



Comparison of Resource and Social Conditions to Existing Standards in Selected Areas of Glacier Bay National Park's Wilderness

Natural Resource Report NPS/GLBA/NRR—2015/1085





ON THIS PAGE

Tour vessel shore excursion, guided kayak party, and NPS assessment staff at Lamplugh Glacier.
NPS photo

ON THE COVER

Campsite at the mouth of McBride Inlet, Glacier Bay National Park and Preserve.
NPS photo

Comparison of Resource and Social Conditions to Existing Planning Guidance in Selected Areas of Glacier Bay National Park's Wilderness

Natural Resource Report NPS/GLBA/NRR—2015/1085

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Abstract

The objective of this qualitative and quantitative data collection effort was to assess whether resource and social conditions in selected areas within Glacier Bay National Park and Preserve (GLBA) met existing planning guidance, and to provide information and data to assist in developing new standards and measures for future backcountry and wilderness stewardship planning efforts.

Existing planning guidance was derived from the GLBA Wilderness Visitor Use Management Plan (NPS 1989) and General Management Plan (GMP 1984). These plans provided background resource and social condition information that effect management of visitor use, vessels, and commercial activities on wilderness lands and waters as well as on waters adjacent to wilderness. Qualitative assessments of resource conditions at tour vessel shore excursion locations and quantitative assessment of social encounters at McBride Inlet within GLBA were conducted in 2014 to compare current conditions to the guidance provided in the plans. The results from the qualitative assessments showed that of the eight individual assessment locations visited, five showed visual evidence of previous use; thereby exceeding planning guidance. The encounters standards established in the WVUMP and interpreted for this study were exceeded for the McBride study area regardless of which planning zone guidance was considered. Recommendations for future management decisions include utilizing the ability to designate heavy use locations and establishing clearly defined visitor use zoning, desired conditions, and standards and measures in future plans.

Acknowledgments

This project would not have been possible without the strong support of the GLBA Protection Division; particularly the Visitor Information Station staff. Many volunteers from the community of Gustavus assisted with data collection for this project, and we are grateful for the show of support and are hopeful that this is the start of ongoing engagement of local community members in monitoring wilderness character in their backyard park.

Introduction

Issue statement

The Glacier Bay National Park General Management Plan (GMP 1984) and Wilderness Visitor Use Management Plan (NPS 1989) established management zones within wilderness and provided guidance regarding management objectives and standards for resource and social conditions. These plans are outdated, and the guidance within them requires interpretation and refinement to be measureable. Nevertheless, until these plans are revised, they remain the current planning guidance for the park, and management decisions should ensure that consideration is given to the resource and social condition standards contained in them.

Current and future management decisions regarding visitor use within Glacier Bay National Park and Preserve (GLBA) require qualitative and quantitative data regarding resource and social conditions in key areas. The results of the studies discussed in this report have implications for current management issues related to visitor use and commercial activities. Assessment of current conditions in select areas to the existing plan standards will be valuable when a new Glacier Bay National Park Backcountry and Wilderness Stewardship Plan is developed.

Background on baseline use levels and resulting resource and social impacts

When monitoring and mitigating resource impacts related to visitor use, managers must decide which indicators to measure and how often to monitor such conditions (Newman et al. 2006). Historically, managers have relied on objective-based planning frameworks such as Limits of Acceptable Change (LAC) and Visitor Experience and Resource Protection (VERP) to identify objectives and develop management actions. More contemporary approaches are best described as indicator-based adaptive management, where the core components of setting appropriate management objectives, the development of associated indicators and standards of quality, and a consistent monitoring are emphasized (Newman et al. 2006). A trajectory of resource and social conditions approaching standards established in this process often triggers a management action.

Unfortunately, it is difficult to ascertain whether the management objectives and planning guidance defined in the Glacier Bay Wilderness Visitor Use Management Plan (WVUMP) and General Management Plan reflect *desired* or *current* conditions at the time. NPS Management Policies 2006, chapter 6, “Wilderness Preservation and Management,” section 6.3.7, states that, “The principle of nondegradation will be applied to wilderness management, and each wilderness area’s condition will be measured and assessed against its own unimpaired standard.” Often, baseline data about conditions at time of designation do not exist, so the wilderness character baseline, from which all future trends are determined, is defined as the first time data are collected (Landres et al. 2014). The park conducted backcountry impact assessments in the 1980s, but the raw data from these assessments are unavailable. Resource degradation by backcountry users was perceived to be a relatively new phenomenon at that time (Brown 1986). The following excerpt from the background information in the 1986 Backcountry Campsite Monitoring Program information is the only known discussion of resource conditions from around the time of designation:

“According to a note from park Biologist Greg Streveler to the Park Superintendent on September 15, 1976 (from resource management files), it was reported by staff that “we have no problem with camper impact on vegetation yet in Muir Inlet.” In September 1979, a fairly extensive survey of popular shoreline areas was examined for camper impact. Areas covered were: York Creek, Garforth Island, Goose Cove, Wolf Point, McBride Glacier, Riggs Glacier, and Reid Inlet. At this time it was suggested that “deterioration is not permissible if it exceeds that which can recover in one fallow year or if it significantly changes the course and/or rate of succession in an area.” Biologist Streveler believed that camping impact on Garforth Island and McBride Glacier was approaching these limits and that at Riggs use was likely preventing new growth.

In the same year, 1979, the southwest shore of Reid Inlet was the site of bowlandings by concession boats which resulted in trailing and tent sites denuded to bare ground in only one season.”

The total number of unique individuals who spent at least one night in the wilderness of Glacier Bay was 651 in 1980, increased to 1425 in 1987 (NPS 1988), rose again to 1,800 in 1996, and subsequently declined to 927 in 2014 (internal NPS data). This (927 in 2014) is 40% more visitors than in 1980, but about half the peak numbers experienced in the mid-1990s. Methods of counting length of stay have varied over the years, so determining increases or decreases in user nights or days is not possible at this time.

Day hikes, kayaking and other activities that do not involve camping overnight in wilderness do not require a permit, so it is unable to ascertain the amount of day use that has occurred historically within the Park. Conducting day use activities in almost all areas more than a few miles beyond the Bartlett Cove Developed Area requires motor vessel or float plane access, shore drop-offs (for hiking), and extensive logistical support, so while it can be assumed that some day-use activity has taken place over the years, it was limited by these constraints. However, recent changes in the tour vessel industry within southeast Alaska caused a major surge in day-use activity within Glacier Bay. In January 2013, two cruise companies merged and grew their fleet from three ships to seven. This merge also resulted in one company receiving more allocated tour vessel entry days to Glacier Bay proper. These companies had also acquired two Glacier Bay National Park charter vessel permits prior to this merge. This combination of an increase in vessels, allocated tour and charter entries, and logistical capability to bring tour vessel passengers to shore caused a three-fold increase in the number of days that tour vessel passengers conducted day use activities within Glacier Bay proper between 2011 and 2015 (Figure 1).

Even though overnight campers generally produce more and different types of impacts than day users (Hammit et al. 2015), the day-use activities of tour vessel passengers present management challenges in regards to the high potential of negative social impacts to other visitors and unknown impacts to wildlife and vegetation.

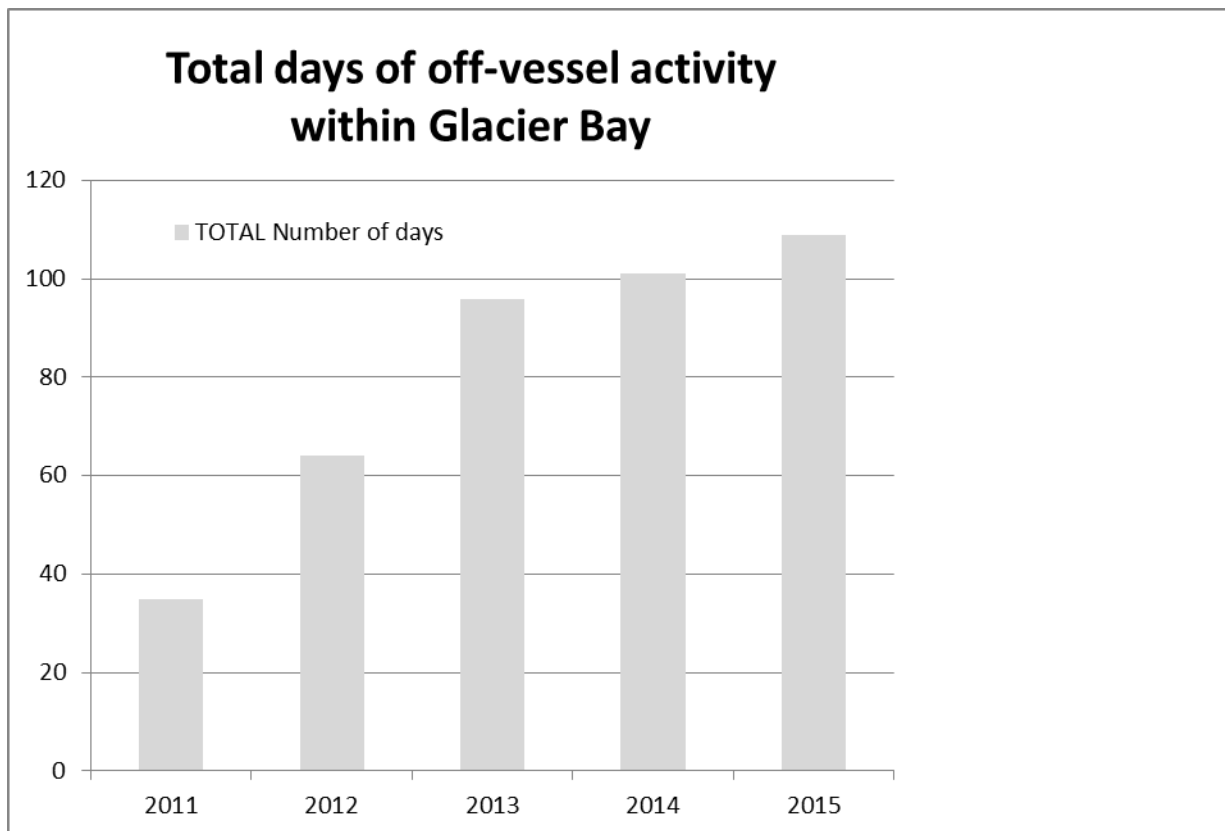


Figure 1. Total days of off-vessel activity within Glacier Bay from 2011 through 2015,

Project objective

The objective of this project was to assess whether selected resource and social conditions in key areas within Glacier Bay proper meet existing plan guidance, and to provide information to assist in developing desired conditions, standards, and measures for future backcountry and wilderness stewardship planning efforts. Information and data collected will be used to inform upcoming management decisions related to commercial services.

In particular, information collected will assist with:

- Completing Minimum Requirement Analyses examining the need for administrative actions related to commercial services.
- Completing Extent Necessary Determinations related to commercial services.
- Developing prospectus documents for tour vessel, charter vessel, and guided kayaking contracts.
- Completing resource protection guidance for operating plans and backcountry and wilderness stewardship plans.
- Refining management objectives and associated standards and measures for future planning efforts.

