forms of mechanized transport (and their effects on visitor experiences) were not altered by the number of ships in Glacier Bay, and thus, these results should not substantially alter managers' decisions about cruise ship policy. The next section discusses evidence (consistent with Johnson, 1990) that encounters with multiple forms of transport were not cleanly separated in visitors' detraction ratings.

Do encounters with one type of craft affect experiences with other types of craft?

In addition to shifting actual encounters with different types of craft, cruise ships may affect how those experiences with different craft are perceived. More broadly, experiences with one type of craft may affect how visitors perceive their experiences with other types of craft. Johnson (1990) discussed evidence for such effects in a 1989 study of Glacier Bay visitors. Understanding the inter-related reactions to different types of craft can help managers more effectively measure and mitigate the impacts of changes in vessel management policy.

The current research program focused on assessing the effects of cruise ships on visitor experiences. Some limited additional questions asking about other types of craft were included to provide context for understanding the effects of cruise ships. However, the nature of these questions was only sufficient to support exploratory analyses regarding the possible relationships between encounters with and effects of

the different type of craft. These exploratory analyses are discussed below to help managers appreciate the complexity of visitor experiences and to provide researchers with information that may be useful in the development of future surveys.

Relationships between encounters with various forms of transport and ratings of their detraction were assessed by examining the correlations between the variables shown in

Table B-31. Measures of encounters with each form of transport (i.e., cruise ships, other motorized vessels, propeller-driven aircraft, and helicopters) were included, as well as measures of the detracting effects of those encounters. In addition, aggregated measures of visitors' encounters with all four types of craft were included in the analysis of correlations.

Table B-31. Measures used in analysis of relationships between encounters with various forms of transport and ratings of their detraction

Type of craft	Encounter Measures						Detraction Measures		
	Saw/heard Y/N	Number saw/heard	Hours saw/heard	Heard engine	Heard P.A.	Saw haze	Detract Y/N	Degree detract	Detract scale*
Large cruise ships	X		X	X	X	X	X		X
Motorized craft other than large cruise ships	X	X	X	X	X	X	X	X	
Propeller-driven aircraft	X	X	X	X			X	X	
Helicopters	X	X	X	X			X	X	
Aggregate (all craft)	Number of types	X	X						

*Average of cruise ship detraction scales for each REP item and the rated detraction of cruise ships in Glacier Bay proper.

The results of the correlation analysis showed that in some cases, the detracting effects of encounters were intertwined.. Table B-32 includes all 21 significant relationships found by the analyses (i.e., relationships between encounters with one type of craft and detraction measures for a different type of craft). For example, the first correlation shows that detraction due to cruise ships was related to whether backcountry visitors heard engine sounds from other motorized craft.

Table B-32. Significant relationships between encounters with one type of craft and detraction measures for a different type of craft: Results of correlation and logistic regression analyses.

Correlation analyses				Logistic regression analyses			
Encounter measure	Detraction measure	<i>r</i>	<i>p</i> -value	Encounter measure	Detraction measure	B*	Chi-Sq <i>p</i> -value
Heard watercraft other than cruise ship engines	Cruise ship detraction scale	.217	.016	Encountered prop-driven aircraft	Cruise ship detracted Y/N	.586	.003
Encountered prop-driven aircraft	Cruise ship detraction scale	-.268	.006	Encountered cruise ship	Watercraft other than cruise ship detracted Y/N	1.20	.03
Hours encountered prop-driven aircraft	Cruise ship detraction scale	-.209	.027	Heard cruise ship engines	Watercraft other than cruise ship detracted Y/N	1.38	.001
Number prop-driven aircraft encountered	Cruise ship detraction scale	.243	.007	Encountered prop-driven aircraft	Watercraft other than cruise ship detracted Y/N	.232	.003
Heard prop-driven aircraft	Cruise ship detraction scale	.245	.006	Hours encountered prop-driven aircraft	Watercraft other than cruise ship detracted Y/N	.357	.034
Encountered helicopters	Cruise ship detraction scale	-.213	.022	Saw cruise ship haze	Prop-driven aircraft detracted Y/N	1.03	.029
Heard cruise ship engines	Watercraft other than cruise ship detraction	.232	.006	Encountered helicopters	Prop-driven aircraft detracted Y/N	.549	.012
Encountered prop-driven aircraft	Watercraft other than cruise ship detraction	-.223	.016	Number helicopters encountered	Prop-driven aircraft detracted Y/N	.992	.03
Hours encountered prop-driven aircraft	Watercraft other than cruise ship detraction	-.308	<.001	Heard helicopter engines	Prop-driven aircraft detracted Y/N	1.15	.021
Encountered helicopters	Prop-driven aircraft detraction	-.181	.05				
Heard cruise ship P.A.	Helicopter detraction	-.454	.006				
Encountered prop-driven aircraft	Helicopter detraction	-.385	.03				

*In logistic regression, the regression coefficients are interpreted as the amount of change in the log odds of the event occurring for a 1 unit change in the predictor variable. Because the dependent variable being predicted is the log odds of the event and not the probability of the event occurring, interpreting the regression coefficient as the amount of change in the likelihood that an event will happen for a 1 unit change in the predictor variable is incorrect.

A variety of hypotheses may account for such intertwined relationships. Some visitors may be both more observant of other craft and more likely to say such craft detracted from their experiences, or a disturbing encounter with one type of craft may sensitize them to the presence of other forms of transport.

