

Request for Marine Mammal Protection Act Incidental Harassment Authorization

**Glaucous-winged Gull and Climate Monitoring & Research in Glacier Bay National Park,
Alaska**

Submitted by:

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Submitted to:

Permits, Conservation, and Education Division

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Permit Application Summary

Glacier Bay National Park is applying for an Incidental Harassment Authorization permit to access island study sites for two projects within Glacier Bay National Park (GLBA), in southeastern Alaska: 1) glaucous-winged gull monitoring and 2) weather station operation for long-term climate monitoring. The gull monitoring studies are mandated by a Record of Decision of an Legislative Environmental Impact Statement (NPS 2010) which states that Glacier Bay National Park must initiate a monitoring program for glaucous-winged gulls (*Larus glaucescens*) to inform future native egg harvest by the Hoonah Tlingit in Glacier Bay, Alaska. Installation of a new weather station on Lone Island is being planned as one of several installations intended to fill coverage gaps among existing weather stations in GLBA (NPS 2015). These new stations will be operated as the foundation of a new long-term climate monitoring program for GLBA.

To effectively access the islands for gull monitoring and weather station operation, occasional minimal disturbance (or Level B harassment) of harbor seals may occur. We are requesting an Incidental Harassment permit to access four study sites up to five times per year for gull research and monitoring activities. We are requesting permission to access Lone Island an additional four times per year for weather station installation, maintenance, and operation. We expect that the disturbance to harbor seals from both projects will be minimal and will be limited to Level B harassment and will not result in serious injury or death. We have previously held IHAs from NMFS for this study in 2014 (during which there was no activity), and 2015-2017 (Table 1). Glacier Bay National Park actively monitors harbor seals at breeding and molting sites to assess population trends over time (e.g., Mathews & Pendleton 2006; Womble et al. 2010). GLBA & NPS-Glacier Bay Field Station coordinates pinniped monitoring and research programs with the Alaska Fisheries Science Center, Marine Mammal Laboratory, and Alaska Department of Fish & Game and plans to continue these collaborations and sharing of monitoring data in the future.

1. A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals

Gull Monitoring and Research

Glaucous-winged gulls are common inshore residents along the northwestern coast of North America (Hayward and Verbeek 2008). These gulls nest colonially in small and large aggregations, often on islands. Glaucous-winged gulls are abundant in Southeast Alaska throughout the year and nest colonially on islands in Glacier Bay from mid-May to August (Patten, 1974). Traditionally the Huna Tlingit, whose ancestral homeland encompasses Glacier Bay National Park, harvested gull eggs annually during the spring and early summer months (Hunn, 2002). This historic egg harvest in Glacier Bay was an important activity both for cultural and nutritional purposes. Legislation is currently underway (Huna Tlingit Traditional Gull Egg

Use Act: S. 156 and H. R. 3110) to allow native subsistence harvest of glaucous-winged gulls at up to 15 locations in Glacier Bay National Park. A Legislative Environmental Impact Statement (LEIS) for gull egg harvest was developed and finalized in 2010 (NPS 2010). The LEIS Record of Decision mandates that the National Park Service (NPS) develop a monitoring program to inform a yearly traditional harvest plan and ensure that harvest activities do not impact park purposes and values (NPS 2010). Annual monitoring requirements outlined in the LEIS include: identify the onset of gull nesting, conduct mid-season adult counts, count number of eggs in nests during harvest, conduct complete nest surveys just before hatch on harvested islands, and document other bird and marine mammal species present that may be impacted by harvest activities. Harvest sites will be selected based on several characteristics including size of colony; population parameters including productivity, population status, recent harvest, age of colony; and minimizing disturbance to other species present.