Guidance from GLBA plans

Wilderness zone type as defined by the WVUMP

Management zoning is the method used by the National Park Service to identify and describe the appropriate variety of resource conditions and visitor experiences to be achieved and maintained in the different geographic areas of a park. Zoning is intended to provide for a variety of resource conditions and visitor uses that are compatible with the park's purpose, and to preserve its fundamental resources and values. The WVUMP established two zones for GLBA's wilderness.

Pristine Zone

Nearly all wilderness lands and waters were designated the Pristine Zone in the WVUMP. The Pristine Zone was further subdivided into approximately 30 management units, each typically including a segment of shore and associated upland watersheds. The non-wilderness marine waters were not included in this zone, and management of these areas was expected to be addressed in a vessel management plan to be developed later.

Threshold Zone

Lands within a one-mile radius of the camper drop-off sites collectively comprise the Threshold Zone. This zone shifts each time a new drop-off site is designated and a previous one is discontinued. Somewhat more concentrated use is allowed for the purposes of wilderness access, within limits compatible with a wilderness experience in the adjacent pristine zone. The assessments analyzed and discussed in this report did not include any lands or waters within the current Threshold Zone; therefore it is not included in any subsequent analysis.

Heavy Use Locations

The WVUMP allowed for ten or fewer specific areas within the Pristine Zone to be designated for heavier use than would otherwise be consistent with maintaining Pristine Zone conditions. It was anticipated that these areas would change as visitor use patterns change. These areas and associated standards were to be identified annually. There is no evidence that this was ever done, although certainly there are areas within the Pristine Zone that exceeded resource and social standards and would fall into this category.

The WVUMP failed to address the geographic extent of these Heavy Use Locations. The plan language suggests that they were intended to refer to specific camping sites. However, it makes more sense for the purposes of this study and for future planning efforts to consider them to be somewhat larger geographic areas that correspond to survey areas used by the recreation impact assessment projects conducted in 2003 and 2004 (Lewis and Drumheller 2004) and subsequently refined in 2012 (Goonan et al. 2015).

Interpreted standards

It is beyond the scope of this project to compare current conditions to all the management guidance ("standards") established in the GMP and WVUMP. However, we can perform comparisons for a subset of these, and those comparisons appear in the table below. The left-hand column displays the verbatim management guidance (in quotes) from existing plans, along with how it was interpreted. The right-hand column shows the final interpretation we used for the analyses in this report.

Table 1. Condition standards from the WVUMP and management objectives from the GMP, and how we interpreted them for this project.

RESOURCE CONDITIONS	
Pristine Zone guidance	Our interpretation
“Over the majority of the area resource effects from visitor use will not be apparent. Disturbance to campsite vegetation and soils can be healed in one fallow year.” Interpretation of intent and/or need for clarity: The “area” is assumed to be the area surveyed in past camper surveys, during this study, or awaiting establishment. “Apparent” means clearly visible or obvious.	Visual evidence of previous use will not be conspicuous or attract attention (e.g., no human-caused trailing, no garbage, no rock cairns, no displaced natural objects).
Heavy Use Location guidance	
“Up to ten sites can be used more heavily than could be tolerated and still maintain the above conditions.” Interpretation of intent and/or need for clarity: The WVUMP failed to specify the geographic extent of these Heavy Use Areas. The plan language suggests it was intended to mean specific camping sites. However, for purposes of this study we interpret Heavy Use Locations to comprise somewhat larger geographic areas.	Up to ten designated areas along the shores of Glacier Bay may have visual evidence of human use (see above).
SOCIAL CONDITIONS	
Management objective defined by GMP	Our interpretation
“Backcountry use by individual visitors (commercially guided trips would be needed for only about 20% of total use), with the use of commercial guides being encouraged for less accessible areas.” Interpretation of intent and/or need for clarity: The language implies that commercial guiding would be encouraged for areas beyond the shorelines of Glacier Bay proper. It is unclear whether “commercially-guided” means all commercial trips (e.g., including bare-boat charters). No metric is provided for “total use” (e.g., camper nights spent sleeping on the ground). No definition is provided for “less accessible”. No temporal context is provided.	Less than 20% of total backcountry use during the June 1 – August 31, 2014 summer visitor season is by visitors on commercially-guided trips (vs. by private independent travelers). Backcountry use is measured in “unique encounters”. See definitions on page 12.
Pristine Zone guidance	Our interpretation
“Over the majority of the area, intergroup contacts will be rare (no campsite encounters per night and one or less travel encounters per day for 90% of the visitors).” Interpretation of intent and/or need for clarity: We assume “majority” means >50%. It is not clear how encounter frequency (inter-group contacts) is to be placed in a spatial context in order to judge whether the standard has been exceeded. No definitions are provided for “inter-group contact”, “campsite encounters per night” (e.g., of, or from? when is “night?”), “per day” (hours?), and “visitors” (what kind?). We assume the standard applies to the June 1 – August 31 summer visitor season. A “zero” standard will always be exceeded.	One or more campsite encounters per day within the study area should occur on no more than 10% of the total sample days.
“Close contacts with motorized craft will be rare (in and adjacent to wilderness waters) or occur on no more than 50% of the days for 90% of the visitors (elsewhere).” Interpretation of intent and/or need for clarity: No specific definitions of “close contact”, “rare”, “adjacent to”, and “visitors” are provided. We defined close contact as “within ¼ mile”. Unlike the previous standard, this does not include a threshold spatial	More than one travel encounter of per day within the study area should occur on no more than 10% of the total sample days. For wilderness and eligible wilderness waters, close encounters (within ¼ mile) with motorized craft of one or more per day within the study area should occur on no more than 50% of the total sample days. For non-wilderness waters, close encounters (within ¼ mile) with motorized

context (e.g., “over the majority of the area”). We assume the standard applies to the June 1 – August 31 summer visitor season. Very high rates of encounters are permissible 50% of the time, given this standard.	craft of more than one per day within the study area should occur on no more than 50% of the total sample days.
Heavy Use Location guidance	Our interpretation
“At the few sites within the pristine zone designated yearly for heavier use, inter-group contacts will still be infrequent (no more than one campsite encounter per night and two travel encounters per day for 90% of visitors).” Interpretation of intent and/or need for clarity: It is not clear that any sites have ever been formally designated for “heavier use”, nor are we aware of any criteria that were established for use in making that a designation. Similarly, there is no reference to any spatial context (size/map-able boundaries) of such sites. As before, no definitions of “inter-group contact”, “campsite encounters per night”, “per day”, and “visitors” are provided. We assume the standard applies to the June 1 – August 31 summer visitor season.	Campsite encounters of more than one per day within the study area should occur on no more than 10% of the total sample days. Travel encounters of more than two per day within the study area should occur on no more than 10% of the total sample days.
“Close contact with motorized craft may occur on most days.” Interpretation of intent and/or need for clarity: No definitions of “close contact” and “days” (when to when?) are provided. We assume “most” means >50%, and that the standard applies to the June 1 – August 31 summer visitor season.	Encounters (within ¼ mile) with motorized craft within the study area occur on more than 50% of the total sample days.
“Visual evidence of previous use will be unobtrusive.” Interpretation of intent and/or need for clarity: No definition of “unobtrusive” is provided.	Visual evidence of previous use will not be conspicuous or attract attention (no human-caused trailing, no garbage, no rock cairns, no displaced natural objects).

Definitions

- **Inter-group contact (“encounter”):** An “encounter” or inter-group contact occurred when a person or group became visually (only) aware of the presence of another person or group within the wilderness. Note that for these purposes a single person or vessel was considered a “group”.
- **Travel encounter:** An encounter detected while the observer was travelling (whether on or off-shore, in any mode other than camping).
- **Campsite encounter:** An encounter detected while the observer was camping.
- **Heavy Use site within transect:** McBride North and South spits - see study area map.
- **Pristine zone within transect:** Everywhere else - see study area map.
- **Close contact with motorized craft:** Within ¼ mile.
- **User days:** The number of days that a single visitor was within GLBA’s backcountry or wilderness from day of entry to day of exit, regardless of entry and exit times.
- **Encounters per day:** For these purposes, the number of encounters during the 8-hour standardized sampling day.

Methods

General project approach

This project consists of two components:

1. A qualitative biophysical assessment of areas where shore excursions from tour vessels were known to be occurring, occurred in the recent past, or are proposed to occur.
2. A quantitative survey of visitor encounter rates near the McBride Inlet area in the East Arm of Glacier Bay which is focused on social encounters in a single key area of Glacier Bay that is known to receive relatively high use.

Component 1: Qualitative assessment of shore excursion locations

The purpose of these qualitative assessments was to assess whether biophysical resource conditions on land meet existing plan guidance, and to provide data to assist in developing new standards and measures for future backcountry and wilderness stewardship planning efforts. These assessments were based on one-time qualitative “snapshots” of conditions in five general areas and eight discrete locations visited during June and July, 2014.



Figure 2. Locations of tour vessels shore excursions where qualitative biophysical assessments were conducted in Glacier Bay in June and July, 2014.

Field methods

Qualitative assessments of certain current and proposed shore excursion areas in Glacier Bay proper (Reid Inlet, McBride Inlet, Geikie Inlet, Beartrack Cove, and Lamplugh Glacier: Figure 1) were conducted by a team of GLBA Concessions, Protection, and Resource Management staff members. Biophysical conditions at each site (three sites included two discrete assessment locations) were qualitatively compared against the interpreted standard for Heavy Use Locations as defined by the WVUMP:

Visual evidence of previous use will not be conspicuous or attract attention (no human-caused trailing, no garbage, no rock cairns, no displaced natural objects).

Site visits

At each location, observers went ashore at locations indicated by tour vessel operators as the areas they utilize or plan to utilize for shore excursions. The team collected a GPS location at the start of their survey and walked the area together, following known shore excursion pathways and obvious human use sites. At each site the observers looked for visual evidence of previous use. All such evidence was documented.

Locations and schedule

The five general assessment locations were identified based on shore excursion areas indicated by 2013 tour vessel reports and by concessionaires as prospective shore excursion areas

Component 2: McBride Inlet encounter rates survey

The purpose of the McBride Inlet encounter rates survey was to assess whether social conditions related to travel and camping encounter rates (including encounters with motorized craft) within a single key area in Glacier Bay proper meet existing plan guidance, and to provide information to assist with the development of new measures and standards for future backcountry and wilderness stewardship planning efforts. McBride Inlet was selected because it is known to be the main attraction in the east arm of Glacier Bay. However, the total amount of use there is assumed to be less than that of similar areas in the west arm due to lack of cruise ships and generally lower amounts of vessel traffic. Should the encounter rates exceed standards at McBride, it is reasonable to assume that encounter rates would also be exceeded in similar areas throughout Glacier Bay.

Defining “encounter rates”

An “encounter” occurs when a person or group becomes aware of the presence of another person or group within the wilderness (Broom and Hall 2009). For the purposes of this survey, awareness involved visual detection but not auditory detection. Sound was removed to simplify the data collection method and because we anticipate that the park’s soundscape will be monitored utilizing different methods at some point in the future. The encounter *rate* was defined as the number of encounters that occurs per day. For the purposes of this study, data were standardized to an 8-hour time period or day.