Alternately, visitors might respond to all the detraction measures based on a generalized feeling of how much they were “bothered” by the presence of other visitors, and be either unwilling or unable to clearly separate the effects of different vessels or craft. Future research could be designed to test these different explanations. Because a complete investigation of these relationships was not a focus of the current research, we can say little about the specific ways in which encounters with the various forms of transport affect visitor ratings of detraction. However, there was strong evidence that those encounters do not have independent effects on the rated detraction due to each type of craft.

Although the exploratory analyses discussed in this section do not clearly define the relationships between encounters with and effects of the different type of craft, they can help managers decide whether information designed to mitigate the detracting effects of cruise ships should focus entirely on cruise ships or should also address the effects of other forms of transport. Specifically, if the detracting effects of each form of transport were unrelated to each other, then each effect could be treated independently. However, because the effects are related, mitigation efforts focused on all forms of transport are likely to be more effective.

Because of the limited understanding of the factors that determine backcountry visitor ratings of the detracting effect of cruise ships, some might argue that the measure should not be used in formulating vessel management policy. A complete understanding of the visitor experience would be ideal. However, it is important to remember that no matter what factors actually led some visitors to report that cruise ships detracted from their experiences, there is every reason to believe that those visitors thought that cruise ships did detract from their experiences. Measuring the prevalence of such detraction is a necessary first step in determining whether it is an issue that merits further study or management action.

XV. SOCIAL VALUE CONFLICT

Reviewers of an earlier draft of this report suggested that the concept of recreational conflict might shed light on the ways cruise ships affect visitor experiences. Because the current research was not conceptualized from this perspective, the measures collected in this study do not map directly onto key variables or concepts used in the conflict approach. However, as described below, several measures that approximate the concepts were available. The findings and discussion below are based on these approximate measures, and thus, are exploratory in nature. Their primary value is to guide the planning of future research that might seek to understand how and why cruise ships affect visitors' experiences (rather than if they do).

Recreational conflict overview

When diverse groups use a common recreation area, conflict between those groups is likely. Interpersonal (or goal interference) conflict arises when a physical encounter with (i.e., hearing and/or seeing) an individual or group interferes with the goals of another individual or group (Jacob & Schreyer 1980). For example, in Glacier Bay proper, individuals who wish to experience nature untouched by humans may experience interpersonal/goal interference conflict when seeing a cruise ship in the otherwise pristine environment of the bay. Recreationists may also experience a second type of conflict – social value conflict occurs between groups who do not share the same norms and/or values, and does not require a physical encounter between the conflicting groups (Ruddell & Gramann 1994). For example, individuals who feel that cruise ships in Glacier Bay are inappropriate may perceive conflict with cruise ships even if they never see a cruise ship during their visits to Glacier Bay proper.

Research examining conflict among recreationists has found that social value conflict occurs not only for individuals who do not encounter a potentially conflicting other group, but can also occur in individuals who encountered the other group. A study by Vaske, Needham, and Cline, Jr. (2007) asked snowmobilers and skiers whether they agreed with the statement “just knowing that skiers (snowmobilers) are in the area bothers me.” Agreement with this statement was used as a measure of social value conflict in individuals who also experienced interpersonal conflict. Findings indicated that a sub-group of individuals who were classified as experiencing interpersonal conflict also experienced social value conflict.⁹ In sum, individuals who have encounters with another potentially conflicting group can experience interpersonal conflict and/or social value conflict whereas individuals who do not have physical encounters with another potentially conflicting group can only experience social value conflict.

Understanding the source of conflict can be useful when setting policy intended to reduce such conflict. For example, interpersonal conflicts, those that arise solely from physical encounters, can be addressed by separating user groups through restricted use or zoning (i.e., limiting opportunities for physical encounters). However, these strategies will not reduce social value conflict, which is independent of actual encounters. Education has been suggested as a more effective means to reduce social value conflicts (Vaske et al. 2007). Thus, managers may be better able to mitigate the detracting effects of cruise ships on backcountry visitors if they know the nature of the conflict (or conflicts) that underlies reported detraction.

⁹ Although their methods did not allow this determination, it should be noted that it was possible that some of the people reported as experiencing both interpersonal conflict and social value conflict may have experienced only social value conflict.

Applying the conflict framework to current research

The current research was designed to inform park management of potential changes in the effects of cruise ships associated with the shift from the 1:2 mix of one- versus two-cruise ships in the bay days to every day being a two-cruise ships in the bay day. Accordingly, it provided cruise ship detraction rates only for those backcountry respondents who saw cruise ships, and was not designed to distinguish whether these detraction effects were due to interpersonal conflict or social value conflict. It was presumed that only the detraction arising from actual interaction with cruise ships (either hearing or seeing) would be affected by the change in policy. Therefore, the primary objective was to determine whether changes in the number of cruise ships in the bay would produce significant changes in: a) the likelihood of encountering cruise ships and b) the likelihood that cruise ships would detract from visitor experiences.

Applying the conflict framework to the current research suggests that for some people, conflict may arise that is not due to physical encounters with cruise ships. As noted above, the current research was not conceptualized using the conflict framework and thus does not have all the necessary data to assess rates of interpersonal conflict and social value conflict among all backcountry visitors. However, for some visitors, data were collected that approximated some of the key concepts from the conflict approach, and those data were used in these exploratory analyses. Specifically, among visitors who saw cruise ships, data were available that could serve as reasonable operationalizations for: 1) problems/conflicts and 2) social value conflict. For those who did not see cruise ships, only a measure assessing social value conflict was available.