The goal of this project is to collect data on the number and distribution of nesting glaucous-winged gulls to fulfill the mandates of the LEIS Record of Decision and to inform annual gull egg harvest. Gull monitoring will be conducted using a combination of ground and vessel surveys. Ground surveys will be used to obtain information on numbers of nests and contents (eggs or chicks) in the Glacier Bay gull colonies because terrain and vegetation prevent most nests from being visible from an offshore vessel or airplane. From May 01 – Sept. 30, 2018 we will conduct ground surveys (1-3 visits each) at the largest glaucous-winged gull colonies: South Marble Island, Boulder Island, Lone Island, Geikie Rock, Flapjack Island, and Tlingit Point Islet (Figure 1) to determine the onset of laying, distribution and abundance of gull nests and eggs, and other species present. The observers would access each island using a kayak, a 32.8 to 39.4-foot (ft) (10 to 12 meter (m)) motorboat, or a 12 ft (4 m) inflatable rowing dinghy. The landing craft's transit speed would not exceed 4 knots (4.6 miles per hour (mph)). Ground surveys generally last from 30 minutes to up to two hours depending on the size of the island and the number of nesting gulls. Glacier Bay NP will discontinue ground surveys after they detect the first hatchling to minimize disturbance to the gull colonies. Ground surveys will be conducted by two trained observers conducting complete nest counts of the colonies (Zador 2001, Arimitsu et al. 2007). The survey will encompass all portions of the gull colony accessible to humans and thus represent a census of the harvestable nests. GPS locations of nests and associated vegetation along with the number of live and predated eggs will be collected during at least one visit to obtain precise nest locations to characterize nesting habitat. On subsequent surveys, nest counts will be tallied on paper so observers can move through the colony more quickly and minimize disturbance. Ground surveys will be discontinued after the first hatched chick is detected to minimize disturbance and mortalities. During ground surveys, observers will also record other bird and marine mammal species in proximity to colonies.

From May 01 - Sept. 30 we will also conduct 1-2 vessel surveys of South Marble Island, Boulder Island, Lone Island, Geikie Rock, Tlingit Point Islet, and other suspected gull colonies. Vessel surveys will be conducted from the deck of a 5 – 20 m motorized vessel and will be used to count the number of adult and fledgling gulls that are visible from the water (Zador 2001,

Arimitsu et al. 2007). Vessel surveys give us a more reliable estimate of the numbers of gulls in the colony than ground surveys because we can count nesting birds in areas that are inaccessible by foot and because the birds do not flush from our presence. We will conduct these surveys by circling the islands at approximately 100 m and counting the number of adult and chick gull as well as other bird and mammal species present.

Preliminary data collection conducted in 2012 - 2014 found that several gull colony study sites are islands that are sometimes occupied by harbor seals. Effort was made to stay at least 100 - 500 m from harbor seals, which often resulted in not accessing the islands. This prevented data collection vital to the development of egg harvest management strategies and increased field costs as repeated visits were necessary to determine if marine mammals were present. In 2018 we are requesting authorization to cause visual disturbance to a limited number of harbor seals from vessels and from the ground in order to conduct gull surveys, similar to IHAs issued for this project in 2015, 2016 and 2017.

Climate Monitoring

Weather and climate were chosen as priorities for long-term monitoring of the Glacier Bay ecosystem during development of the Southeast Alaska Network Vital Signs Monitoring Plan (Moynahan et al. 2008). An inventory of existing weather stations revealed the need for additional station installations to represent the park's geographic (i.e., east-west and north-south) and elevation-related climate gradients (Davey et al. 2007). A system of eight new stations were ultimately identified to meet this goal, including the Lone Island station, described further in a 2015 Environmental Assessment and associated Finding of No Significant Impact (NPS 2015). Formal protocols for the operation of this new climate monitoring program are currently in review with final publication anticipated in early 2018. These protocols will ensure that methods for data acquisition, quality control, storage, and dissemination meet the highest standards of scientific rigor to maximize utility within the National Park Service and for our partners. Station configuration is typical of Remote Automated Weather Stations (RAWS) operated by land management agencies for weather and climate monitoring, fire weather observation, and other uses. A number of design elements will be modified as mitigation to reduce station visibility along a popular cruise ship route. An 8-ft monopole and associated guy lines will be installed onto which instrumentation and an environmental enclosure will be secured (Figure 2). A fuel cell and sealed 12V battery housed in a watertight enclosure will provide power to the station. Standard meteorological sensors for measuring precipitation, wind, temperature, solar radiation, and snow depth will be used. Data will be housed in internal memory and communicated via satellite telemetry to the Wildland Fire Management Institute where it is relayed to a variety of repositories such as the Western Regional Climate Center in near real-time.