Figure 3. McBride Study Area where quantitative encounters assessments were conducted in Glacier Bay in June, July and August, 2014.

Ideally, encounter rates surveys are periodically repeated in order to detect changes over time. This rarely occurs, however, because the expense and effort required often make it impractical (Broom and Hall 2009). Instead, occasional encounter rates surveys (including this component of this project) provide “snapshots” in time of conditions relative to established standards. Statistically significant changes in encounter rates and trends over time can be detected with periodic surveys employing a standardized protocol if location, level of effort, season, etc. are the same.

Field methods

The data collection protocol used by this project draws from the field encounters protocol of the Tongass National Forest that has similar visitor use activities and patterns (Hood 2006). It was designed to be implemented by park staff and partner observers as they travel through wilderness. The perspective of the “observer” was intended to mimic that of the wilderness visitor.

Observers visited the study area (Figure 2) and traveled and camped throughout the area as would any visitor. During their stay they collected data in the manner described below. All data were compiled and entered into an aggregated database at the end of each trip as described in the data management section. Quality assurance/quality control ensured that data were completely and accurately entered.

To complete the encounters survey, data were collected for a total of 31 days within the study area. For the purposes of this study the visitor use season was defined as June 1 through August 31. This project sampled 33.7% of the days in that 92-day-long period.

Sampling design

Each sampling day was divided into three distinct sampling periods, each of which was three hours long. Observations took place for two consecutive and continuous hours within a sampling period for a total of 6 hours per day. This provided for observer breaks so that they could accomplish other patrol objectives. The two-hour period was chosen by the observer and started no later than one hour into the three-hour sampling period. During this two-hour block a single observer employed the field data collection protocol and documented encounters on the field data sheet. The observers could be camping or travelling at will during the sampling period.

Sampling periods:

9:00 AM – Noon

Noon – 3:00 PM

3:00 PM – 6:00 PM

Field observation data sheet and explanation of data types

Appendix A contains the Field Observation Data Sheet and Instructions.

Data analyses

For most standards, only days with all three sampling periods were used. The exception to this was percentage of commercial vs. non-commercial use. Data were collected over different periods of time on different days. To combine these data for analysis, each day's observations were standardized to an eight-hour day. This was accomplished by taking the sampling days where all three three-hour periods were successfully sampled, dividing the number of encounters by the number of hours of observation (a total of six hours per day), and then multiplying by 8. Data were aggregated to show total travel and campsite encounters per day and compared against the standards for reporting.

The core analyses used for comparison to the existing standards are summarized below. For a complete analyses protocol, refer to Appendix D.

Commercial vs. non-commercial encounters

We calculated the total number of unique encounters (not counting multiple encounters with the same group), total number of unique private encounters, total number of unique administrative encounters, and total number of unique unknown encounters for the entire study area and for the shore only. From this, we calculated the percentage of private encounters, administrative encounters, and unknown encounters for the entire study area and for the shore only.

Camp and travel encounters

We calculated the total number of encounters and determined the per-day minimum, maximum, mean, standard deviation, and 95% confidence interval for campsite and travel encounters including

aircraft, and not including aircraft. We used this information to determine whether the encounters exceeded the standards for the pristine zone and heavy use locations and for the entire study area and on-shore only.

Close contacts with motorized craft

We calculated the total number of encounters to motorized vessels and determined the per-day minimum, maximum, mean, standard deviation, and 95% confidence interval for campsite and travel encounters. We used this information to determine whether the encounters exceeded the standards for pristine zones and heavy use locations.

Results

Component 1. Qualitative assessment of shore excursion locations

Of the eight individual assessment locations visited, five showed visual evidence of previous use. Complete Assessment Sheets are located in Appendix B.

Interpreted standard: *Visual evidence of previous use will not be conspicuous or attract attention. (No human-caused trailing, no evidence of garbage, no rock cairns, etc.).*

Table 2. Summary of Qualitative Assessments of Shore Excursion Locations, Glacier Bay National Park, 2014

Location	Evidence of Human Use	Other noteworthy assessment information
Beartrack Cove	None	Generator and motor sounds would impact the non-motorized waters in the Beardslee Islands. Note that there is a triangle of wilderness waters that are open to motorized use in the southern portion of Beartrack Cove. Wilderness zoning guidance would apply there. Wildlife trails in the forest were not completely hardened, and additional human use would likely cause additional impacts to the vegetation within the game trails. Ideally visitors would spread out through the forest and not hike in a single file; this advice is unlikely to be followed. If followed, it is possible that large numbers of shore excursions could cause even more damage and trail braiding. If human use levels increase, the trail will likely become more hardened. See images 104-058-061 on pages 37-41. Increased use levels and dispersion may have negative impacts to wildlife.
Geikie Inlet/ Charpentier Cutoff	None	There was one site with exposed soil which could have been from camping (see image 104-0069 on page 46), but this could also be a result of wildlife activity. Following the recently developed campsite assessment protocol (Goonan 2012), this site would not qualify as a set campsite, but would be mapped and ongoingly monitored. This assessment area was identified by Un-Cruise Adventures as an area for potential new shore excursion activity. More use in Geikie Inlet would probably be acceptable from a visitor use perspective. However, increased use levels and dispersion may have negative impacts to wildlife. Increased use in the immediate area would likely result in visible human impact very quickly.
Geikie Inlet Wood Lake Outlet	None	This area is very brushy and difficult terrain for hiking. This is another area identified by Un-Cruise Adventures as an area for potential new shore excursion activity. More use in Geikie Inlet would probably be acceptable from a visitor use perspective. However, increased use levels and dispersion may have negative impacts to wildlife..
Reid East	Yes	Campsites were present at the assessment start point, and one rock ring campsite was visible on shore on the way to the glacier. There were footprints but no visible trailing due to dynamic substrate of the shorelines. The assessment team recommends dispersed hiking along the shore. The ground surface is very resilient/durable. Increased use levels and dispersion may have negative impacts to wildlife.
Reid West	Yes	Human-caused trailing through vegetation was evident at the assessment start point and is known to have been present in

Location	Evidence of Human Use	Other noteworthy assessment information
		the 1980s (Naumann 1985). It would be advisable to promote less use in vegetated areas and somehow provide access to the west glacial area in a more durable location. Once through the vegetation, the west side of the glacier provides a rocky, durable substrate for hikers and that specific area could receive more use than it currently receives with little visible impact to vegetation. Increased use levels and dispersion may have negative impacts to wildlife.
Lamplugh	Yes	At Mary's Beach (start point) there were visible campsites and rock rings and flattened areas in the beach gravel, as well as conspicuous trailing leading toward the glacier through dense willow scrub. Campsite cairns at Lamplugh had been removed two weeks prior by Protection staff, but campsites were still evident. The assessment team recommends concentrating use onto the existing trail. Trails were braided in areas. Park management could consider building and maintaining cairns. Increased use levels and dispersion may have negative impacts to wildlife.
McBride North	Yes	Obvious rock rings, vegetation loss, and trailing were evident throughout the survey area. Campsites were in full view of other campsites. The assessment team recommends minimizing large concentrations of visitor use such as off-vessel activity from tour vessels because this area is popular with independent kayakers and there is little room for dispersal. The area could potentially be an active seabird nesting area if there was less human disturbance in the area. Increased use levels and dispersion may have negative impacts to wildlife.
McBride South	Yes	Obvious rock rings, vegetation loss, and trailing were evident throughout the survey area. Campsites were in full view of other campsites. The assessment team recommends minimizing large concentrations of visitor use (this area is popular with independent kayakers) because there is little room for dispersal. Increased use levels and dispersion may have negative impacts to wildlife.

Component 2: Encounter rates survey

Commercial vs. non-commercial encounters

Types of use entire study area

Management Objective: Commercial encounters should not exceed 20% of total encounters in the McBride Study Area.

2014 condition: Commercial groups in the McBride Study Area totaled 32% of the total encounters on sampled days, while known private groups totaled 29% of the total encounters. Administrative encounters and unknown encounters totaled 7% and 27% of the total encounters, respectively. The high percentage of unknown encounters was due to difficulty with distinguishing types of vessels while viewing them from a distance.

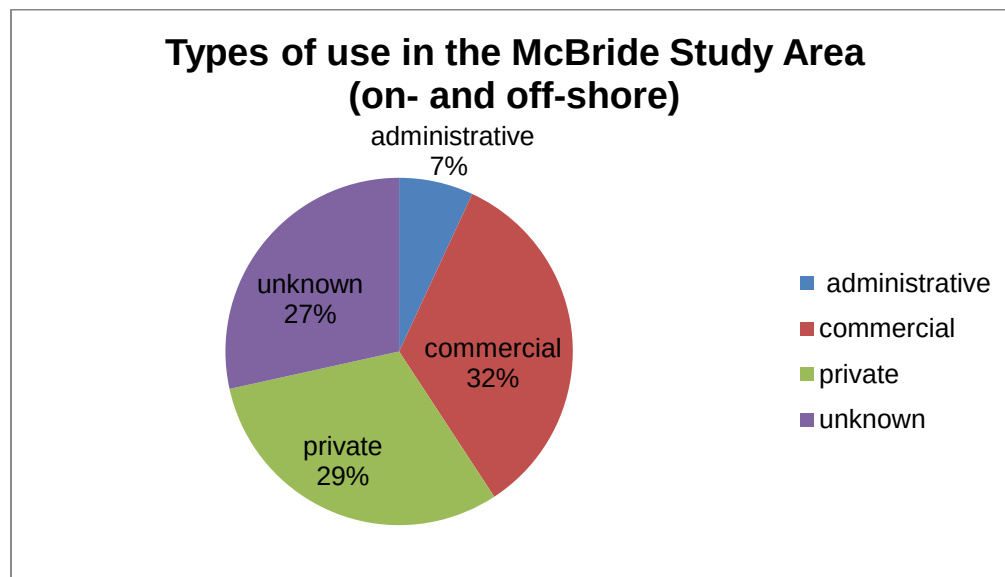


Figure 4. Types of use in the McBride Study Area (on- and off-shore) during encounter surveys in Glacier Bay, 2014.

Types of use on-shore only

Management Objective: On-shore commercial encounters in the McBride Study Area should not exceed 20% of the total encounters.

2014 condition: Commercial groups on shore in the McBride Study Area totaled 40% of the total encounters on sampled days, while known private groups totaled 47% of the total encounters. Administrative encounters and unknown encounters each totaled 7% of the total encounters.