Measure of problem/conflict

Recreational conflict research typically considers a problem or conflict to exist if a person reports a problem with specific behaviors engaged in by another user group. The current research was interested in the effects of cruise ships rather than the behavior of those aboard them. Thus, for analyses of conflict, if a visitor indicated that cruise ships detracted from their trip experience, a problem or conflict was assumed to be inherent in that detraction. If cruise ships did not detract, then no problem or conflict was considered present.

A dichotomous measure of cruise ship detraction based on an aggregated measure of cruise ship effects was developed for other analyses (see Measures of Effect of Cruise Ships on Visitors Experience for description of this measure). Individuals whose scores on the aggregated measure indicated a negative effect of cruise ships on their trip enjoyment were coded as “cruise ships detracting” whereas individuals who reported no effects of cruise ships were coded as “cruise ships did not detract”. The small number of individuals with aggregate scores indicating cruise ships added to their trip enjoyment were excluded. Because only visitors who saw or heard cruise ships were asked cruise ship effect questions, there were no problem/conflict data for people who did not see cruise ships.

As seen in Table B-33, 84% of backcountry respondents saw or heard cruise ships and of those, 90% reported cruise ships detracted from their trip experience.

Table B-33. Summary of variables related to social value conflict

% of all backcountry visitors who saw/heard cruise ships	84%
% for whom cruise ships detracted of those who saw/heard them	90%
% of all backcountry visitors agreed it is inappropriate for large cruise ships to be in Glacier Bay proper (social value conflict)	36%

Measure of social value conflict

Social value conflict is defined as arising when the values a person holds are in conflict with the values of another individual or group. These value conflicts can exist and result in perceived problems even if the

two user groups have no physical contact. Review of the questionnaire suggested that one of the included opinion items could serve as a reasonable measure of social value conflict between backcountry passengers and cruise ships in Glacier Bay proper. This item asked respondents' agreement with the statement, "It is inappropriate for large cruise ships to be in Glacier Bay proper." Individuals who indicated that they strongly agreed or agreed with the statement were classified as having a social value conflict with cruise ships in Glacier Bay proper. Individuals who indicated that they were neutral, disagreed, or strongly disagreed were classified as having no social value conflict. Because all respondents completed the opinion measures, social value conflict data were available for all backcountry respondents.

As can be seen in Table B-33, 36% of backcountry respondents agreed that it is inappropriate for large cruise ships to be in Glacier Bay proper suggesting over one-third of backcountry respondents experience social value conflict with cruise ships in Glacier Bay proper.

Analyses

Within the framework of user conflict, it is possible that cruise ships detracted from the experiences of some backcountry visitors who did not see cruise ships based exclusively on their social value conflict with cruise ships being in Glacier Bay proper. In addition, for backcountry visitors who saw cruise ships and reported that the ships detracted from trip experience, understanding whether that detraction arose from interpersonal conflict, social value conflict, or a mix of the two can help park managers assess whether limiting encounters with cruise ships is likely to reduce conflict and associated detraction. Thus, further analysis of these variables has the potential to: 1) provide an estimate of negative effects of cruise ships due to social value conflict among backcountry passengers who did not see cruise ships and 2) provide insight into the possible sources of conflict underlying the reported detraction for those who did see cruise ships.

Source of conflict for those who saw/heard cruise ships

A total of 90% of the backcountry visitors who saw/heard cruise ships indicated that cruise ships detracted from their trip enjoyment. When these individuals are separated by their agreement with "It is inappropriate for large cruise ships to be in Glacier Bay proper", 56% of those who saw/heard cruise ships experienced only interpersonal conflict (see Table B-34).

The methods used in prior social value conflict research allowed the separation of individuals who experienced problems due to their encounters with another user group into those who had social value conflict and those who did not. However, these methods did not provide a means to distinguish if those who experienced problems from encountering another group did so for both interpersonal and social value conflict or for social value conflict only. Thus, per the conflict literature, the remaining 34% would be considered to have experienced a mix of social value conflict and interpersonal conflict. However, it is possible that the detraction effects experienced by these individuals on this trip could have been entirely due to social value conflict or to interpersonal conflict. For individuals who encounter the other user group, just because their values do not agree with the other user group does not mean that the detraction experienced was due to a conflict in values—it may have been due to interpersonal/goal conflict.

For those who saw/heard cruise ships but reported no conflict, a small percentage were classified as having social value conflict. However, because these individuals did not report detraction, it is possible that: 1) the level of conflict was insufficient to result in detraction, 2) our opinion item was a less than ideal measure of social value conflict, or 3) there was inconsistency within individuals. Prior research examining social conflict used methods that examined or distinguished the rate of social value conflict among only those users who both encountered another user group and reported effects of the encountered group (Vaske et al. 2007). If they had looked at rates of social value conflict in other groups, it is possible that they would have seen similar patterns to those reported in Table B-34.

Table B-34. Source of conflict for backcountry respondents

	Did not see/hear cruise ships		Saw/heard cruise ships	
Cruise ships did not detract	100%		10%	
No conflict		63%		10%
Social value conflict only		37%		0%
Cruise ships detracted	0%		90%	
Interpersonal conflict only				56%
Both types of conflict*				34%
Total	100%	100%	100%	100%

Estimating additional detraction effects due to social value conflict.

