Glacier Bay Province

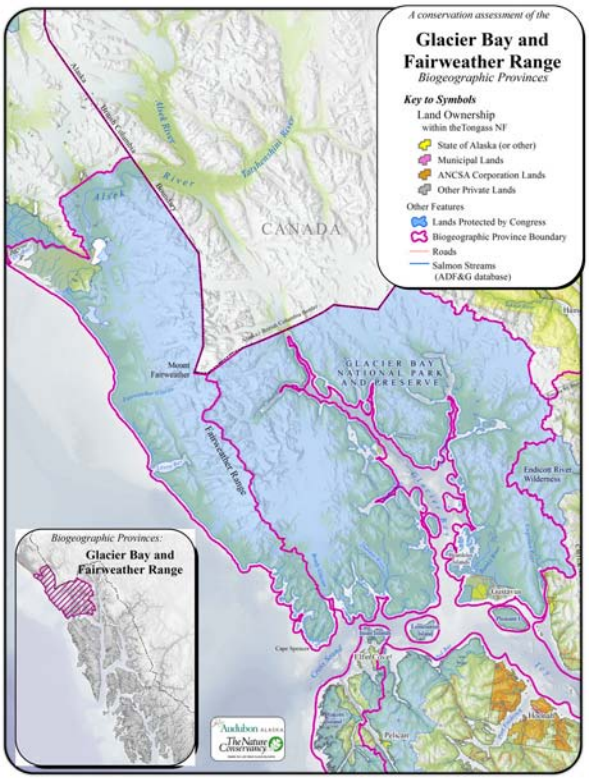

FIG 1. Glacier Bay Biogeographic Province.

The Glacier Bay Province (Fig 1) experienced the most dramatic Little Ice Age (~1550 – 1850) in the world. About 85% of the province was covered by ice to a depth of 1 mi (1.6 km) in the upper reaches, sloping smoothly down to the berg-spewing glacial terminus in Icy Strait (a name no longer descriptive). During the past two centuries many of the tidewater glaciers have receded onto land. Recolonizing plants and animals followed, and after them, scientists and tourists. Today, ice cover is reduced to 41% of the province (Fig 2).

Glaciers began to advance into Glacier Bay about 3,000 to 4,000 years ago, building a huge, sparsely wooded outwash plain almost to the mouth of today's bay about 800 years ago. It was on this plain that the "Chookan heeni" river flowed, from which one of the Hoonah clans derives its name (Streveler 1996). The final Little Ice Age advance culminated in the mid-1700s, driving these people from their homeland.

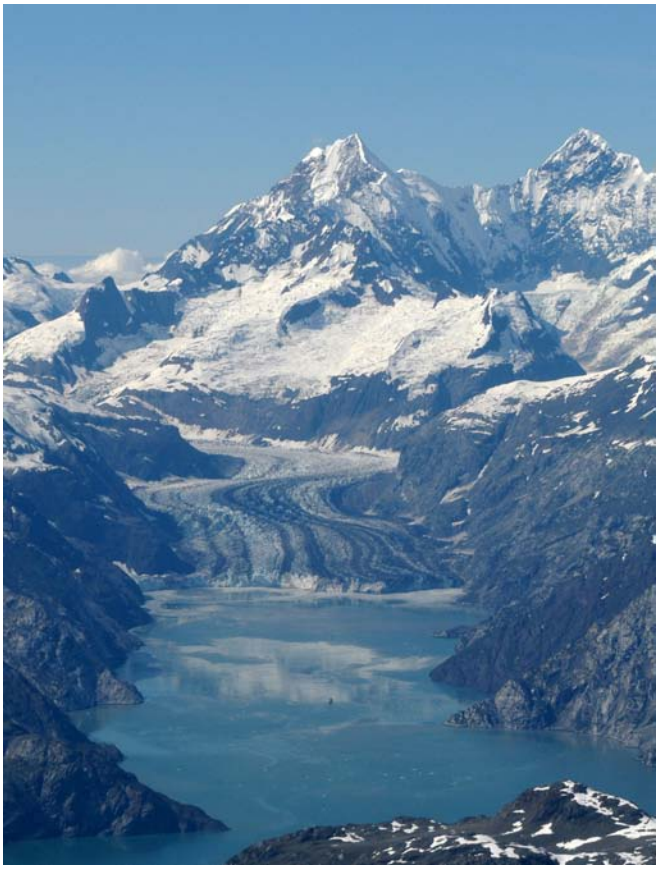

FIG 2. Mounts Wilbur and Orville stand over 10,000 ft (3,049 m) high above Johns Hopkins Inlet, July 20, 2005. Formerly choked with icebergs, this bay was a primary seal pupping grounds. (John Schoen photo)

The flat Beardslee Islands are made of compacted silt and clay, thought to be former lake beds that once existed in the coarse outwash plain prior to the

penultimate glacial advance. The ice mined away the coarse surroundings, turning the former concavities into convexities (Fig 3).

FIG 3. Looking north over Lester Island in the Beardslee chain. These 150 year-old forests grow on recently deglaciated till and outwash. In spite of their youthfulness, they would probably qualify as "large-tree" if the park had been covered in the USFS TIMTYP layer. Northward from the Beardslees into Glacier Bay, tree size declines rapidly. Eventually, conifers and even woody shrubs (Fig 4.3.2) drop out. (John Schoen photo)

The Gustavus Forelands are an extensive wetland mosaic second only to the Yakutat foreland in size. They were created by migrating outwash streams two centuries ago when ice still sat on the terminal moraine above Bartlett Cove (Fig 4). These flats provide important wetland habitat for migratory waterfowl, shorebirds, and sandhill cranes (*Grus canadensis*).