Lone Island will be accessed by a 10-20 meter motor vessel to install and maintain the weather station. Materials will be carried by hand to the installation location. The exact location of the weather station on Lone Island has not been determined yet. However, the Principle Investigator will work with National Park Service bird and pinniped biologists to locate the

weather station in an area that will minimize effects on nesting seabirds and harbor seals. It is possible that the weather station can be accessed in a fashion that will not disturb hauled out harbor seals, but we are requesting authorization to cause visual disturbance to a limited number of harbor seals from vessels and from the ground to ensure our ability to install and perform yearly maintenance of the weather station.

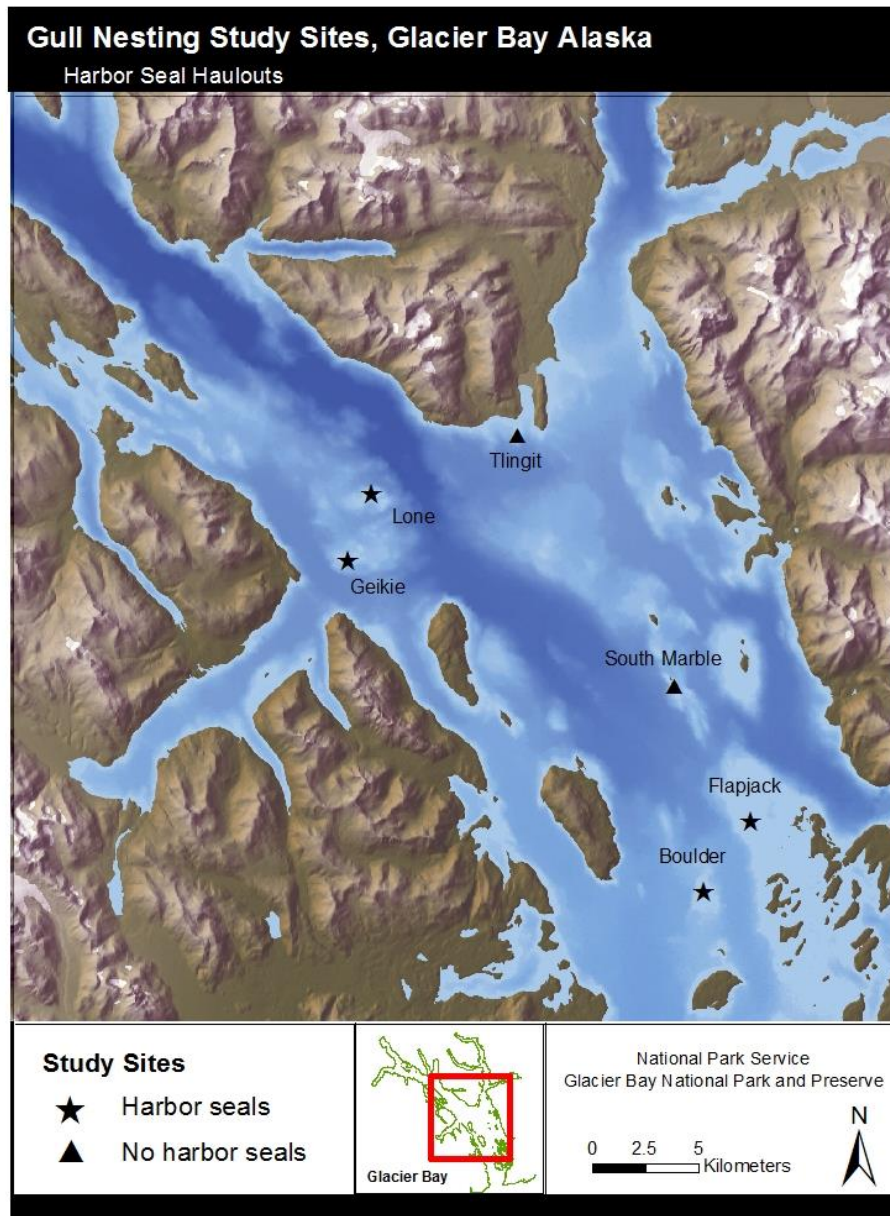


Figure 1. Study sites for glaucous-winged gull and climate monitoring sites in 2018 with symbols indicating locations where harbor seals have been observed hauled out (stars) and locations where harbor seals have not been observed hauled out (triangles).