In the current survey, visitors who did not see or hear cruise ships were not asked whether cruise ships in Glacier Bay affected their trip enjoyment. However, the social value conflict literature suggests that some individuals who do not see another user group may still experience negative effects of that group because of differing social values. Using the information in Table B-33 and Table B-34, we can estimate the percentage of backcountry respondents who did not see cruise ships but would be expected to have negative reactions due to social value conflict.

Our proxy measure for social value conflict indicated that 37% of backcountry respondents who did not see cruise ships agreed that it was inappropriate for large cruise ships to be in Glacier Bay proper (see Table B-34). As 16% of backcountry visitors did not encounter cruise ships (100% - 84% per Table B-33), it would be expected that up to 6% ($16\% \times 38\%$) of backcountry visitors who did not see cruise ships in Glacier Bay proper would report negative effects of cruise ships on their trip experience from simply knowing that the ships are in the bay (i.e., because of social value conflict).

Discussion

The survey focused primarily on effects of cruise ships on those visitors who encountered ships and did not include measures traditionally used to measure the different sources of user conflict. Thus, analyses examining social value conflict among backcountry visitors were exploratory and are presented for park managers' consideration in light of current and future visitor research.

Stereotypes of backcountry users suggested they would be the user group most likely to have social value conflicts with cruise ships and that many of them would express this conflict. These exploratory analyses found 35% of backcountry users reported social value conflicts with cruise ships. This rate was considerably lower than stereotypes might suggest and it was not the highest rate observed for all user groups (39% of day-boat users had social value conflicts with cruise ships). Backcountry users may have greater knowledge of park management's objectives/policies and value the balancing of the benefit of large numbers of people to experience the park with the relative footprint.

The fact that some backcountry visitors believe it is inappropriate for large cruise ships to be in Glacier Bay is undoubtedly not surprising to park management. The idea that this belief can result in cruise ships detracting from park visitors' experiences even when they do not encounter cruise ships during the trip may be more novel.

The concept of social value conflict also suggests that people who never go to Glacier Bay proper can experience negative effects of cruise ships because they hold values incongruent with cruise ships being in the bay. If managers make use of social value conflict when considering the impacts of cruise ships, a question naturally arises concerning the population in which such conflicts should be considered. Is the

relevant population park visitors? Park visitors and AK residents? All U.S. residents? All North Americans? The world? In light of such complex decisions, managers might reasonably elect to focus on the experiences of park visitors, recognizing that those experiences may be influenced by a variety of factors including social value conflict.

Managers can still benefit from the insight that there are people whose experiences are negatively affected by cruise ships independent of whether they physically encounter one. This insight suggests that vessel limits or zoning efforts that reduce encounters will not have a directly proportional effect on detraction rates (because some visitors' experiences will be negatively affected as long as any cruise ships are allowed in Glacier Bay, whether or not they encounter one). Research to better understand the specific value conflicts for these visitors may help managers to determine whether other mitigation efforts, such as educational programs, would mitigate the negative effects of cruise ships on their experiences. For example, if people believe that large cruise ships are inappropriate in Glacier Bay proper because they pollute the environment, then providing information about the air and water standards/monitoring for cruise ships that are much more rigorous than most Alaskan coastal villages may help to reduce the conflict. However, if individuals believe that large cruise ships are simply incongruent with the park aesthetic, then educational programs are unlikely to be effective. Qualitative information from interviews with visitors found evidence of both beliefs, but their prevalence in visitors who reported detraction due to cruise ships is unknown.

XI. SUMMARY AND IMPLICATIONS

The Backcountry (overnight, non-motorized) Mail Survey was designed to address the following three research objectives as it related to the kayaking/hiking portion of backcountry visitors' trips:

1. How do cruise ships affect, if at all, backcountry visitors' experiences in Glacier Bay proper?
 - a. Which dimensions of backcountry visitor experiences in Glacier Bay proper, if any, do cruise ships affect?
 - b. If cruise ships affect backcountry visitor experiences in Glacier Bay proper, which features of cruise ships have effects?
2. What are estimated effects for backcountry visitors under the Record of Decision maximum use level of 2 cruise ships per day, every day?
3. How do the effects of cruise ships on backcountry visitor experiences in Glacier Bay proper compare to the effects of other forms of mechanized transport?

This section addresses each of these objectives. However, the third objective will not be discussed independently. Rather, when the effects of cruise ships on visitor experiences (either current effects or estimated effects under the maximum use level) are discussed, the analogous effects of other forms of mechanized transport will be compared and contrasted.

Objective 1: How do cruise ships affect, if at all, backcountry visitors' experiences in Glacier Bay proper?

Recalled encounters with cruise ships

It is difficult to imagine how cruise ships could have a direct effect on backcountry visitor experiences if visitors did not remember seeing them. Accordingly, the maximum possible extent of such direct effects is indicated by the proportion of backcountry visitors who report seeing cruise ships. In this survey, 84.1% of backcountry (overnight, non-motorized) visitors reported seeing or hearing large cruise ships during the kayaking/hiking portion of their trips. In comparison, motorized watercraft other than large cruise ships and propeller-driven aircraft were heard or seen by more backcountry visitors (90.6% and 84.8%, respectively). (For more detail regarding encounters on the entire trip see Chapter V.)

Qualitative interviews conducted in 2007 suggested that cruise ships might have particularly strong effects on experiences at focal attractions in Glacier Bay. The foremost attractions for most visitors are the tidewater glaciers including the terminus of Tarr Inlet where the Margerie and Grand Pacific glaciers are visible. In this survey, 10.2% of all backcountry visitors (71.4% of those who said they visited Margerie/Grand Pacific glaciers) reported seeing or hearing large cruise ships at that location. The same percentage of backcountry visitors reported seeing or hearing motorized watercraft other than large cruise ships at the glaciers. (For more detail regarding encounters at Margerie and Grand Pacific glaciers see Chapter IV.)