In 2005, The Nature Conservancy, in partnership with the community of Gustavus, State of Alaska, U.S. Fish and Wildlife, Ducks Unlimited, and many private donors, acquired over 4,100 acres (1,659 hectares) of coastal wetlands in the Gustavus Forelands, including nearly 7 mi (11 km) of shoreline. The acquisition also provides a significant buffer to the Dude Creek Critical Habitat Area. Approximately half of the property was transferred to the State of Alaska; half remains with the Conservancy.

Glacier Bay has long served as a world center for succession research. Most ecology textbooks quote from the work of William Cooper and Donald Lawrence in their treatment of primary succession. About 60 mi (96 km) of glacial recession has uncovered a sequence of progressively more mature communities as one moves away from the ice fronts (see also succession in Chapter 5). This "chronosequence" approach to successional study has been used by researchers who assume that the 60 mi (96 km) of spatial change resembles the 250 years of temporal change. Fastie (1995) has shown that patterns and rates of plant colonization are dependent on substrate and proximity of seed source, and that the chronosequence interpretations may be simplistic.

On the Gustavus forelands, stringers of spruce, shore pine (*Pinus contorta*), cottonwood (*Populus balsamifera*) and willow follow the now "underfit" streams in former glacial outwash channels. The areas of poorly drained silt and fine sand support only sedges, horsetail (*Equisetum spp.*) sweet gale (*Myrica gale*) and herbaceous communities (Streveler et al. 2002). These communities have been heavily altered by the recent arrival of moose.

Moose colonized Glacier Bay through the low pass between upper Adams Inlet and the Excursion River that flows into Lynn Canal. This pass has been a major wildlife corridor since the bay was deglaciated.

Glacier Bay is mammal-rich by Southeast Alaskan standards; 30 species are known to occur in the province. It also has three endemic subspecies and one endemic species found nowhere else, the highest endemism for any Southeast province. Endemic mammals of this province include: *Sorex alaskanus*, the Glacier Bay water shrew; *Marmota caligata vigilis*, a hoary marmot; *Clethrionomys rutilus glacialis*, a red-backed vole; and *Mustela erminea alascensis*, an ermine (Chapter 6.7). The only Southeast records for heather vole (*Phenacomys intermedius*) are in Glacier Bay and the mountains near Hyder. Glacier Bay is also one of the few places in Southeast with a sight record for least weasel, *Mustela nivalis*, although no specimens exist.

The Dundas river and several rivers of the Gustavus forelands have the most extensive freshwater habitat for salmon in the Glacier Bay province. These two watersheds also share a history of "rejuvenation" by copious glacial outwash at the peak of the Little Ice Age, 250 years ago. They now support mature forests with abundant cottonwood, willow and alder that provide nutrients to the stream channels. While these forests are mostly comprised of Sitka spruce, they lack the structural characteristics typical of old growth forests elsewhere in the region. Watersheds in the middle and upper bay are still too young and sparsely vegetated to have well-developed salmon runs.

FIG 4. Dotted line traces the moraine deposited at the peak of the Little Ice Age in Bartlett Cove. The large alluvial fan spreading towards the lower right was formed when ice still sat on this moraine. It originates in a pass called Cooper's Notch. This and several other giant fans coalesced to form the Gustavus Forelands. (John Schoen photo)

The climate of this area is drier than most regions of Southeast. Glacier Bay receives 70 in (178 cm) of precipitation and 110 in (279 cm) of snowfall annually. The mean January and July temperatures are 27.9 and 55.7 deg F (-2.3 to 13.2 deg C), respectively.

The periglacial environments of Glacier Bay and Fairweather provinces differ from the hyper-maritime environments typical throughout much of the rest of the region. Because of the short time span since the Little Ice Age, forests generally do not display the type of old growth characteristics typical of coastal forest ecosystems. Moreover, species such as moose, willow (Salix sp.) and Kittlitz's murrelet (*Brachyramphus brevirostris*) are more typical of these provinces, rather than deer (*Odocoileus hemionus*), Sitka spruce and marbled murrelet (*Brachyramphus marmoratus*) that are used as focal targets for Southeast. For the purpose of this assessment these provinces are included in the Coastal Forests Ecoregion, for the sake of applying a consistent ranking procedure throughout the region. Nonetheless, this demonstrates the climatic and ecological diversity within the region and the importance of a rigorous geographic stratification of conservation areas. Glacier Bay National Park does not necessarily provide a conservation benefit for key species and habitats typical of the Tongass National Forest.

There is very limited distribution of productive old growth in this province and little industrial forestry activity has occurred here. There are 306 mi (490 km) of anadromous fish streams in the province (Chapter 2, Table 11) and virtually no harvest of riparian forests associated with anadromous fish (Chapter 2, Table 12). Eighty-five percent of riparian forests with anadromous fish values are protected in watershed or sub-watershed reserves. Conservation is the long-term priority for fish and wildlife habitats in this province. Perhaps the major concern in the future would be potential impacts from industrial tourism.

FIG 5. Southeastern corner of the Gustavus flats at low tide. The Gustavus Foreland is a giant outwash lobe deposited when ice sat on the Little Ice Age terminal moraine in the mid-1700s. The Nature Conservancy recently acquired lands on the forelands to protect its conservation values. Falls Creek (arrow) drains a low, boggy bench above the Foreland, dropping through a canyon in its final descent to the beach. This is the site of a hydropower project under construction that will provide electricity to Gustavus. (John Schoen photo)