Figure 2. Photo of the Nunatak Upper weather station in Glacier Bay National Park. The station at Lone Island is planned to be powered by a fuel cell rather than the solar panel pictured. Sensors may also be positioned closer to the ground to limit visibility. Configuration is otherwise similar.

2. The date(s) and duration of such activity and the specific geographical region where it will occur:

Installation and maintenance of the Lone Island weather station will begin March 1 2018. Generally site visits to this location will be scheduled between October 1 and April 30 to avoid the gull nesting period. Unscheduled maintenance that is needed outside of the regularly scheduled October 1 through April 30 time period will require Superintendent authorization to ensure protection of park resources and values. Any such unscheduled visits will be coordinated with gull researchers to limit the number of visits to Lone Island as much as possible. During initial station installation, staff will require up to 8 hours for setting instrument mounts and configuring electronics. Datalogger memory constraints and sensor calibration requirements established by instrument manufacturers dictate annual station visits to maintain station operability and preserve data usability. These annual maintenance visits will require approximately 2 hours per visit. Responses to unanticipated station failures would vary by the

complexity of the problem, but could require up to 8 hours on site. In 2018, up to four visits maximum are anticipated.

Ground and vessel surveys for nesting gulls will be conducted from May 01 - Sept. 30 in 2018 on bird nesting islands in Glacier Bay National Park and Preserve (Figure 1, Table 1) and other suspected gull colonies. There will be 1-3 ground visits and 1-2 vessel surveys at each site per summer adding up to a maximum of 5 visits per site. Duration of surveys will be 0.5 – 2 hours each.

3. The species and numbers of marine mammals likely to be found within the activity area:

Harbor seal (*Phoca vitulina richardii*) from the Glacier Bay/Icy Strait stock may be found hauled-out at gull monitoring study sites (Table 1). Counts from gull monitoring surveys likely represent a minimum estimate due to difficulty observing marine mammals from a vessel. Harbor seal counts conducted during aerial photographic surveys in June and August provide a more accurate number of animals using the study sites seasonally (Table 2). However, counts from aerial photographic surveys represent the minimum number of seals ashore as there is some unknown proportion in the water, unavailable to be counted

Table 1. Number of harbor seals observed and flushed from haul out (level B harassment) under Incidental Harassment Authorizations at gull study sites from 2015-2017 in Glacier Bay, Alaska.

Site Name	Latitude (dd)	Longitude (dd)	2015 Observed/Take	2016 Observed/Take	2017 Observed/Take
Boulder	58.55535	-136.01814	13/11	21/0	4/0
Flapjack	58.58698	-135.98251	0/0	101/41	0/0
Geikie	58.69402	-136.31291	45/14	37/0	33/33
Lone	58.72102	-136.29470	98/32	58/39	49/0
TOTAL			156/57	217/80	86/33

Table 2. Average and maximum counts of hauled out harbor seals vulnerable to disturbance at glaucous-winged gull study sites during harbor seal monitoring aerial surveys including *a)* all harbor seals from 2007-2016, and *b)* harbor seal pup counts from 2007-2016 (Womble et al. 2010, 2013, 2015, and unpublished data).

a) All harbor seals

Site	Average of Count	StdDev of Count	Max of Count	Number of Surveys
Boulder Island				
2007	3.9	5.2	14	9
2008	2.3	2.3	6	9
2009	11.1	16.7	43	10