These results suggested that even if every encounter with another cruise ship had a strong negative effect on backcountry overnight visitors (which it did not), a maximum of 84.1% of backcountry visitors would experience such negative effects at some point during their trip whereas 10.2% would be negatively affected by encounters at Margerie/Grand Pacific glacier. The actual effects of encounters with cruise ships that were reported by backcountry visitors are discussed in the following section.

General and specific effects of cruise ships

The survey was designed to measure a wide range of effects that encounters with cruise ships might have on visitors' experiences. Some of these effects were very general whereas others were much more specific. For example, the question asking backcountry visitors how seeing or hearing large cruise ships affected their enjoyment of Glacier Bay proper was an extremely general measure. More specific measures asked about effects of encounters on backcountry visitor enjoyment of Margerie/Grand Pacific glaciers, effects of encounters on particular trip experiences, and effects of particular aspects of encounters (e.g., engine sounds, public address system sound, and haze) with cruise ships.

The more specific measures were included for two different reasons. First, past studies found that general measures tend to be less sensitive to trip experiences (e.g., seeing or hearing cruise ships) than more specific measures. And second, more specific information about the aspects of encounters that have the greatest effects on trip experiences (e.g., location, engine sounds, public address system sound, and haze) has the potential to help managers set policy that mitigates negative effects.

Throughout earlier sections of this report, percentages were often calculated and reported for various sub-populations of backcountry overnight visitors. For example, the percentage of backcountry visitors reporting that cruise ships detracted from their general enjoyment of Glacier Bay was calculated based on the sub-population of backcountry visitors who saw or heard cruise ships. In this section, results are generally reported as percentages of all backcountry visitors. This approach allows direct comparison between the results of different questions, thus enabling readers to better judge the magnitude of the various effects of cruise ships and effects of other motorized craft.

Detraction from general enjoyment and from particular trip experiences

Figure B-68 shows the percentage of backcountry overnight visitors who reported that encounters with large cruise ships detracted from their experiences in any of a number of ways. The largest percentage (68.2%) reported detraction from particular trip experiences that were related to wilderness experience as legally defined (i.e., outstanding opportunities for solitude or a primitive and unconfined type of recreation). However, nearly the same percentage (66.5%) of backcountry overnight visitors reported that encounters detracted from their general enjoyment of Glacier Bay. Apparently, the detractions from particular trip experiences were sufficient to prompt reports of general detraction for most backcountry visitors. Moreover, approximately 80% of overnight backcountry visitors who saw or heard cruise ships felt that the cruise ships detracted from particular trip experiences or from their general enjoyment.

These quantitative findings showed some consistency with the findings of the qualitative interviews with Glacier Bay visitors conducted in both 2007 and 2008. For example, the most common effects of cruise ships mentioned by interviewed visitors were disruptions of “the wilderness experience” or a “sense of solitude,” and such disruptions were felt most keenly by backcountry overnight visitors. Many backcountry overnight visitors apparently felt similar to the kayaker interviewed in 2008 who said, “It is a very unhappy situation to leave the East Arm, where you’ve worked for days, and then get buzzed by cruise ships headed up the West Arm. It’s like watching a floating hotel go by.”

Although the qualitative report concluded that nearly all participants felt that other vessels (including cruise ships) had no significant effects on their experiences, the mail survey found that most backcountry overnight visitors reported that encounters with cruise ships detracted from their general enjoyment of Glacier Bay. Further examination of the mail survey data, reported below under “Measures of overall trip satisfaction”, suggests that the results of the two surveys were not as discrepant as the reported incidence of detraction would indicate.

Backcountry Visitor Survey

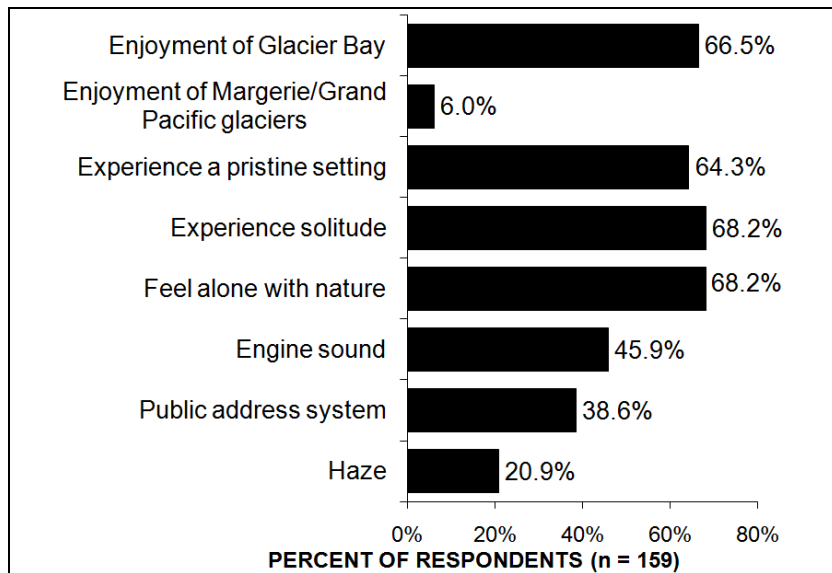


Figure B-68. Percent of all backcountry respondents who reported detraction effects due to large cruise ships