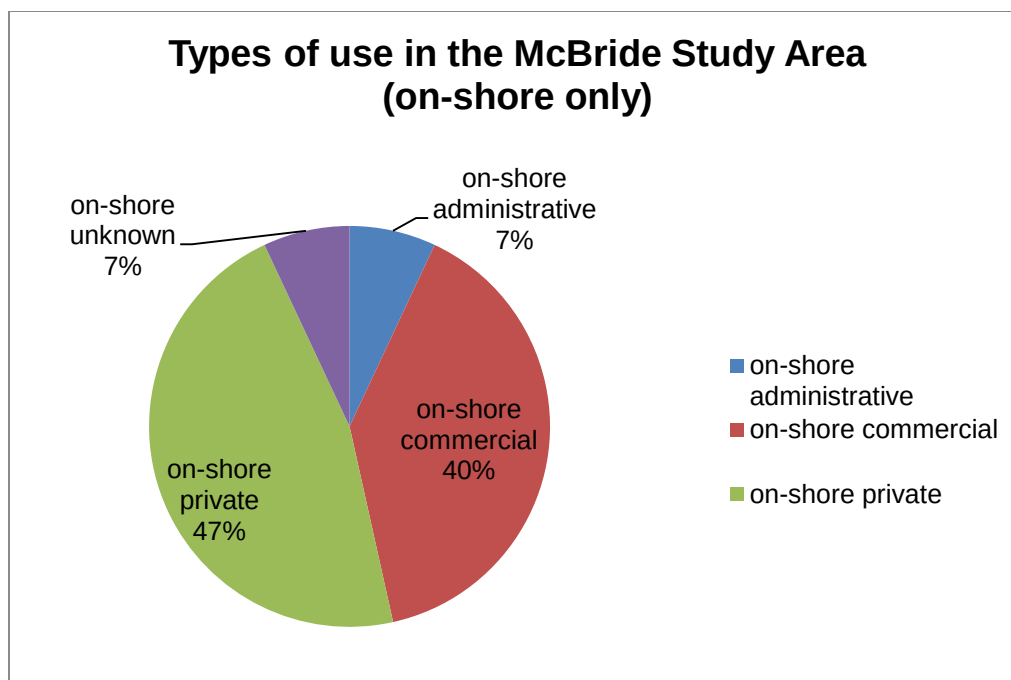


Figure 5. Types of on-shore use in the McBride Study Area (on-shore only) during encounter surveys in Glacier Bay, 2014.

Campsite and travel encounters

We found that campsite and travel encounter standards for pristine and heavy use zones were far exceeded both with and without including aircraft (Table 5).

Table 3. Per-day minimum, maximum, mean, standard deviation and confidence interval for campsite and travel encounters *including* aircraft

	Campsite encounters	Travel encounters
MIN	0	0
MAX	30.67	18.67
Mean	4.17	4.6
SD	5.98	4.79
95% CI	2.11	2.91

Table 4. Per-day minimum, maximum, mean, standard deviation and confidence interval for campsite and travel encounters *excluding* aircraft

	Campsite encounters	Travel encounters
MIN	0	0
MAX	30.67	16
Mean	4.04	3.7
SD	6.72	4.3
95% CI	2.36	1.51

Table 5. 2014 survey results: campsite and travel encounter rates summary

Pristine zone	Interpreted Standard	Results (including aircraft)	Results (excluding aircraft)	Meets standard?
Campsite encounter rates	Encounters of more than 0 per day should occur on no more than 10% of sample days	Encounters exceeding standard occurred on 77% of sample days	Encounters exceeding standard occurred on 65% of sample days	No
Travel encounter rates	Encounters of more than 1 per day should occur on no more than 10% of total sample days	Encounters exceeding standard occurred on 81% of sample days	Encounters exceeding standard occurred on 68% of sample days	No
Heavy Use zone				
Campsite encounter rates	Encounters of more than 1 per day should occur on no more than 10% of total sample days	Encounters exceeding standard occurred on 77% of sample days	Encounters exceeding standard occurred on 65% of sample days	No
Travel encounter rates	Encounters of more than 2 per day should occur on no more than 10% of total sample days	Encounters exceeding standard occurred on 65% of sample days	Encounters exceeding standard occurred on 52% of sample days	No

Close encounters with motorized craft

Encounters with motorized craft exceeded planning standards for every zone except the Heavy Use Location, which had no upper limit (Table 7).

Table 6. Per-day minimum, maximum, mean, standard deviation and confidence interval for close encounters with motorized craft

MIN	0
MAX	25.33
Mean	5.2
SD	5.54
95% CI	1.95

Table 7. 2014 survey results: Close encounters with motorized craft for each standard in the McBride Study Area.

	Interpreted Standard	Current condition	Meets standard?
Pristine zone Non-wilderness waters	Close encounters with motorized craft of more than 1 per day should occur on no more than 50% of total sample days.	Close encounters exceeding standard occurred on 80.65% of sample days	No
Pristine zone Wilderness waters (including eligible)	Close encounters with motorized craft of more than 0 per day should occur on no more than 50% of sample days.	Close encounters exceeding standard occurred on 80.65% of sample days	No
Heavy Use Location	Encounters (within ¼ mile) with motorized craft within the study area occur on more than 50% of the total sample days	Close encounters exceeding standard occurred on 80.65% of sample days	Yes

Discussion and Recommendations

Qualitative analysis of selected shore excursion areas

Of the eight individual assessment locations visited, five showed visual evidence of previous use and exceeded the standard for the pristine zone. These sites- two locations at Reid Inlet, two locations at McBride, and one at Lamplugh - have long been popular due to their proximity to tidewater glaciers. An analysis of records from interpretation rangers stationed upon each tour vessel that enters Glacier Bay shows that these sites have received the preponderance of shore excursion activity in the West Arm of Glacier Bay since 2012 (Figure 5). The McBride Inlet area locations in the East Arm of Glacier Bay also exceeded the standard. The McBride area is known anecdotally to be the most popular destination in the East Arm due to its glacier attraction.

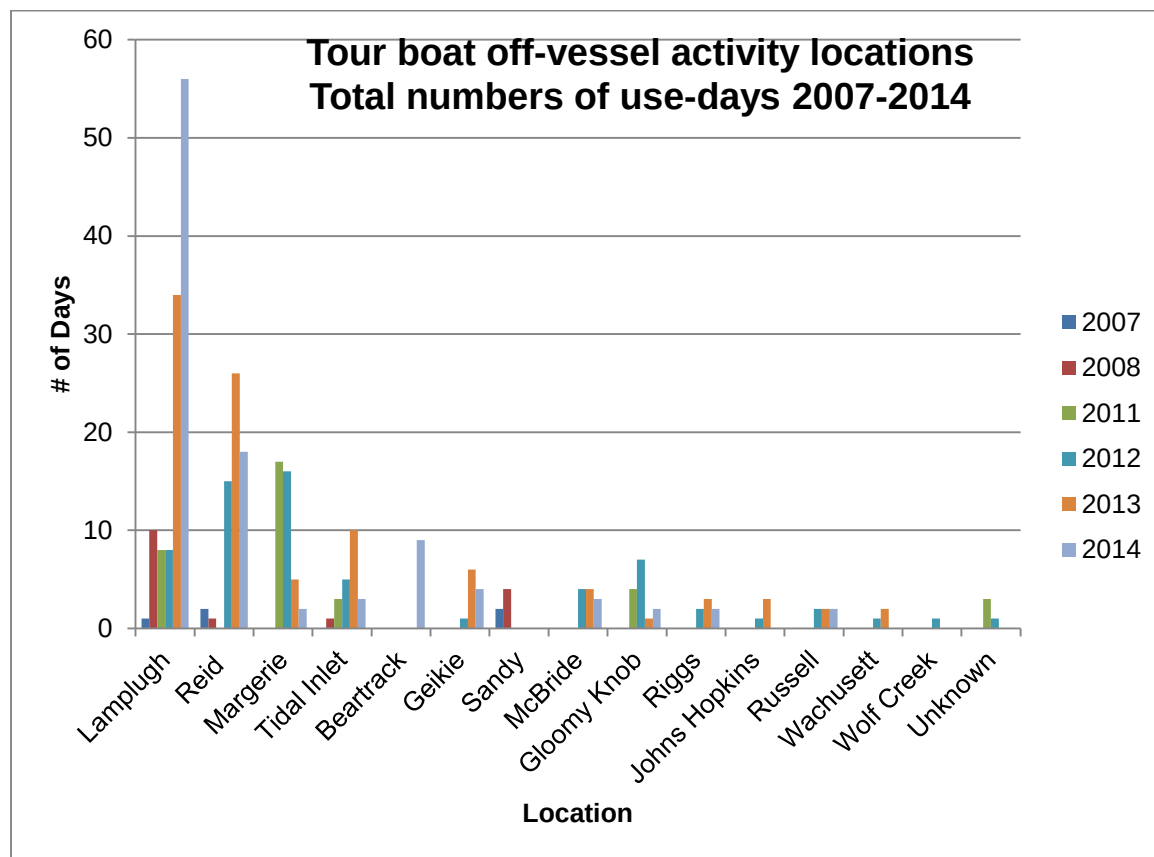


Figure 6. Tour boat off-vessel activity locations within Glacier Bay proper – total days of use 2012-2014

The WVUMP anticipated that its standard for the pristine zone would be exceeded in locations that become popular because of their proximity to tidewater glaciers or other attractions, and allowed for the designation of “heavy-use” areas that could exceed that standard. To date, the park has not actively used this designation in its backcountry or wilderness visitor use management. However, the ability to designate heavy use locations is included in the operating plans for 2016 tour vessel contracts. Criteria for selecting and using these areas remain to be developed. One logical selection criterion is whether the site is already highly used and can accommodate high levels of use due to a

resistant substrate or the existence of user built trails. By selecting durable areas and ensuring each area is comprehensively defined, appropriate recreation strategies can be conveyed to shore excursion guides. Included in this guidance should be a recommendation to either concentrate or disperse visitor use depending on the site. A dispersed strategy would include directing visitors to spread out when above the mean high tide line to avoid creating trails. A concentrated strategy would include directing visitors to stay on existing trails or other durable surfaces. More information on impacts to wildlife may be necessary to accurately determine which strategy is preferable in a given location.

The three locations meeting the existing standard were two sites in Geikie Inlet that have been proposed for more use by a tour vessel company but did not receive any off-vessel activity from 2012-2014. The other site, Beartrack Cove, received nine visits in 2014 and none in previous years. Beartrack Cove and similar sites should be actively monitored for increasing use and resulting impact levels. Recreation impacts occur rapidly with initial and low levels of use, and then begin to level off as near-maximum impacts are reached at moderate to high use levels (Leung 2000). The relationship between level of use and level of many impact variables is curvilinear, with the majority of impact occurring with initial use (Hammit et al. 2015). Because of the curvilinear use-impact relationship, indications of use in new areas should be investigated immediately, in order to document baseline conditions and assess whether increased use levels in the area pose management issues related to resource or social conditions.

Other management strategies to consider for managing visitor use in popular locations include hardening sites and/or creating trails. This would constitute a change from the existing management regime and WVUMP recommendation that the wilderness remain trail-less (except for existing trails near the Bartlett Cove Developed Area: NPS 1989). Hardening sites or building trails would impact the undeveloped quality of wilderness character in the area, but could benefit the natural quality and opportunities for unconfined recreation. Another method to reduce resource impacts in heavier-use areas would be to build and maintain cairns to ensure visitors stay on one user-created path instead of multiple paths that unnecessarily impact vegetation and soils. Intensive use usually requires intensive management to minimize impact. It is often far better to direct visitors to areas that are desirable for recreation and not compromising other resource protection goals than to proliferate impacts in less desirable locations. All these potential management strategies will be addressed in a future GLBA Backcountry and Wilderness Stewardship Plan.