2010	28	30.6	82	9
2011	38.7	31.6	92	7
2012	28.8	45.8	118	8
2013	55.4	72.8	175	9
2014	33.6	20.6	53	5
2015	35.3	15.9	53	3
2016	21.4	48.9	132	7
Flapjack Island				
2007	51	61.4	150	11
2008	55.4	44.4	131	10
2009	99.7	58	182	15
2010	111.1	42.7	175	8
2011	194.8	52.4	285	11
2012	158.3	66.4	273	11
2013	83.5	43.5	151	11
2014	130.2	44.3	173	6
2015	151	49.4	181	3
2016	87.5	73.5	217	8
Geikie Rock				
2007	4.6	6.7	16	10
2008	7.1	5.2	17	10
2009	3.6	5	13	9
2010	2.7	3.6	10	7
2011	13.2	20.8	46	6
2012	2.1	6	17	8
2013	5.4	13.1	35	7
2014	0	0	0	5
2015	0	0	0	4
2016	0	0	0	8
Lone Island				
2007	7.1	10	29	11
2008	6.8	4.5	13	9
2009	20.1	12.8	35	9
2010	21.1	10.8	38	7
2011	17.3	5.6	22	6
2012	9.3	5.7	19	8
2013	23.4	24.4	59	7
2014	18.4	10.6	26	5
2015	8	6.5	15	4
2016	8	13.4	32	6

b) Harbor seal pups only

Site	Average of Pup Count	StdDev of Pup Count	Max of Pup Count
Boulder Island	0.8	1.3	5
Flapjack Island	14.9	11.5	43
Geikie Rock	0.1	0.4	2
Lone Island	0.8	0.9	4
Grand Total	4.74	9	43

4. A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities:

Harbor seal (Phoca vitulina richardii), Glacier Bay/Icy Strait stock

Harbor seals are the most widely distributed pinniped in the northern hemisphere and occupy a diverse array of habitats along the North Pacific Rim, including small islands, beaches, and glacial ice emanating from tidewater glaciers. Historically, harbor seals in Alaska have been managed as three stocks (Bering Sea, Gulf of Alaska, Southeast Alaska); however, in 2010, the National Marine Fisheries Service and their co-management partners, the Alaska Native Harbor Seal Commission, revised the stock structure and identified 12 separate stocks of harbor seals based largely on the genetic structure. Although genetic samples were not obtained continuously throughout the range, a total evidence approach was used to consider additional factors such as population trends, observed harbor seal movements and traditional native use areas in the final designation of stock boundaries. The twelve stocks of harbor seals identified in Alaska are 1) the Aleutian Islands stock, 2) the Pribilof Islands stock, 3) the Bristol Bay stock, 4) the North Kodiak stock, 5) the South Kodiak stock, 6) the Prince William Sound stock, 7) the Cook Inlet/Shelikof stock, 8) the Glacier Bay/Icy Strait stock, 9) the Lynn Canal/Stephens stock, 10) the Sitka/Chatham stock, 11) the Dixon/Cape Decision stock, and 12) the Clarence Strait stock (Allen & Angliss 2011).

Population monitoring of harbor seals has a long history in Glacier Bay spanning from the 1970's to the present (Streveler 1979, Calambokidis et al. 1987, Mathews and Pendleton 2006, Womble et al. 2010) representing one of only a few sites in Alaska where such long-term monitoring efforts for harbor seals exist (Pitcher 1990, Frost et al. 1999, Jemison et al. 2006, Hoover-Miller et al. 2011). The primary objectives of Glacier Bay National Park harbor seal population monitoring are to (1) evaluate population status, trend and distribution within the park; (2) help determine whether conservation and management strategies are effective in reversing the decline; (3) share the survey data with NOAA Fisheries-National Marine Mammal Laboratory in order to estimate Alaska-wide trends, and (4) inform the National Marine Fisheries Stock Assessments for harbor seals in Alaska. Stock assessment of harbor seals is required under section 117 of Marine Mammal Protection Act of 1972.

During the harbor seal breeding (May-June) and molting (August) periods, ~66% of seals in Glacier Bay inhabit the primary glacial ice site and ~22% of seals are found in and adjacent to

the a group of islands in the southeast portion of Glacier Bay. Harbor seals are also found at smaller terrestrial sites that are scattered throughout Glacier Bay and at 2 small glacial ice sites (Mathews and Pendleton 2006; Womble et al. 2010). From 1992-2002, the number of harbor seals counted declined precipitously at terrestrial and glacial ice sites in Glacier Bay (Mathews and Pendleton 2006). The numbers of non-pups declined in the primary glacial ice site by 6.6%/yr (-39%/8yr) in June and by 9.6%/yr (-63%/11yr) in August and at all other haulout by 14.5%/yr (-75%/10yr) during August (Mathews and Pendleton 2006). The precipitous declines documented in the number of seals counted in Glacier Bay (Mathews and Pendleton 2006) were in contrast to trends for nearby regions in Ketchikan and Sitka (Small et al. 2003), thus raising questions regarding possible factors that may have contributed to declines in the number of seals in Glacier Bay.