Figure B-69 shows that 64.2% of backcountry overnight visitors reported that seeing or hearing motorized craft other than cruise ships detracted from their general enjoyment of Glacier Bay. This percentage was roughly comparable to the 66.5% who reported detraction due to seeing or hearing cruise ships. Although the overall percentages of backcountry overnight visitors reporting detraction were similar, two findings suggested that encounters with cruise ships were perceived more negatively. First, for those backcountry overnight visitors who encountered each of the different types of craft, detraction rates were higher for cruise ships than for motorized craft other than cruise ships (79.5% vs. 70.8%, respectively). The overall percentages of visitors reporting detraction was roughly comparable because backcountry overnight visitors were slightly less likely to encounter cruise ships than they were to encounter motorized craft other than cruise ships (83.5% vs. 90.6%). Second, of visitors seeing or hearing the craft, 26.5% reported that seeing or hearing cruise ships “detracted greatly” from their enjoyment whereas only 11.1% reported that motorized craft other than cruise ships “detracted greatly”.

Figure B-70 reports the findings for helicopters and propeller-driven aircraft. The overall percentage of backcountry visitors reporting general detraction due to helicopters (18.7%) was much lower than the percentages for cruise ships or motorized watercraft other than cruise ships, most likely because encounters with helicopters were relatively rare – they were seen or heard by only 26.5% of backcountry overnight visitors. The percentage of backcountry visitors who said that propeller-driven aircraft detracted from their general trips was nearly as high (53.8%) as the percentages reported for large cruise ships and motorized watercraft other than large cruise ships. However, results suggested that cruise ships were perceived more negatively. Cruise ships and propeller-driven aircraft were encountered equally often (encounter rates of 83.5% and 84.8%, respectively), but for those backcountry overnight visitors who encountered both types of craft: a) detraction rates were higher for cruise ships than for propeller-driven aircraft (79.5% vs. 63.4%, respectively); and b) 26.5% reported that seeing or hearing cruise ships “detracted greatly” from their enjoyment whereas only 13.4% reported that propeller-driven aircraft “detracted greatly”.

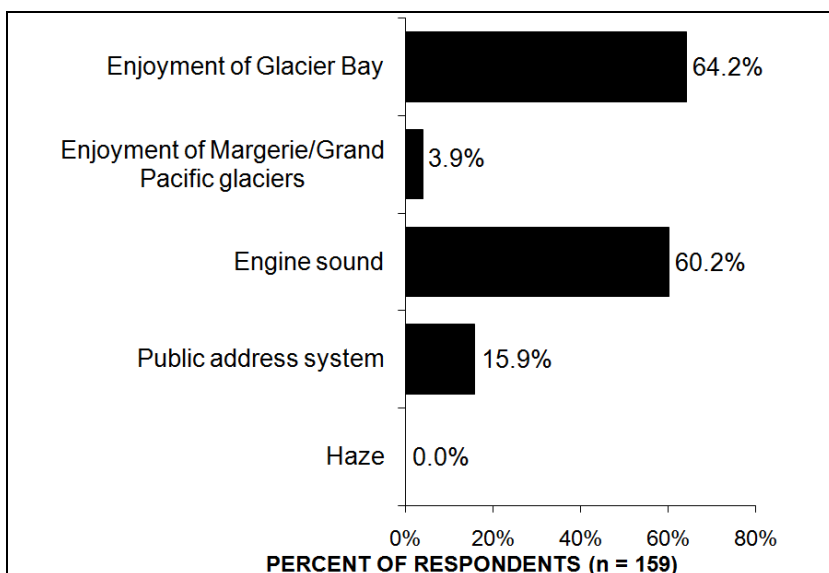


Figure B-69. Percent of all backcountry respondents who reported detraction effects due to motorized water craft other than large cruise ships

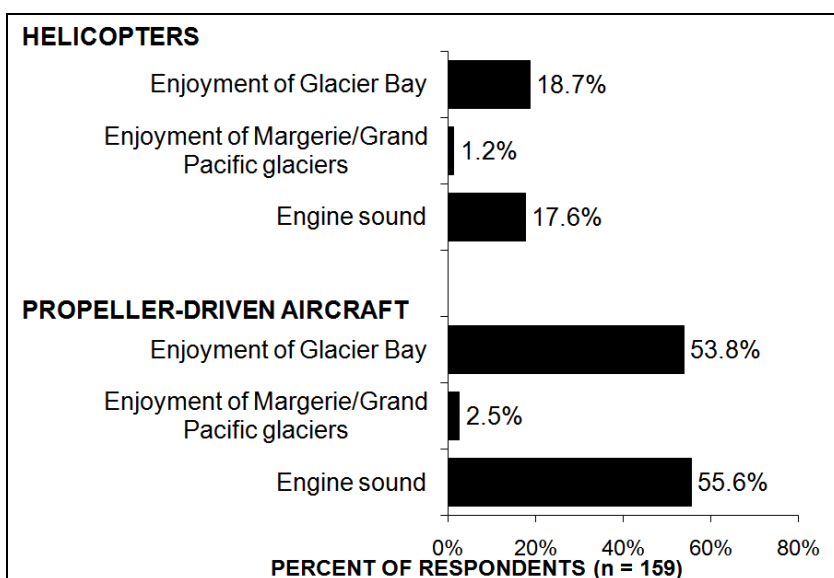


Figure B-70. Percent of all backcountry respondents who reported detraction effects due to aircraft

