

## Key Site 7: Glacier Bay, Alaska

**Location:** 58°40'28"N, 136°6'30"W

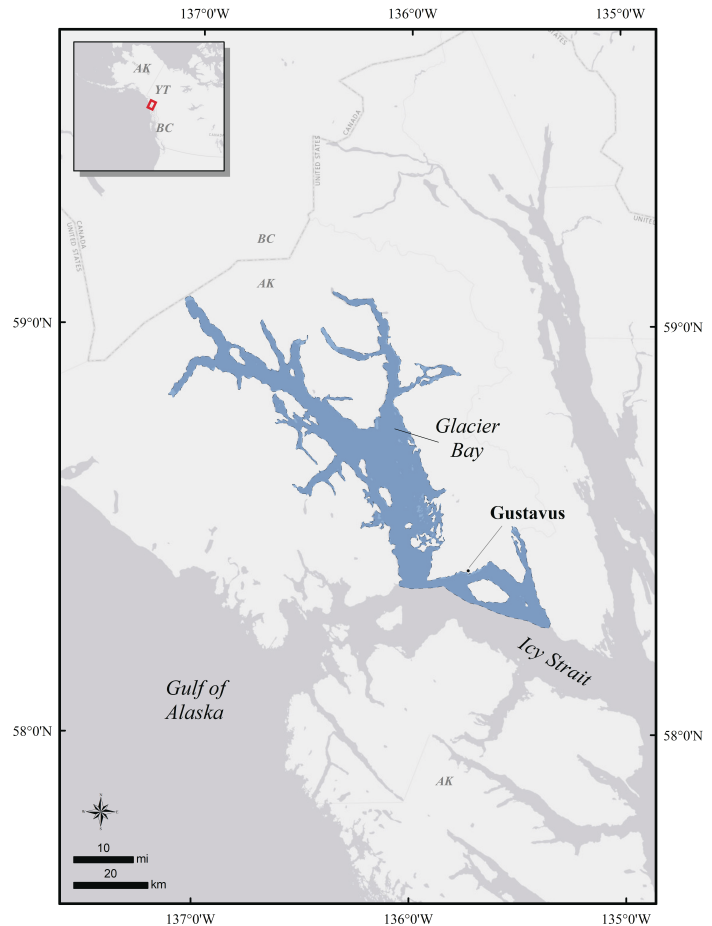
**Size:** 1588 km<sup>2</sup>

**Description:** Glacier Bay is a complex fjord system, connected to the Gulf of Alaska by the waters of Icy Strait and Cross Sound. Most of the key habitat site falls within Glacier Bay National Park and Preserve and includes Glacier Bay (to the heads of the East and West arms) and the northeastern part of Icy Strait, around Gustavus, Pleasant Island, and Porpoise Islands, extending up into Excursion Inlet east of Gustavus. About 27% of Glacier Bay National Park is covered by glaciers, including seven active tidewater glaciers, but the area is undergoing recent and very rapid deglaciation (National Park Service 2016). The region has a wet and moderate maritime climate with about 175 to 200 cm of rain annually (Audubon Alaska 2016a). Freshwater input from glacier and snowfield melt as well as precipitation runoff combined with strong tidal mixing contributes to high levels of productivity in Glacier Bay (Etherington et al. 2007).

### Precision and Correction of Abundance

**Estimates Presented:** Abundance estimates based on data from Hodges et al. (2008) have been adjusted to account for incomplete detection by applying species-specific visibility correction factors (VCFs) estimated for aerial surveys specific to this area (Appendix 1).

**Biological Value:** The waters of Glacier Bay regularly support at least 10 species of sea ducks, some in great abundance (Nadeau et al. 2017). Sea ducks accounted for about half of all marine birds surveyed during summer and winter (Robards et al. 2003). During winter (mid-February to mid-March), there were estimated to be >14,000 Barrow's Goldeneyes (*Bucephala islandica*) (>5% of the western population), >3,000 Surf Scoters (*Melanitta perspicillata*), >2,000 White-winged Scoters (*M. deglandi*), >1,500 Bufflehead (*B. albeola*), and lesser numbers of Harlequin Ducks (*Histrionicus histrionicus*), Long-tailed Ducks (*Clangula hyemalis*), Common Goldeneyes (*B. clangula*), and Red-breasted (*Mergus serrator*) and Common mergansers (*M. merganser*) (Hodges et al. 2008, D. Groves, USFWS unpublished data; Appendix 1). In the summer molting period



(late July to early August), nearly 49,000 Surf Scoters (~7% of the continental population), >6,000 White-winged Scoters, >6,000 Harlequin Ducks, >3,000 Red-breasted Mergansers, and >2,000 Common Mergansers used this site (Hodges et al. 2008, D. Groves, USFWS unpublished data). Although Drew et al. (2008) did not apply VCFs to their boat-based survey data, they reported much higher densities of sea ducks in Glacier Bay than did Hodges et al. (2008). Differences in survey and analysis methodologies make comparisons difficult, but sea ducks may be even more abundant in this area than indicated by Hodges et al. (2008). Additionally, some surveys have found that during summer White-winged Scoters were up to three times more abundant than Surf Scoters, so there may be high variability across seasons and years (Nadeau et al. 2017). Barrow's Goldeneyes were found throughout Glacier Bay but consistently used the same areas over a five-year period. Harlequin Ducks were mostly in the upper Bay during summer and shifted south in winter. Common Mergansers were particularly numerous in the Beardslee Islands, Berg Bay, and Adams Inlet,

and Surf and White-winged scoters were more frequent in the northern Bay, especially Muir Inlet and West Arm (Robards et al. 2003, Drew et al. 2008). Numbers of Long-tailed Ducks may fluctuate significantly between years (Drew et al. 2008, National Park Service 2016).