The observed declines in harbor seals resulted in new research efforts which were initiated in 2004 and were aimed at trying to further understand the biology and ecology of seals and possible factors that may have contributed to the declines (e.g., Herreman et al. 2009, Blundell et al. 2011, Hueffer et al. 2012, Womble and Gende 2013a, Womble et al. 2014) with an emphasis on possible factors that may have contributed to the declines. The recent studies suggest that (1) harbor seals in Glacier Bay are not significantly stressed due to nutritional constraints (Blundell et al. 2011), (2) the clinical health and disease status of seals within Glacier Bay is not different than seals from other stable or increasing populations (Hueffer et al. 2012), and (3) disturbance by vessels does not appear to be a primary factor driving the decline (Young 2009). The most recent long-term trend estimate for harbor seals at terrestrial sites in Glacier Bay for the 22-year period from 1992-2013 is -6.91 % / yr (SE=0.40, 95% CI = -7.69, -6.13). This trend is less negative than previous estimates from 1992-2001 (-14.5%/year; -17.07, -11.85, CI) (Mathews and Pendleton 2006) and 1992-2008 (-11.5%/year; -12.7, -10.4, CI) (Womble et al. 2010). From 2004-2013, there was a 10-yr trend estimate of 9.64% % / yr (SE=1.66, 95% CI = 6.40, 12.89) (Womble et al. 2015). Similarly, estimates of number of seals at terrestrial and ice sites combined further indicate that the decline has lessened and seal numbers may even be increasing since 2004 (Table 3: Womble et al. 2015). Results from satellite telemetry studies suggest that harbor seals traveled extensively beyond the boundaries of Glacier Bay during the post-breeding season (September-April); however, harbor seals demonstrated a high degree of inter-annual site fidelity (93%) to Glacier Bay the following breeding season (Womble and Gende 2013b). Glacier Bay is also home to the only enforceable regulations in United States waters aimed at protecting harbor seals from vessel and human-related disturbance (Jansen et al. 2010). Spatial and temporal regulations for vessels transiting in and near harbor seal breeding areas, and operating regulations once in those areas, are all aimed at reducing impacts of human visitation.

Table 3. Trend estimates and annual change (%) in the number of harbor seals counted at terrestrial sites and two glacial ice sites (Tarr Inlet and McBride Inlet) during the molting period in late July-August (1992-2013) and the pupping period in June (2007 to 2013) in Glacier Bay National Park. Previous trend estimates are from Mathews & Pendleton (2006) and Womble et al. (2010). From Womble et al. 2015, Table 2, p. 19.

Years	Annual Change (%)	SE	Lower 95% CI	Upper 95% CI	Trend Period (yr)	Season	Source
1992-2002	-14.46	1.33	-17.07	-11.85	10	Molting	Mathews & Pendleton 2006
1992-2008	-12.41	0.66	-13.70	-11.11	17	Molting	Womble et al. 2010
1992-2011	-9.27	0.49	-10.22	-8.31	20	Molting	Womble et al. 2015
1992-2013	-6.91	0.40	-7.69	-6.13	22	Molting	Womble et al. 2015
2004-2013	9.64	1.66	6.40	12.89	10	Molting	Womble et al. 2015
2009-2013	13.25	4.37	4.69	21.82	5	Molting	Womble et al. 2015
2007-2013	4.36	1.79	0.85	7.86	7	Pupping	Womble et al. 2015

5. The type of incidental taking authorization that is being requested (i.e., takes by harassment only; takes by harassment, injury and/or death) and the method of incidental taking:

An Incidental Harassment Authorization (IHA) for Level B harassment is being requested. We anticipate visual disturbance of hauled out harbor seals from a vessel and researchers approach the island or from shore as researchers conduct data collection and/or equipment maintenance. We do not expect any death or serious injury to harbor seals as a result of the proposed activities.

6. By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in paragraph (a)(5) of this section, and the number of times such takings by each type of taking are likely to occur:

Table 4. Annual number of marine mammals expected to be taken by incidental harassment during glaucous-winged gull monitoring in Glacier Bay, Alaska.