Detraction at particular sites

A much smaller percentage of backcountry overnight visitors reported that cruise ships detracted from their experiences at Margerie and Grand Pacific glaciers than reported detraction from their general enjoyment of Glacier Bay (6.0% vs. 66.5%; see Figure B-68). However, few backcountry overnight visitors (13.8%) visit Margerie and Grand Pacific glaciers during the kayaking/hiking portion of their trip (the focus of the survey) and thus fewer are there to encounter cruise ships. Comparing the detraction rate for visitors who encountered cruise ships at Margerie and Grand Pacific glaciers with that for visitors who encountered cruise ships anywhere in Glacier Bay proper (66.7% vs. 79.5%, respectively) shows that when visitors did encounter cruise ships at Margerie and Grand Pacific glaciers, those encounters produced slightly less detraction from their experiences than encounters at other places in Glacier Bay.

Backcountry Visitor Survey

Seeing or hearing large cruise ships at Margerie and Grand Pacific glaciers detracted from a slightly higher proportion of backcountry visitors' trips than did seeing or hearing motorized craft other than cruise ships (6.0% vs. 3.9%). Two additional findings suggest that encounters with cruise ships were perceived more negatively. First, for those backcountry overnight visitors who encountered each of the different types of craft, detraction rates were slightly higher for cruise ships than for motorized craft other than cruise ships (79.5% vs. 70.8%, respectively). Second, of backcountry visitors seeing or hearing the craft at the glaciers, 4.2% (3.8% of all respondents) reported that seeing or hearing motorized craft other than cruise ships *added* to their enjoyment of Margerie and Grand Pacific glaciers whereas 1.5% (1.3% of all backcountry respondents) reported similar positive effects for encounters with cruise ships at the glaciers.

Figure B-70 reports the findings for helicopters and propeller-driven aircraft at Margerie and Grand Pacific glaciers. Detraction effects for both types of aircraft at the glaciers were lower than cruise ships or motorized watercraft other than cruise ships. Very few backcountry visitors heard or saw propeller-driven aircraft or helicopters at Margerie and Grand Pacific glaciers. Of those who did, two-thirds of those who encountered propeller-driven aircraft reported that they detracted from their enjoyment of Margerie and Grand Pacific glaciers, and all of those who saw helicopters reported such detraction. However, the reliability of these values is low given that only six backcountry overnight visitors reported seeing or hearing propeller-driven airplanes and only two reported encounters with helicopters.

Detraction due to specific aspects of encounters

Engine sound was the aspect of encounters with other craft most likely to detract from the general trip experiences of backcountry overnight visitors. Almost half of backcountry visitors (45.9%) reported detraction due to the sound of cruise ship engines. In comparison, the engine sounds of both motorized watercraft other than cruise ships and propeller-driven aircraft were more likely to detract from backcountry visitors' experiences (detracted from 60.2% and 55.6% of trips, respectively). In the qualitative interviews of Glacier Bay visitors, a number of respondents noted that cruise ships were surprisingly quiet given their size and speed. Perhaps part of the reason the sounds of cruise ships were less detracting than the other craft was because they made less noise than visitors expected.

The sound of public address systems (PA) from cruise ships detracted from the general trip experiences of 38.6% of backcountry overnight visitors. Detraction due to the PA systems of motorized watercraft other than cruise ships was reported less than half as often (15.9%). The difference arose primarily because backcountry overnight visitors were more likely to hear PA systems from cruise ships than from motorized watercraft other than cruise ships (42.4% and 19.7%, respectively). Of the visitors who heard PA systems from cruise ships or from motorized watercraft other than cruise ships, high percentages reported detraction from their experiences (91.0% and 80.7%, respectively).

Haze from large cruise ship exhaust was reported to detract from general trip experiences by 20.9% of backcountry overnight visitors. Less than one-quarter (22.8%) said they saw such haze, but of those who did, 91.7% reported detraction from their experience. None of the sampled backcountry visitors reported that they saw haze from the exhaust of motorized watercraft other than cruise ships.

These findings regarding engine sounds, PA sounds, and haze were generally consistent with the findings of the qualitative interviews with Glacier Bay visitors. The feature of cruise ships that elicited the most comments from interviewed visitors was their vast size, not sounds or haze. That is not to say that sounds and haze were unimportant to interviewed visitors, but that (as in the mail survey results) the effects of sounds and haze did not account for all the detraction associated with cruise ships.

The wakes and navigational hazards due to cruise ships were not asked about specifically in the mail survey, but were the subject of comments by overnight backcountry users in the general comment section of the mail survey and in the qualitative survey. These hazards are a topic of considerable concern to

backcountry visitors who spend time in areas visited by cruise ships. For example, interviewed West Arm kayakers said, "...the wake problem is very significant and dangerous when loading and unloading boats" and "They [cruise ships] can really make open water crossings dangerous and difficult." For such visitors, concerns about safety may have affected whether, and to what degree, they reported detracting from their general trip experiences due to cruise ships.

Measures of overall trip satisfaction

In the mail survey of backcountry overnight visitors, the most general measures that could have been affected by seeing or hearing other cruise ships were two questions assessing visitors' overall ratings of their trip experiences (see Chapter VIII). On the simplest of these measures, over 90% of backcountry visitors rated their time in Glacier Bay as "Extremely good" or "Very good". Only one (out of 153) backcountry respondent rated their time as "Poor". The second question showed that 79.9% of backcountry overnight visitors said they were very likely to recommend that others kayak/hike Glacier Bay. Only 5.1% of backcountry overnight visitors said they would be somewhat or very unlikely to recommend kayaking/hiking Glacier Bay.