High and sustained primary productivity (phytoplankton, seaweed, and kelp) supports sustained zooplankton abundance from spring through fall (Robards et al. 2003, Etherington et al. 2007), as well as large numbers of forage fish, benthic invertebrates, waterbirds, and marine mammals (Drew et al. 2008).

**Sensitivities:** Large aggregations of molting sea ducks may be particularly sensitive to disturbance. Mortality rates may be higher during winter, especially for female and immature sea ducks wintering near the northern extent of their range (Uher-Koch et al. 2016).

**Potential Conflicts:** Glacier Bay National Park receives about 350,000 visitors each year, mostly on cruise ships and tour boats (Etherington et al. 2007, National Park Service 2016). The majority of these visitors arrive during June through August (Nadeau et al. 2017), when the bay is also used by tens of thousands of molting sea ducks, which are sensitive to disturbance by vessels large and small, including kayaks. In addition to disturbance, vessel traffic also increases the risk of exposure to petroleum pollution and other contaminants (Nadeau et al. 2017). The community of *Gustavus* is located within this site.

Sea otter abundance has increased dramatically in Glacier Bay since the mid-1990s, and their foraging activity may reduce the availability of important sea duck prey species (e.g., clams, mussels) as well as impacting the structure and function of nearshore ecosystems (Nadeau et al. 2017).

**Status:** The majority of this Key Habitat site is encompassed by Glacier Bay National Park, which was established as a national monument in 1925 and expanded and given national park status in 1980. It has also been designated as part of a World Biosphere Reserve and World Heritage Site. About 80% of the park is designated Wilderness and access to some areas is restricted or prohibited to protect wildlife (National Park Service 2016). From June 1 to August 31, permits are required for vessels entering the park, and there are daily quotas on the number

of vessels allowed (National Park Service 2016). There were important commercial fish and crab harvests in Glacier Bay, but these are now restricted or prohibited. However, these activities continue to be permitted within the Key Habitat site east of the park. There is a lot of overlap between this Key Habitat site and the Glacier Bay and Icy Strait Important Bird Area, although that IBA also covers large areas of Icy Strait, Cross Sound, and the Gulf of Alaska coastline (Audubon Alaska 2016b). Within Glacier Bay, marine waters are protected within the national park, but in the area to the east of the park the State of Alaska has jurisdiction over tidelands (between mean high water and mean low water) and submerged lands (from mean low water to the three nautical mile line), with the authority to manage, develop, and lease resources. However, the federal government regulates commerce, navigation, power generation, national defense, and international affairs throughout state waters.

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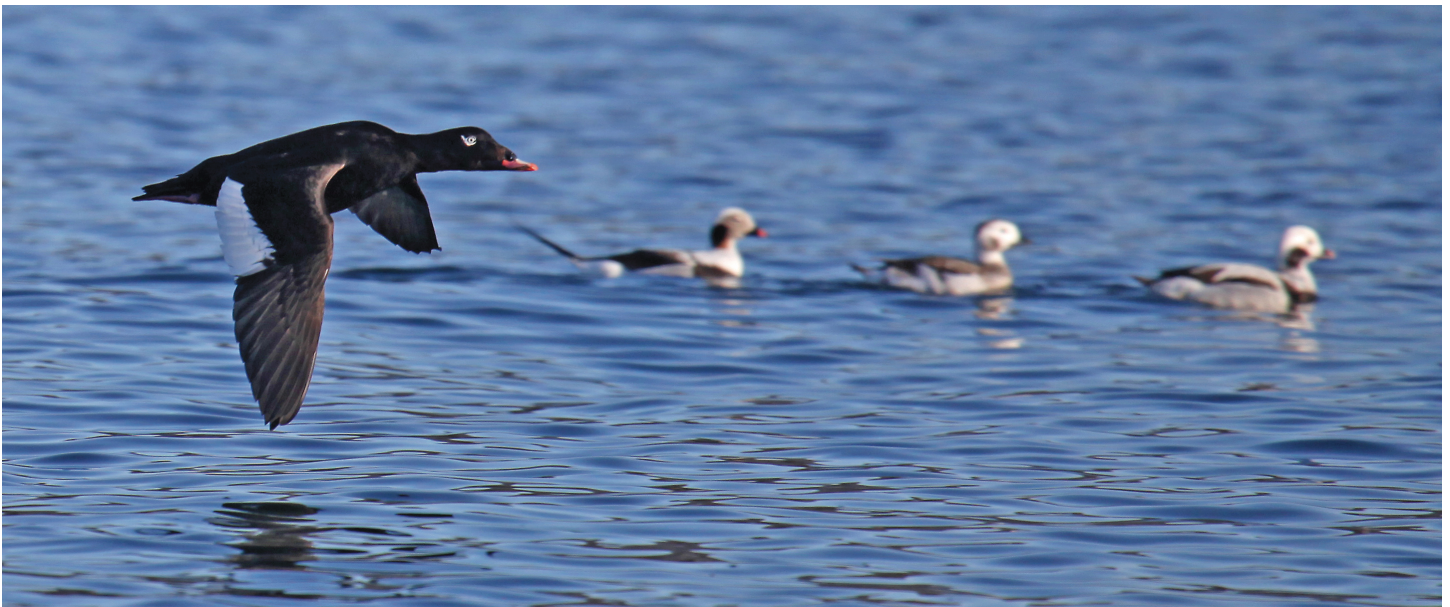
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White-winged Scoter and Long-tailed Ducks. Photo: Tim Bowman.