Encounter rates survey

Commercial vs. non-commercial encounters

One of the management objectives in the GMP was that commercial guides would be necessary for only 20% of backcountry use, and the guides would be more necessary for “less accessible areas.” Commercial encounters comprised 32% of the total encounters and 40% of the on-shore encounters within the McBride study area in 2014, clearly exceeding the management objectives for commercial use in this specific area (refer to Figs 3 and 4). These management objectives were apparently

intended to comply with Section 4(d)(6) of the Wilderness Act¹. However, it is unclear how the threshold numbers were derived, creating an impression of being arbitrary. Recent case law (*High Sierra Hikers Association v United States Department of Interior*, 2012) has established that park managers must determine the extent to which commercial services are necessary in wilderness, and a general framework outlining this determination process for the National Park Service was drafted in 2014 (NPS 2014). The management objective from the GMP, could inform the final step of the Extent Necessary planning framework (the *extent* of necessary commercial services), but nothing in the GMP contributes to the other analyses necessary in deriving extent or capacity determinations. The missing analyses are: 1) whether the activity itself is proper, 2) whether the activity is consistent with standards of the 1998 Concessions Management Improvement Act, 3) whether the activity is proper for realizing a wilderness purpose, and 4) whether commercial services are necessary to support the activity (NPS 2014).

The management objective of having commercial services comprise 20% of total visitor use should be revisited in future backcountry and wilderness planning efforts, and should incorporate the “extent necessary” decision framework for all the proper activities and applicable zones within GLBA’s wilderness. In order to determine an extent or amount of commercial services, managers would ideally determine the visitor capacity of certain areas in order to allocate use (commercial and non-commercial). Once capacity is determined, consideration must be given to how the capacity will be allocated:

- If use is not near capacity, managers must determine the appropriate amount of commercial services relative to non-commercial opportunities. This can be done through a visitor capacity study, levels of current use, or establishing thresholds that would trigger further analysis.
- If use is at or near capacity, use allocations could be redistributed between commercial and non-commercial users, or it could be determined that no commercial service is necessary. Director’s Order 41 states that “wilderness areas at, or near, visitor capacity may not be able to accommodate any commercial services either at all or during peak capacity periods.” However, if there are compelling reasons for commercial services to support proper activities, non-commercial allocations could be adjusted in order to allow for a necessary amount of commercial service allocation.

There may be occasions when managers make allocation decisions without knowing visitor capacity. Much of GLBA’s wilderness receives extremely low levels of use, and capacity may be a highly localized management question. In circumstances where use is not impacting wilderness character

¹ Commercial services may be performed within the wilderness areas designated by this Act to the extent necessary for activities which are proper for realizing the recreational or other wilderness purposes of the areas. The purposes referred to in section 4(d)(6) are those enumerated in section 4(b). Section 4 (b) provides that “wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use

and there are no established visitor capacity data available, it may be appropriate to set sufficiently low allocations and to implement a monitoring program to assess developing impacts to wilderness character. If impacts to wilderness character begin to appear, then managers could respond by reducing commercial services allocations, adjusting overall use levels, establishing visitor capacities, or taking other necessary measures to ensure that wilderness character is preserved (NPS 2014). With the designation of heavy-use locations within GLBA, park management has the ability to adjust commercial use allocations in a spatially-specific manner for wilderness-based, off-vessel excursions in those areas.

Campsite and travel encounters

Section 2(c) of the Wilderness Act states that wilderness “has outstanding opportunities for solitude or a primitive and unconfined type of recreation.” Additionally, Section 2(a) directs that wildernesses “shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness” (Wilderness Act, 16 U.S.C. 1131-1136, 78 Stat. 890 -- Public Law 88-577. 1964.). Encounters are one measurable indicator that managers can monitor over time to assess compliance with these legal mandates. It is important to note that the Act specifies that wilderness will provide outstanding *opportunities* for solitude, as opposed to guaranteeing that visitors will have an actual experience of solitude (Broom and Hall 2009).

The encounters standards established in the WVUMP and interpreted for this study were exceeded for the McBride study area in 2014 regardless of whether it was considered a Pristine or Heavy-Use zone, and regardless of whether aircraft encounters were counted (Refer back to table in results section). Once again it must be asked whether the existing standards were established to describe *desired* or *current* (at that time) conditions. The WVUMP standards were written to apply only to wilderness lands and waters, based on the assumption that visitor experience related to traffic on non-wilderness waters would be dealt with in a Vessel Management Plan. This did not occur, leaving a large ambiguity in the ability to assess encounters data within GLBA. Since the study area encompassed eligible wilderness waters, and the wilderness standards for the pristine zone would apply, vessel traffic was included in all the encounters observation figures. Without vessel traffic, encounters rates would have been lower but still would have exceeded the standards.

Close encounters with motorized craft

The only standard not exceeded was that for the Heavy Use zone which had no upper limit. Close encounters with motorized craft occurred on 80.65% of sample days (Refer back to table in results section).

Additional Considerations

The McBride Inlet area location was chosen for this study because it assumed to receive the least use of all the highly used glacial attractions within Glacier Bay. Therefore, if encounter rates in the McBride study area exceed the current planning guidance, it can be assumed that other areas near drop-offs and attractions within Glacier Bay likely would also exceed them. It may not be necessary to invest a high degree of monitoring effort in other high-use areas to establish what is likely already known – that the campsite and travel encounter rates for both the Pristine zone and Heavy-Use

subzone within GLBA are exceeding existing planning guidance. Our analysis suggests that the current standards are unrealistic and future planning will need to keep this in mind as it incorporates, updates, and/or develops visitor use zoning, desired conditions, and standards and measures. Care must be taken that these standards and measures are relevant and efficient to monitor and are clarified spatially. Establishment of standards will necessitate some type of monitoring program to assess whether specified areas comply with direction set by the plan.

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Appendix A 2014 Field Data Sheet

Qualitative Assessment of Shore Excursion Areas Glacier Bay National Park and Preserve

Assessment team: _____

Assessment date: _____

Area name: _____

Start location (coordinates): _____

1. What evidence of trailing, garbage, vegetation damage/alteration/loss, and other impacts related to human use can be seen in the study site. Is the evidence conspicuous and/or does it attract attention? How or why?
2. Is there any potential for conflicts between shore excursion groups and other users? If yes, describe.
3. What would be the acceptable distance between groups in this particular area? Why?
4. What number of groups (and of what size) would be acceptable within the area at any one time? Why?
5. Are there any sensitive resources that should be addressed in operating plans (e.g., nesting shorebirds, marine mammal haulouts)?
6. What is the best recreation strategy (e.g., dispersed, concentrated) for this area? Why?
7. Should park management promote more or less use in this area? Why?

Photo Log

Photo Number	Topic	Waypoint	Comments

Appendix B 2014 Qualitative Assessments

Beartrack Cove 2014 Field Data Sheet Qualitative Assessment of Shore Excursion Areas Glacier Bay National Park and Preserve

Assessment team: Melanie Berg,
Margaret Hazen, Barb Miranda

Assessment date: June 18, 2014

Area name: Beartrack Cove

Start location (coordinates): N
58.58514 W 135.86908



Beartrack Cove

1. What evidence of trailing, garbage, vegetation damage/alteration/loss, and other impacts related to human use can be seen in the study site. Is the evidence conspicuous and/or does it attract attention? How or why?

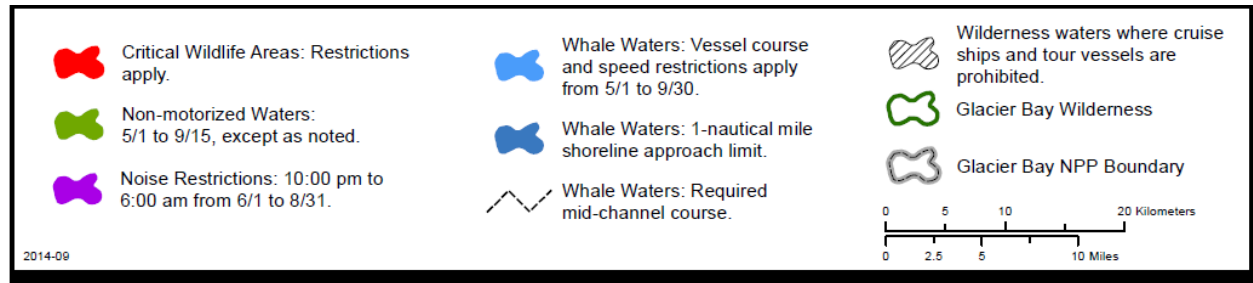
We observed no evidence of human use. Wildlife trails in the forest on the south shore are likely used for shore-based activities. Assessors could not discern whether trailing was from wildlife or from human use.

2. Is there any potential for conflicts between shore excursion groups and other users? If yes, describe.

It is possible for shore-based groups to stay out of sight of one another in this area. Activities in the open near the mouth of the Beartrack river would be visible, and visitors would be able to see any water-based activity in the Cove. The wildlife trail along the southern shore is in thick forest and provides a visual barrier to other areas within the Cove.

3. What would be the acceptable distance between groups in this particular area? Why?

Acceptable distance would be "out of sight". The ¼ mile rule seems too close here and would result in conflict between water- and shore-based activities. Generator and motor sounds would impact the immediately adjacent non-motorized wilderness waters of the Beardslee Islands. Note that there is a triangle of wilderness waters that are open to motorized use in the southern portion of Beartrack Cove. See map below. Use in this area should generally conform to the higher standards applied to wilderness waters.



4. What number of groups (and of what size) would be acceptable within the area at any one time? Why?

Two to four groups of 12 people could be accommodated on shore depending on where they were dropped off. Enough vegetation screens various beaches to allow these groups to remain out of sight of each other.

5. Are there any sensitive resources that should be addressed in operating plans (e.g., nesting shorebirds, marine mammal haulouts)?

None were noted at the time of the visit.

6. What is the best recreation strategy (e.g., dispersed, concentrated) for this area? Why?

Wildlife trails in the forest are not completely hardened, and additional human use would likely cause additional impacts to the vegetation within the game trails. Ideally, visitors would spread out through the forest and not hike in single-file - but this advice is unlikely to be followed. Use levels should likely stay about the same in order for wildlife trails to remain at the current level of impact.

7. Should park management promote more or less use in this area? Why?

Impacts to visitor experience and noise impacts to the adjacent Beardslee Islands should be considered. Use in this area calls for a well-defined strategy of whether to concentrate visitor use in more popular (due to tidewater glacier and access) and more “hardened” areas (like Lamplugh or Reid), or to disperse visitation to less popular (no particular attraction and more difficult to access) areas like Beartrack Cove or Geikie Inlet. Development of that strategy should be a part of a backcountry and wilderness stewardship planning process.