Species	Lifestage	Sex	Animals per Year	Takes per Animal	Procedures	Details
Harbor seal	ALL	Male and female	286	9 on Lone and 5 on other islands	Ground and vessel surveys	Incidental visual disturbance when approaching or surveying gull colonies on the ground or by vessel.

Harbor seals

Harbor seals may be disturbed when vessels approach or researchers go ashore for the purpose of monitoring gull colonies or maintaining the Lone Island weather station. Harbor seals tend to haul out in small numbers (average < 50 animals) at most sites with the exception of Boulder and Flapjack Islands (Table 2). However, harbor seals hauled out at Flapjack Island are generally on the southern end whereas the glaucous-winged gull colony is on the northern end. We try to access the island from the north with a motor vessel, but when we use kayaks we generally need to approach from the south. Similarly, harbor seals on Boulder Island tend to haul out on the southern end while the gull colony is located and can be accessed on the northern end without disturbing the marine mammals. Lone and Geikie are small enough islands that even if we can approach without disturbing hauled out harbor seals, we will likely disturb them when conducting gull surveys. We do not know the likelihood of disturbing hauled out seals on Lone Island during the weather station installation, but have a better sense once we determine the exact location of the station. Results from satellite telemetry studies suggest that harbor seals traveled extensively beyond the boundaries of Glacier Bay during the post-breeding season (Womble and Gende 2013b) but we will not know how many seals continue to use this island to haul out during the non-breeding harbor seal seasons of September-April until we begin monitoring harbor seals when installing and maintaining the weather station.

Aerial survey maximum counts show that harbor seals sometimes haul out in large numbers at all four locations (Table 2), and sometimes individuals and mother/pup pairs occupy different terrestrial locations than the main haulout (J. Womble, *personal observation*). We believe an annual take of 286 harbor seals is a reasonable estimate that will allow access to gull colonies and climate stations for monitoring. This number was calculated by multiplying the average number of seals observed during the last 3 years at each site during gull surveys and multiplying this by 5 visits for Flapjack, Geikie, and Lone Islands and 9 visits to Lone Island (5 for gull monitoring and 4 for climate monitoring). The totals were calculated as follows: Boulder average of 3 seals per visit x 5 visits = 15, Flapjack average of 10 seals per visit x 5 = 50, Geikie average of 10 seals per visit x 5 = 50, and Lone Island average of 19 seals per visit x 9 visits = 171 for a grand total of 286 seals. The highest number of annual visits to each gull study site will be 9 at Lone Island, therefore it is expected that individual harbor seals at a given site will be disturbed no more than 9 times per year at Lone and 5 times per year at all other locations.

7. The anticipated impact of the activity upon the species or stock:

We anticipate potential temporary behavioral disturbance of individual harbor seals as a result of our activities. We do not anticipate death, injury, or reduction in reproductive fitness of any marine mammal species or stocks due to the temporary nature of the disturbance of a small number of individuals. Temporary disturbance constitutes Level B harassment that should not result in negative impacts to individual or stocks of marine mammals. No long-term negative

effects are anticipated and every effort will be made to minimize the potential for stampeding and disturbance of dependent young (see #11).

8. The anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses:

Subsistence harvest of harbor seals by Alaska Natives is authorized under the Marine Mammal Protection Act; however, subsistence harvest of harbor seals has not been permitted in Glacier Bay National Park since 1974 (Catton 1995). Yet the extensive post-breeding seasonal distribution of seals from Glacier Bay (Womble and Gende 2013b) may expose seals to subsistence harvest outside of the park. Subsistence surveys and anthropological studies demonstrate that harbor seals may be harvested during all months; however, there are typically two distinct seasonal peaks for harvest of seals which occur during spring and in autumn/early winter (de Laguna 1972; Emmons 1991). These time periods co-occur with the time period during which seals travel beyond the boundaries of Glacier Bay (Womble and Gende 2013b). The level of subsistence harvest on seals from Glacier Bay/Icy Strait stock has not been quantified; however, subsistence reports from nearby communities have documented subsistence harvest (e.g., Wolfe et al. 2009). Due to the prohibition of subsistence harvest at the gull study sites and the temporary non-lethal nature of marine mammal disturbance caused by this project, we anticipate no impacts to subsistence harvest of marine mammals in the region.