Neither of these general measures of backcountry respondents' experience quality was affected by the number of cruise ships visitors encountered. When asked specifically how their experiences with cruise ships (or lack thereof) affected their recommendations to others, most backcountry overnight visitors said that there was no effect (62.4%). Almost a third (31.2%) of backcountry visitors reported that their likelihood of recommending a visit was decreased by their experiences with cruise ships, but those reports were not related to the number of days two cruise ships were in the bay, and most backcountry overnight visitors still said that they would recommend that others kayak/hike Glacier Bay.

These results were consistent with established findings that general measures of satisfaction are insensitive to the effects of specific visitor experiences. Visitors commonly rationalize specific negative aspects of their experiences when making more global assessments. Thus, it should not be surprising that 66.5% of backcountry overnight visitors reported that cruise ships detracted from their general trip enjoyment while over 90% of the same visitors rated their time in Glacier Bay as very or extremely good.

The qualitative report suggested similar discrepancies when asking visitors about their trip experiences at different levels of specificity. In the qualitative report, nearly all the interviewed visitors reported that other vessels (including cruise ships) did not have "significant" effects on their experiences. However, the most commonly reported effects of cruise ships were disruptions of the "wilderness experience", and a closely-related feeling of surreal incongruity when encountering a ship. Thus, the findings of the qualitative report were relatively consistent with the mail survey results. Perhaps the effects of similar rationalizing processes were present in both the qualitative and mail survey results.

Rated detracting due to cruise ships and encounters with other craft

Prior research in Glacier Bay (Johnson, 1990) suggested that the rated effects of cruise ships on visitor experiences were affected by encounters with other forms of transport. The exploratory analyses conducted on the mail survey of backcountry overnight visitors were consistent with this prior research, showing that in some cases, the detracting effects of encounters with different kinds of craft were intertwined. For example, the detracting due to cruise ships was related to encounters with helicopters and the detracting due to helicopters was related to encounters with cruise ships. Clearly, encounters with each type of craft do not have effects only on the rated detracting due to that specific type of craft.

Because a complete investigation of these relationships was not a focus of the current research, little can be said about the specific ways in which encounters with the various forms of transport affect visitor ratings of detracting. Based on this limited understanding, some might argue that visitor ratings of the detracting effect of cruise ships should not be used in formulating vessel management policy. A complete understanding of the visitor experience would be ideal. However, it is important to remember that no

matter what factors actually led some visitors to report that cruise ships detracted from their experiences, there is every reason to believe that those visitors thought that cruise ships did detract from their experiences. Measuring the prevalence of such detraction is a necessary first step in determining whether it is an issue that merits further study or management action.

Implications

The findings from the mail survey of backcountry overnight visitors do not lead to a set of simple implications for management. While general measures of trip satisfaction suggested little to no evidence that cruise ships affected backcountry visitors' trips, measures asking about the effect of cruise ships on specific aspects of trip experiences indicated that cruise ships affected most backcountry overnight visitors' trips in a variety of ways. Inconsistent findings between general and specific measures have been found in other visitor research. Such findings suggest that events can have meaningful and significant effects on specific aspects of visitors' trips and yet, visitors can still report minimal effects when considering their trip more generally.

When both general and specific measures find comparable effects, implications for management policy are relatively simple compared to the inconsistent results found in this survey. Questions of policy cannot be settled by simply asking whether most backcountry overnight visitors were generally satisfied with their trips. Managers must also consider whether all the measured effects of cruise ship encounters are acceptable in light of the conditions they seek to provide backcountry overnight visitors. Findings for overall trip satisfaction showed minimal effects of cruise ships whereas specific measures indicated for a majority of backcountry visitors that cruise ships detracted from trip experiences related to the legal definition of wilderness. Managers must consider these findings in the context of the type of experience(s) that they wish to (and are in some cases required to) provide when making vessel management decisions.

An additional factor complicating the interpretation of this survey concerns the geographic location in which encounters with cruise ships occur. Many backcountry overnight visitors kayak in the East Arm or other areas in which cruise ships are not allowed. Both the target and actual experiences provided in those portions of Glacier Bay may differ markedly from experiences elsewhere. Practical limitations on the complexity of the survey prevented this research from differentiating between the geographical locations in which cruise ships affected visitors' experiences. Thus, managers have a limited ability to assess the acceptability of the backcountry overnight visitor experiences in specific areas where the experiences they wish to provide are different.

In the end, while researchers can provide data and visitors can provide opinions, it is up to managers to decide whether or not the effects of cruise ships described in this report are appropriate and acceptable.

Objective 2: What are estimated effects for backcountry visitors under the Record of Decision maximum use level of 2 cruise ships per day, every day?

Analyses were conducted that examined whether backcountry overnight visitors' experiences depended on the number of cruise ships in the bay during the days when they visited. None of those analyses found statistically significant effects for the measures collected in the mail survey. Thus, there was no statistically reliable basis for predicting any changes from current conditions, when 2/3 of the days are 2-cruise ships in the bay days, to maximum allowed conditions, when 2 cruise ships are in the bay every day.

The negative findings for these analyses place additional weight on the first objective for managers evaluating the effects of cruise ships on backcountry overnight visitors. The survey results do not predict that the effects of cruise ships will change, but managers must still decide whether the current effects of cruise ships on the experiences of backcountry overnight visitors are appropriate.