Photo Log

Photo Number	Topic	Waypoint	Comments
104-055	Start point	N 58.58514 W 135.86908	
104-056	2 nd beach	N 58.58947 W 135.86101	
104-057	Forest walk/ wildlife trail	N 58.59300 W 135.85313	
104-058,059	Forest walk/ wildlife trail	N 58.59300 W 135.85313	
104-060,061	Forest walk/ wildlife trail	N 58.59718 W 135.83992	



Photo 104-055. Start point



Photo 104-056. 2nd beach



Photo 104-057. Forest walk/ wildlife trail



Photo 104-058. Forest walk/ wildlife trail



Photo 104-059. Forest walk/ wildlife trail

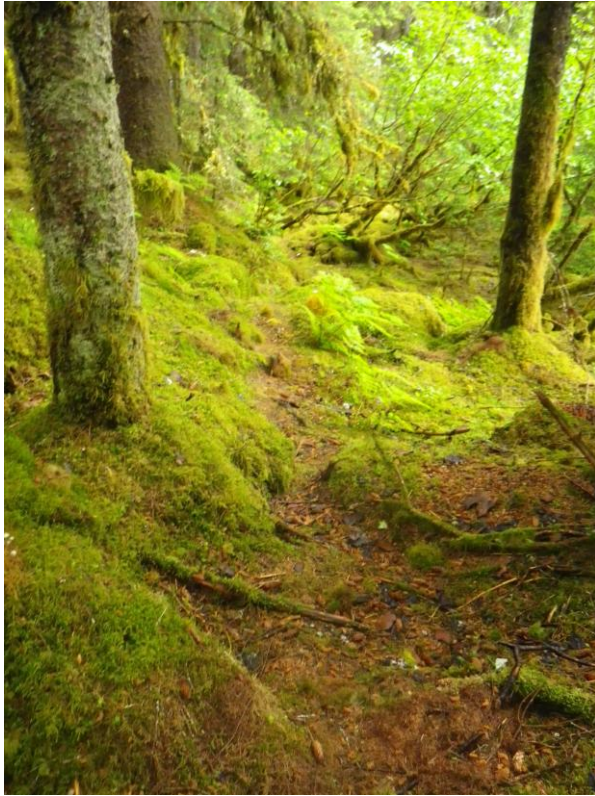


Photo 104-060. Forest walk/ wildlife trail



Photo 104-061. Forest walk/ wildlife trail

**Geikie Inlet Charpentier Outlet
2014 Field Data Sheet
Qualitative Assessment of Shore
Excursion Areas
Glacier Bay National Park and Preserve**

Assessment team: Melanie Berg, Margaret Hazen, Barb Miranda

Assessment date: June 18, 2014

Area name: Geikie Inlet / Charpentier Outlet

Start location (coordinates): N 58.64561
W 136.42184



Geikie Inlet

1. What evidence of trailing, garbage, vegetation damage/alteration/loss, and other impacts related to human use can be seen in the study site. Is the evidence conspicuous and/or does it attract attention? How or why?

We observed no signs that were obviously related to human activity. There were some areas that looked as if camping had occurred there (see photos below), but this could have been the result of wildlife activity. This area was identified by Un-Cruise Adventures as an area for potential new shore excursion activity.

2. Is there any potential for conflicts between shore excursion groups and other users? If yes, describe.

It is possible for shore-based groups to stay out of sight of one another.

3. What would be the acceptable distance between groups in this particular area? Why?

Acceptable distance would be "out of sight". There is plenty of room for dispersal within the larger inlet.

4. What number of groups (and of what size) would be acceptable within the area at any one time? Why?

Only one group on shore in the immediate area and one group interior toward Charpentier outlet.

The entire Geikie Inlet has a lot to offer for distribution of shore excursion groups and off-vessel activities. It is a large inlet with diverse beach and outwash terrain. Unknown impacts to wildlife could occur.

5. Are there any sensitive resources that should be addressed in operating plans (e.g., nesting shorebirds, marine mammal haulouts)?

None were noted at the time of the visit.

6. What is the best recreation strategy (e.g., dispersed, concentrated) for this area? Why?

Disperse along shoreline and in forest. High use levels will likely result in trailing along ponds.

7. Should park management promote more or less use in this area? Why?

More use in Geikie Inlet could be acceptable from a visitor use perspective. However, levels of use and dispersal could have unknown impacts on wildlife. Increased use in the immediate area would likely result in visible human impact very quickly.

Photo Log

Photo Number	Topic	Waypoint	Comments
104-0065-68	Charpentier cutoff	N 58.64561 W 136.42184	Ponds along the way to cutoff
104-0069	Disturbed site	N58.64631 W136.42670	Unknown cause



Photo 104-0065. Charpentier cutoff



Photo 104-0066. Charpentier cutoff



Photo 104-0067. Charpentier cutoff



Photo 104-0069. Disturbed site.

**Geikie Inlet Wood Lake Outlet
2014 Field Data Sheet
Qualitative Assessment of Shore
Excursion Areas
Glacier Bay National Park and Preserve**

Assessment team: Melanie Berg,
Margaret Hazen, Barb Miranda

Assessment date: June 18, 2014

Area name: Geikie Inlet Woods Lake
Outlet

Start location (coordinates): N 58.58555
W 136.47504



Geikie Inlet

1. What evidence of trailing, garbage, vegetation damage/alteration/loss, and other impacts related to human use can be seen in the study site. Is the evidence conspicuous and/or does it attract attention? How or why?

There is no evidence of previous human use; The area is very brushy and is difficult terrain for hiking. This area was identified by Un-Cruise Adventures as an area for potential new shore excursion activity.

2. Is there any potential for conflicts between shore excursion groups and other users? If yes, describe.

It is possible for shore-based groups to stay out of sight of one another.

3. What would be the acceptable distance between groups in this particular area? Why?

Acceptable distance would be "out of sight". There is plenty of room for dispersal within the larger inlet.

4. What number of groups (and of what size) would be acceptable within the area at any one time? Why?

The entire Geikie Inlet area has a lot to offer for distribution of shore excursion groups and off-vessel activities. It is a large inlet with diverse beach and outwash walks. Unknown impacts to wildlife could occur.

5. Are there any sensitive resources that should be addressed in operating plans (e.g., nesting shorebirds, marine mammal haulouts)?

None were noted at the time of the visit.

6. What is the best recreation strategy (e.g., dispersed, concentrated) for this area? Why?

Disperse along shoreline and in forest.

7. Should park management promote more or less use in this area? Why?

More use in Geikie Inlet would be acceptable from a visitor use perspective. However, levels of use and dispersion could have unknown impacts on wildlife.

Photo Log

Photo Number	Topic	Waypoint	Comments
104-0062	Wood Lake access	N 58.58386 W 136.47556	
104-0063	Wood Lake access		Brushy and wet



Photo 104-0062. Wood Lake access



Photo 104-0063. Wood Lake access

Reid East

2014 Field Data Sheet

Qualitative Assessment of Shore Excursion Areas Glacier Bay National Park and Preserve

Assessment team: Melanie Berg, Margaret Hazen,
Barb Miranda

Assessment date: July 12, 2014

Area name: Reid East

Start location (coordinates): N 58.05563 W 136.80452



Reid Inlet

1. **What evidence of trailing, garbage, vegetation damage/alteration/loss, and other impacts related to human use can be seen in the study site. Is the evidence conspicuous and/or does it attract attention? How or why?**

Campsites were present at the start point, and one rock ring campsite was visible on shore on the way to the glacier. There were footprints but no visible trailing due to the dynamic substrate (sand and gravel that shifts with snowmelt, tides, and wind) of the shorelines.

2. **Is there any potential for conflicts between shore excursion groups and other users? If yes, describe.**

There is potential for conflict if the campsites were occupied. Conflict could be minimized if visitors were dropped closer to glacier.

3. **What would be the acceptable distance between groups in this particular area? Why?**

One group at mouth of Reid Inlet and one at the glacier would be acceptable.

4. **What number of groups (and of what size) would be acceptable within the area at any one time? Why?**

Two groups of 12 or less would be acceptable on shore.

5. **Are there any sensitive resources that should be addressed in operating plans (e.g., nesting shorebirds, marine mammal haulouts)?**

None were observed during this visit. A brown bear with cubs followed our trail, but low tide allowed for plenty of room to pass.

6. What is the best recreation strategy (e.g., dispersed, concentrated) for this area? Why?

Disperse hiking along shore. Surface is comprised of loose sand and gravel material and is very resilient/durable. A “resilient” surface is usually soft and although it immediately shows indication somebody has been there, it rebounds quickly. Examples of resilient surfaces include snow, sand, and gravel.

7. Should park management promote more or less use in this area? Why?

Current level of use is appropriate. This area provides great views of Reid Glacier.

Photo Log

Photo Number	Topic	Waypoint	Comments
1114,1115	Campsites and rock rings at start point	Same as start	
1116,1117	Footprints in silt		
1119	Substrate for hiking toward glacier		
1120	View		
1127	Brown bear and cubs		



Photo 4114. Campsites and rock rings at start point



Photo 1115. Campsites and rock rings at start point



Photo 1116. Footprints in silt



Photo 1117. Footprints in silt



Photo 1119. View



Photo 1120. View



Photo 1127. Brown bear and cubs

Reid West
2014 Field Data Sheet
Qualitative Assessment of Shore
Excursion Areas
Glacier Bay National Park and
Preserve

Assessment team: Melanie Berg,
Margaret Hazen, Barb Miranda

Assessment date: July 12, 2014

Area name: Reid West

Start location (coordinates): N 58.84798
W 136.82045



- 1. What evidence of trailing, garbage, vegetation damage/alteration/loss, and other impacts related to human use can be seen in the study site. Is the evidence conspicuous and/or does it attract attention? How or why?**

Reid Inlet

There is human-caused trailing through vegetation at start point is evident and is known to have been present in the 1980s. Most drop-offs probably occur at 2nd beach.

- 2. Is there any potential for conflicts between shore excursion groups and other users? If yes, describe.**

The potential for conflict is minimal. There are few camping opportunities in the area. Most campers camp at the mouth of Reid Inlet.

- 3. What would be the acceptable distance between groups in this particular area? Why?**

One group at mouth of Reid Inlet and one at the glacier. More use in the area would be visible to other shore excursion groups and other wilderness visitors.

- 4. What number of groups (and of what size) would be acceptable within the area at any one time? Why?**

Two group of 12 people or less would be acceptable on shore.

- 5. Are there any sensitive resources that should be addressed in operating plans (e.g., nesting shorebirds, marine mammal haulouts)?**

None were noted at the time of the visit.

6. What is the best recreation strategy (e.g., dispersed, concentrated) for this area? Why?

The best strategy would be to keep people out of the vegetated area. The trails in these places are damp and therefore susceptible to damage, and more people on these trail would result in more impact. Defining user trails (perhaps with cairns), or building trails in this area could help. However, the hiking/scrambling, views, and the ability to hike right next to the glacier is a terrific recreation opportunity, and the surfaces are compacted rock, and thus very durable, in this area.

7. Should park management promote more or less use in this area? Why?

Recommend promoting less use in vegetated areas yet still provide good access to the scenic (and durable) areas close to the glacier. This could be achieved by building a bypass route or a durable trail to facilitate access through moist, vegetated areas.