9. The anticipated impact of the activity upon the habitat of the marine mammal populations, and the likelihood of restoration of the affected habitat:

This activity will not impact marine mammal habitat.

10. The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved:

There will be no loss or modification to marine mammal habitat.

11. The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance:

The NPS lead biologist will instruct additional survey crew on appropriate conduct when in the vicinity of hauled-out marine mammals. The NPS research teams will maintain a quiet working atmosphere by avoiding making unnecessary noise and by using hushed voices while near hauled out seals; will remain at least 50 m from seals when possible; and will choose pathways to study sites that will minimize disturbance to seals.

Disturbance to hauled out marine mammals will be further minimized as follows:

1. We will conduct pre-survey monitoring before deciding to access study sites of Boulder, Lone, Flapjack, or Geikie, using high-powered binoculars to determine and document the number species and location of hauled-out marine mammals on each island. Prior to deciding to land onshore to conduct the study, the researchers will use high-powered image stabilizing binoculars from the watercraft to document the number, species, and location of hauled out marine mammals at each island. The vessels would maintain a distance of 328 to 1,640 ft (100 to 500 m) from the shoreline to allow the researchers to conduct pre-survey monitoring.
2. If we observe harbor seals hauled out at survey site, we will minimize potential disturbance by boat travel and pedestrian approach during research activities by:
 - a) Performing controlled and slow (approximately 2 to 3 knots/2.3 to 3.4 mph) ingress to study site to prevent stampede, and
 - b) Selecting a pathway of approach farthest from the hauled out harbor seals to minimize disturbance.
 - c) If a pup less than one week of age is spotted during the proposed pre-survey monitoring or general monitoring activities, survey activities will conclude.
3. We will monitor for offshore predators and conclude survey activities if harbor seals are hauled out and killer whales are observed within 1 mile of the study site.
4. We will not approach Steller's sea lions closer than 100 meters to conduct gull [or climate] monitoring research.
5. We will maintain a quiet research atmosphere in the presence of pinnipeds.
6. We will record the date, time, and location of each visit to research sites.

12. Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, the applicant must submit either a "plan of cooperation" or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses:

Not applicable

13. The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity:

Gull and climate researchers will report all observations of marine mammals and document all disturbances to state and federal agencies conducting marine mammal research in this region. We will coordinate with state and federal marine mammal biologists to determine what additional data or observations may be useful for monitoring marine mammals and haul outs in Glacier Bay. At a minimum we will collect and report the following for each site visit:

- a) Composition of marine mammals sighted, such as species, gender and life history stage.
- b) Information on the numbers by species of marine mammals observed during surveys.
- c) Species counts of numbers of adults and juveniles
- d) Number of disturbances by species and age according to a three-point scale of intensity including: (1) Alert: Seal head orientation or brief movement in response to disturbance, which may include turning head towards the disturbance, craning head and neck while holding the body rigid in a u-shaped position, changing from a lying to a sitting position, or brief movement of less than twice the animal's body length, (2) Movement: Movements in response to the source of disturbance, ranging from short withdrawals at least twice the animal's body length to longer retreats over the beach, or if already moving a change of direction of greater than 90 degrees., and (3) Flush: All retreats (flushes) to the water.
- e) Information on weather and tidal height.
- f) If applicable, observations of marked or tag-bearing pinnipeds or carcasses as well as any rare or unusual species of marine mammal.
- g) If applicable, note the presence of offshore predators including date, time, number and species.

14. Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects:

Glacier Bay National Park actively monitors harbor seals at breeding and molting haul out locations to assess trends over time (e.g., Mathews & Pendleton 2006; Womble et al. 2010, Womble and Gende 2013, Womble et al. 2015). This monitoring program involves collaborations with biologists from the Alaska Department of Fish and Game, and the National Marine Mammal Laboratory. We will continue these collaborations and encourage continued or renewed monitoring of marine mammal species. Additionally, we will report vessel-based counts of marine mammals, branded or injured animals, and all observed disturbances to state and federal agencies.

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