Photo Log

Photo Number	Topic	Waypoint	Comments
1141	Start point		Trail through veg
1142	Trail through vegetation		"
1143	Trail through vegetation		"
1144	Brass cap on knoll		
1146	Trail through vegetation		"
1149-1152	Trailside attractions		Glaciers, cave, waterfall
1157	Trail by glacier		
1159	Trail by glacier		
1166, 1167	Trail through veg		Trail through veg



Photo 5141. Start point



Photo 1142. Trails through vegetation



Photo 1143. Trails through vegetation

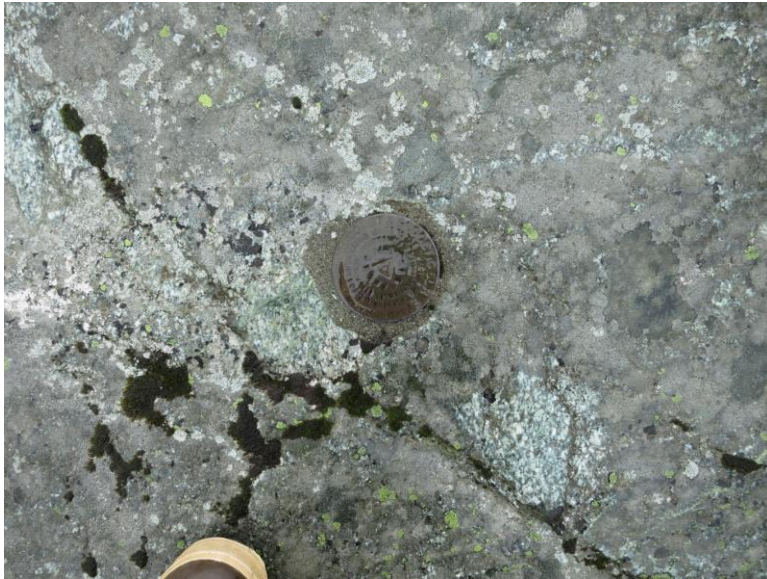


Photo 1144. Brass cap on knoll



Photo 1146. Trail through vegetation



Photo 1149. Trailside attractions-glacier



Photo 1151. Trailside attractions - glacier



Photo 1152. Trailside attractions - waterfall



Photo 1157. Trail by glacier



Photo 1159. Trail by glacier



Photo 1166. Trail through vegetation.



Photo 1167. Trail through vegetation.

Lamplugh
2014 Field Data Sheet
Qualitative Assessment of Shore Excursion Areas
Glacier Bay National Park and Preserve

Assessment team: Melanie Berg, Margaret Hazen, Barb Miranda

Assessment date: July 13, 2014

Area name: Lamplugh

Start location (coordinates): N 58.89468 W 136.91490

1. What evidence of trailing, garbage, vegetation damage/alteration/loss, and other impacts related to human use can be seen in the study site. Is the evidence conspicuous and/or does it attract attention? How or why?

At Mary's Beach (start point), visible campsites and rock rings and flattened areas in beach gravel were observed. Conspicuous trailing leads toward Lamplugh, but through dense willow scrub. Campsite cairns at Lamplugh were removed two weeks prior by Protection staff, but campsites were still evident.

2. Is there any potential for conflicts between shore excursion groups and other users? If yes, describe.

If there are campers at Mary's Beach or Lamplugh, shore excursions should not occur at either place to remain within current standards.

3. What would be the acceptable distance between groups in this particular area? Why?

One shore excursion group at face of glacier and one hiking is possible, but it would be difficult to manage and stay out of sight of one another. Kayak and shore groups would not be out of sight of one another.

4. What number of groups (and of what size) would be acceptable within the area at any one time? Why?

Potentially two on shore if staying within sight of one another is deemed acceptable. Group size should be 12 people or less.

5. Are there any sensitive resources that should be addressed in operating plans (e.g., nesting shorebirds, marine mammal haulouts)?

Ptarmigan with young and marmots were observed.

6. What is the best recreation strategy (e.g., dispersed, concentrated) for this area? Why?

Concentrate use onto existing trails. Trails are braided in areas, we could consider building cairns and maintaining trails.

7. Should park management promote more or less use in this area? Why?

Lamplugh offers a wonderful opportunity to hike on a well-established user trail and gain views of a tidewater glacier. About the same level of use as is occurring currently would be appropriate.

Photo Log

Photo Number	Topic	Waypoint	Comments
106-0100	Trail start from Mary's Beach		Visible but flooded at different times of year.
106-0101	Trail looking up cleft toward Lamplugh		
106-0102	"		
106-0103	Looking back toward Mary's Beach		Some rock scrambling and brush
106-0104	Rock cairn		
106-0105	Wet trail with old footprints		
106-0106	Wet trail with human and bear tracks		
106-0108	Willow scrub		Trailing continues along rock wall, but bushwacking is necessary.
106-0113 & 0115	WEX shore excursion from trail overlook		
106-0123 & 125 & 128 & 153 & 154 &	Lamplugh trail overview		
106-0133	Lamplugh trail		A bit less visible than previous portions of the trail
106-0134	Lamplugh trail		
106-0142	Lamplugh trail		
106-0143 & 0144	Lamplugh trail; cruise ship		
106-0151	Lamplugh Overlook		WEX, dinghy, and private boat in background. Marmot in foreground.
106-0156	Lamplugh trail		Trail leading to sea level
106-0159 -0162	Lamplugh campsites		
106-0164	Marmot		



Photo 106-0100. Trail start from Mary's Beach



Photo 106-0101. Trail looking up cleft toward Lamplugh



Photo 106-0102. Trail looking up cleft toward Lamplugh



Photo 106-0103. Looking back toward Mary's Beach



Photo 106-0104. Rock cairn



Photo 106-0105. Wet trail with old footprints



Photo 106-0106. Wet trail with old footprints



Photo 106-0108. Willow scrub. Trailing continues along rock wall, but bushwacking is necessary.



Photo 106-0113. WEX shore excursion from trail overlook



Photo 106-0115. WEX shore excursion from trail overlook



Photo 106-0123. Lamplugh trail overview



Photo 106-0125. Lamplugh trail overview



Photo 106-0128. Lamplugh trail overview



Photo 106-0153. Lamplugh trail overview



Photo 106-0154. Lamplugh trail overview



Photo 106-0133. Lamplugh trail



Photo 106-0134. Lamplugh trail



Photo 106-0142. Lamplugh trail



Photo 106-0143. Lamplugh trail; cruise ship



Photo 106-0144. Lamplugh trail; cruise ship



Photo 106-0151. Lamplugh overlook; WEX, dinghy, and private boat in background, marmot in foreground



Photo 106-0156. Lamplugh trail; trail leading to sea level



Photo 106-0159. Lamplugh campsites



Photo 106-0160. Lamplugh campsites



Photo 106-0161. Lamplugh campsites



Photo 106-0162. Lamplugh campsites



Photo 106-0164. Lamplugh marmot

McBride North
2014 Field Data Sheet
Qualitative Assessment of Shore Excursion Areas
Glacier Bay National Park and Preserve

Assessment team: Melanie Berg, Margaret Hazen, Barb Miranda

Assessment date: July 11, 2014

Area name: McBride North

Start location (coordinates): N 59.03318 W 136.14381

1. What evidence of trailing, garbage, vegetation damage/alteration/loss, and other impacts related to human use can be seen in the study site. Is the evidence conspicuous and/or does it attract attention? How or why?

Obvious rock rings, vegetation loss, and trailing throughout survey area.

2. Is there any potential for conflicts between shore excursion groups and other users? If yes, describe.

Yes. Campsites were in full view of anchorage points and other campsites.

3. What would be the acceptable distance between groups in this particular area? Why?

Out of sight. North and South Spits are within view of each other.

4. What number of groups (and of what size) would be acceptable within the area at any one time? Why?

Only one group on shore on either side of McBride mouth. Two groups here would have to pass each other to traverse the area.

5. Are there any sensitive resources that should be addressed in operating plans (e.g., nesting shorebirds, marine mammal haulouts)?

Nesting birds on north shore. No sign of active nesting, but black oystercatcher with chicks were observed. Harbor seals are known to frequent the inlet, but none were observed during this visit.

6. What is the best recreation strategy (e.g., dispersed, concentrated) for this area? Why?

Concentrate hikes onto the existing user-built trails and user-defined campsites. Spread out where these do not exist.

7. Should park management promote more or less use in this area? Why?

Minimize large concentrations of visitor use (this area is popular with independent kayakers). There is little room for dispersal. Could potentially be an active bird nesting area if there was less human disturbance in the area.

Photo Log

Photo Number	Topic	Waypoint	Comments
105-0089	Campsites	N 59.03318 W 136.14381	Terns nested in this area last year
105-0090	Campsites		Note rock rings, vegetation loss, and trailing.
105-0091	Campsites		
105-0092	Black oystercatcher		Chicks not present in this image
105-0099	Campsites		Note rock rings and vegetation loss.



Photo 105-0089. Campsites; Terns nested in this area last year



Photo 105-0090. Campsites; note rock rings, vegetation loss, and trailing.



Photo 105-0091. Campsites



Photo 105-0099. Black Oystercatcher



Photo 105-0099. Campsites; note rock rings and vegetation loss.

McBride South
2014 Field Data Sheet
Qualitative Assessment of Shore Excursion Areas
Glacier Bay National Park and Preserve

Assessment team: Melanie Berg, Margaret Hazen, Barb Miranda

Assessment date: July 11, 2014

Area name: McBride South

Start location (coordinates): N 59.03080 W. 136.14180

1. What evidence of trailing, garbage, vegetation damage/alteration/loss, and other impacts related to human use can be seen in the study site. Is the evidence conspicuous and/or does it attract attention? How or why?

Obvious rock rings, vegetation loss, and trailing are visible throughout survey area.

2. Is there any potential for conflicts between shore excursion groups and other users? If yes, describe.

Yes. Campsites were in full view of anchorage points and other campsites.

3. What would be the acceptable distance between groups in this particular area? Why?

Out of sight. This is difficult as the north and south spits are within view of each other.

4. What number of groups (and of what size) would be acceptable within the area at any one time? Why?

Only one group on shore on either side of McBride mouth. Two groups here would have to pass each other to traverse the area.

5. Are there any sensitive resources that should be addressed in operating plans (e.g., nesting shorebirds, marine mammal haulouts)?

Nesting birds on north shore were visible from south shore. Harbor seals are known to frequent the inlet, but none were observed during this visit.

6. What is the best recreation strategy (e.g., dispersed, concentrated) for this area? Why?

Concentrate hikes onto the existing user-built trails and user-defined campsites. Spread out where these do not exist.

7. Should park management promote more or less use in this area? Why?

Minimize large concentrations of visitor use (this area is popular with independent kayakers). There is little room for dispersal.

Photo Log

Photo Number	Topic	Waypoint	Comments
105-0071	Start point and camping area	N 59.03080 W. 136.14180	Note visibility of beach areas on the north shore of McBride
105-0072	Disturbed site		Note rock rings and vegetation loss.
105-0075	End of survey area	N 59.03191 W 136.12325	Saw-cut interstadial wood log (for research). Two years ago this log was suspended above ground and more visible.
105-0078	Interstadial stump		Saw-cut interstadial wood stump (for research)
105-0079	Assessment team		
105-0081, 0086	Rock overlook		Noticeable trailing and vegetation loss.



Photo 105-0071. Start point and camping area; note visibility of beach areas on the north shore of McBride



Photo 105-0072. Disturbed site



Photo 105-0075. End of survey area; saw-cut interstadial wood log (for research). Two years ago this log was suspended above ground and more visible.



Photo 105-0078. Interstadial stump



Photo 105-0079. Assessment team



Photo 105-0081. Rock overlook; noticeable trailing and vegetation loss.



Photo 105-0086. Rock overlook; noticeable trailing and vegetation loss.

Appendix C 2014 Field Observation Data Sheet and Instructions

Data Sheet for McBride Encounter Surveys

Instructions

• Name of Observer: First/Last • Transect: McBride • Date: MM/DD/YYYY • Sampling Period: Check appropriate box • Observation start and end times (2-hr. sample block within the 3-hr. Sampling Period)
• Time (for each encounter): Encounter Start and End Times, using military time format (e.g., "1400" = 2:00 PM). An encounter starts when you see the vessel, hiker, gear, etc. It ends when you no longer see it. If you see the same vessel, etc., again during that day... it is a new encounter with the same "group alpha" (see below). Leave end time blank if the sample period ends while the encounter is still underway. IMPORTANT: REMEMBER TO LOG THE END TIME of the ENCOUNTER! This is time when you no longer see the observed vessel or group. • Type of Encounter: Enter (T) travel or (C) camping. This is based on the observer (that's you) activity. A travel encounter is recorded if the observer is not camping (observer can be kayaking, hiking, etc.). A camping encounter is recorded if the observer is in or near their established campsite. • Zone: Location of observer at time of encounter. Record whether you are in the Riggs, Mid, or McBride zone (see study area map). Encounters include all visual sightings of people and vessels anywhere within the entire study area... not just within your zone. You are merely noting here what zone you are in.
• Encounter #: Enter the numerical identifier of the group encountered. Note that this will always start with "1" and then increase sequentially during the sampling period, even if the same group/craft is observed again. Remember, the sampling unit is the 2-hr. period; each sampling unit gets a new datasheet with the Encounter # starting at "1". • Group Alpha: The group alpha is the identifier assigned to the particular group (or vessel) you are observing. If you have another encounter with same the group later on during that sampling day, the group alpha will be the same as that assigned during the first encounter (so try to remember who's who – maybe a Comment will help!). Start with A, then go on to B, C, etc. If there are more than 26 encounters, continue with AA, BB, etc. If more than 52, continue with AAA, BBB, etc. • Motorized encounter (Y/N): Mark Y if the encounter is with a motorized vessel. • Non-motorized encounter (Y/N): Mark Y if the encounter is with a non-motorized vessel.
Check appropriate box, <i>only one box should be checked. All others should be blank. If you're not reasonably certain, check Unknown.</i> • Administrative: Check if the group observed is NPS. • Commercial: Check if the group or vessel observed is commercial. This applies to guided kayak groups as well as tourboats and charter vessels. See the attached list of commercial tour/charter vessels and kayak guides that have contracts to operate in Glacier Bay. • Private: Check if the group or vessel observed is a private group. • Unknown: Check if the group affiliation is unknown.
• Gear Encounter: Check if the encounter is simply the observation of unoccupied tent(s) or kayak(s) on shore. • # of Hikers/Campers: Enter the number of hikers or campers in the group. This is a different metric than gear encounter. If hikers, there should be no more than 1/8 mile or 5 minutes between the first and last members of the party. If in doubt as to whether parties are associated and traveling together, record as separate encounters.
• Kayak or other small non-motorized vessel: Enter the number of kayaks (in the group) observed during the encounter. This is the only vessel/craft category that is aggregated. A group with 6 kayaks would have a 6 in the # of kayaks column. The other column in this category is # of people. If two of the kayaks are fully-occupied doubles and the other 4 are singles, the # of people would be tallied as 8. A group is defined as a group of people readily recognized as traveling together. There should be no more than 1/8 mile or 15 minutes between the first and last members of the party. If in doubt about whether parties are associated

and traveling together, record as separate encounters.
• Vessel/Craft: Enter the number of vessels of each type observed during an encounter. <i>Each encounter with a vessel other than a kayak or other small non-motorized vessel is counted singly.</i> A tourboat hosting clients in 1 motorized inflatable and 6 kayaks would have a 1 in the tourboat column. The motorized inflatable (in the water) would be recorded as a separate encounter on the next row. The six double kayaks (in the water) would be recorded as a separate encounter on the following row as 6 kayaks with 12 people, etc. Do not count vessels that are not launched in the water (i.e., lifeboats/dinghies/kayaks aboard larger vessels).
• Auxiliary Boat: Mark Y if the vessel has been launched from another vessel while being observed.
• Closest Approach: Indicate the closest approach for the encounter in one of two classes: within a quarter-mile; or more than a quarter-mile.
• Contact: Note whether the observer made verbal contact - Y or N as appropriate. The observer should not initiate contact., but the observer <i>partner</i> may, if necessary and appropriate.
• Effect on Solitude: This is a subjective measure of how the encounter affected the sense of solitude of the observer. L = almost no effect. M = somewhat noisy and noticeable. H = some combination of loud, very close, and/or very prolonged and/or disruptive.
• Aircraft. Indicate whether it is a fixed-wing or helicopter flying below 5000 feet in elevation. If the plane lands or is on the water, so indicate. Please note the 5000' elevation contour on a map or nautical chart, and/or use the noted elevations of relatable geographic features.
• Environmental Conditions: Please indicate with a Y/N whether any environmental conditions (e.g., fog or precipitation) impacted your ability to detect encounters or make observations. Explain in the comments field.
• Comments: Record the name of any vessels/craft; general behavior/destination; topics of conversation during contacts, and any other pertinent information (e.g., vessels transiting the McBride Inlet entrance, and wildlife disturbance [birds and seals]).

Appendix D 2014 Core Analysis Methods

Commercial vs. non-commercial encounters

1. Did commercial encounters exceed 20% of total use in the McBride Area during the field season?
2. Did commercial encounters on shore in the McBride area exceed 20% of total use during the field season?

Comparison of current conditions to standards

The following totals were calculated:

- Total unique encounters (not counting multiple encounters with the same group)
- Total number of unique private encounters
- Total number of unique administrative encounters
- Total number of unique unknown encounters

The above figures were used as follows:

- Number of commercial encounters as a percentage of total encounters = $(\text{number of known commercial encounters}) \div (\text{total number of unique encounters}) \times 100$
- Number of commercial encounters on shore as a percentage of total encounters on shore = $(\text{number of known commercial encounters on shore}) \div (\text{total number of unique encounters on shore}) \times 100$
- Number of private encounters as a percentage of total encounters = $(\text{number of known private encounters}) \div (\text{total number of unique encounters}) \times 100$
- Number of private encounters on shore as a percentage of total encounters on shore = $(\text{number of known private encounters on shore}) \div (\text{total number of unique encounters on shore}) \times 100$
- Number of administrative encounters as a percentage of total encounters = $(\text{number of known administrative encounters}) \div (\text{total number of unique encounters}) \times 100$
- Number of administrative encounters on shore as a percentage of total encounters on shore = $(\text{number of known administrative encounters on shore}) \div (\text{total number of unique encounters on shore}) \times 100$
- Number of unknown encounters as a percentage of total encounters = $(\text{number of unknown encounters}) \div (\text{total number of unique encounters}) \times 100$
- Number of unknown encounters on shore as a percentage of total encounters on shore = $(\text{number of unknown encounters on shore}) \div (\text{total number of unique encounters on shore}) \times 100$

Camp and travel encounters

Calculate the minimum, maximum, mean, standard deviation, and 95% confidence interval for campsite and travel encounters including aircraft.

Comparisons of Pristine Zone current conditions to standards

- Interpreted standard: Campsite encounters of more than 0 per day should occur on no more than 10% of the total sample days.
- Analysis method: Calculate daily tally of total campsite encounters. Standardize to an 8-hour day.

Create a table of standardized daily summaries (standardized to an 8-hour day).

Calculate how many of the days exceeded 0 encounters.

Calculate the percentage of sample days in excess of 0 encounters.

Determine whether this exceeded 10% of the total sample days.

- Interpreted standard: Travel encounters of more than 1 per day should occur on no more than 10% of the total sample days.
- Analysis method: Calculate daily tally of total travel encounters. Standardize to an 8-hour day.

Create a table of standardized daily summaries (standardized to an 8-hour day).

Calculate how many of the days exceeded 0 encounters.

Calculate the percentage of sample days in excess of 0 encounters.

Determine whether this exceeded 10% of the total sample days.

Comparisons of Heavy Use Location current conditions to standards

- Interpreted standard: Campsite encounters of more than 1 per day should occur on no more than 10% of the total sample days.
- Analysis method: Calculate daily tally of total campsite encounters. Standardize to an 8-hour day.

Create a table of standardized daily summaries (standardized to an 8-hour day).

Calculate how many of the days exceeded 1 encounter.

Calculate the percentage of sample days in excess of 1 encounter.

Determine whether this exceeded 10% of the total sample days.

- Interpreted standard: Travel encounters of more than 2 per day should occur on no more than 10% of the total sample days.
- Analysis method: Calculate daily tally of total travel encounters. Standardize to an 8-hour day.

Create a table of standardized daily summaries (standardized to an 8-hour day).

Calculate how many of the days exceeded 1 encounter.

Calculate the percentage of sample days in excess of 1 encounter.

Determine whether this exceeded 10% of the total sample days.

Close contacts with motorized craft

Calculate the minimum, maximum, mean, standard deviation, and 95% confidence interval for close contacts with motorized craft.

Comparisons of Pristine Zone current conditions to standards

- Interpreted standard for eligible wilderness waters:
Close encounters with motorized craft of more than 0 per day should occur on no more than 10% of the total sample days.

- Analysis method:

Tally the number of close contacts (within $\frac{1}{4}$ mile) of motorized craft per day.

Calculate how many of the days exceeded 0 close encounters per day.

Calculate the percentage of sample days in excess of 0 encounters.

Determine whether this exceeded 10% of the total sample days.

- Interpreted standard for non-wilderness waters:
Close encounters with motorized craft of more than 1 per day should occur on no more than 50% of the total sample days.

- Analysis method:

Tally the number of close contacts (within $\frac{1}{4}$ mile) of motorized craft per day.

Calculate how many of the days exceeded 1 close encounter per day.

Calculate the percentage of sample days in excess of 1 encounter.

Determine whether this exceeded 10% of the total sample days.

Comparisons of Heavy Use Location current conditions to standards

- Interpreted standard: Encounters with motorized craft should occur on no more than 50% of the total sample days.

- Analysis method:

Tally the number of close contacts (within $\frac{1}{4}$ mile) of motorized craft per day.

Calculate how many of the days exceeded 1 close encounter per day.

Calculate the percentage of sample days in excess of 1 encounter.

Determine whether this exceeded 50% of the total sample days.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 132/130565, November 2015

National Park Service
U.S. Department of the Interior



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