

**Inventory of Marine and Estuarine Fishes in  
Southeast and Central Alaska National Parks**



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## **ABSTRACT**

As part of a national inventory program funded by the National Park Service, we conducted an inventory of marine and estuarine fishes in Glacier Bay National Park and Preserve, Wrangell-St. Elias National Park and Preserve, Sitka National Historical Park, and Klondike Gold Rush National Historical Park in 2001 and 2002. In addition, marine fish data from a previous project that focused on forage fishes and marine predators during 1999 and 2000 in Glacier Bay proper were compiled for this study. Sampling was conducted with modified herring and Isaacs-Kidd midwater trawls, a plumb staff beam trawl, and beach seines. Species lists of relative abundance were generated for nearshore fishes in all parks, and for demersal and pelagic fishes in Glacier Bay National Park and Preserve and Wrangell-St. Elias National Park and Preserve. With a total sampling effort of 531 sets, we captured 100 species in Glacier Bay National Park and Preserve, 31 species in Wrangell-St. Elias National Park and Preserve, 23 species in Sitka National Historical Park, and 11 species in Klondike Gold Rush National Historical Park. We estimated that between 59 and 85 percent of the total marine fish species present were sampled by us in the various habitat-park units. We also combined these data with historical records and prepared an annotated species list of 160 marine and estuarine fishes known to occur in Glacier Bay National Park and Preserve. Shannon-Wiener diversity index and catch per unit effort were used to assess the effects of depth and latitude (distance from tidewater glaciers) on marine fish community ecology in Glacier Bay proper. Our findings suggest that demersal fishes are more abundant and diverse with increased distance from tidewater glaciers, and that pelagic fishes sampled deeper than 50 m are more abundant in areas closer to tidewater glaciers.

**KEY WORDS:** Fish, Marine, Estuarine, National Parks, Southeast Alaska, Central Alaska, Inventory, Monitoring, Diversity, Abundance, Glacier Bay

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## INTRODUCTION

Systematic biological inventories lay the foundation for understanding ecological and survival requirements for individual species within communities (Mikkelsen and Cracraft 2001). The general lack of scientific information regarding the occurrence and status of plant and animal species in National Parks led to the development of the Inventory and Monitoring (I&M) program of the National Park Service. Funded by Congress, the purpose of the I&M program is to collect baseline information on biological processes that help to identify issues of conservation and management (Williams 1997). The primary goal of the Biological Inventory Program in Alaska is to document at least 90% of vertebrate animal and vascular plant species that occur in each park (Lenz et al. 2002).

Some National Parks in Alaska support abundant fish populations. Marine and anadromous fishes play an important role in park ecosystems. Anadromous fishes influence terrestrial ecosystems by transporting marine production to freshwater streams and lakes (Bilby et al. 2001). Eggs, larvae/juveniles, and adult carcasses of anadromous fishes provide prey and nutrients to estuarine and freshwater systems. In marine ecosystems, predators such as humpback whales (*Megaptera novaeangliae*), Steller sea lions (*Eumetopias jubatus*), harbor seals (*Phoca vitulina*) and *Brachyramphus* murrelets are dependent on marine fishes as a major source of prey.

Establishing baseline information on marine fish species occurrence and distribution may help to identify ecological trends. For example, declines in marine mammal and seabird populations in the Gulf of Alaska have been linked to shifts in abundance and composition of forage fish stocks over the past 45 years (Anderson and Piatt 1999, Piatt and Anderson 1996). This finding was the result of long-term monitoring of fish populations in the northern Gulf of Alaska by the National Marine Fisheries Service (NMFS).

The diversity of Alaska's fishes has been the focus of studies for well over a century. The most recent and comprehensive publication, *Fishes of Alaska* (Mecklenburg et al. 2002), documents 602 species from 108 families in Alaska. Still, regional marine fish assemblages from southeastern and central Alaska are poorly known. The Alaska Natural Heritage Program (ANHP) compiled a list of 313 expected species for Glacier Bay National Park and Preserve, however, less than 30% were confirmed prior to our

study (Lenz et al. 2002). Previous work pertaining to this study includes whale forage studies (Kreiger and Wing 1984,1986), freshwater re-colonization studies (Milner 1989,1994), marine and anadromous fish surveys (Murrell and Streveler 1975, Orsi and Landingham 1985), and USGS-Biological Resources Division long-line halibut surveys (Bishop et al. 1993).

This report presents the combined results from two studies: 1) an initial study of fishes in Glacier Bay conducted in 1999 and 2000 with a focus on forage fish species and their marine bird and mammal predators (Robards et al. 2003), and, 2) an NPS marine fishes inventory project undertaken during 2001 and 2002 designed to randomly sample a variety of marine habitats in order to document fish diversity and abundance. We present data from Glacier Bay National Park and Preserve (hereafter “Glacier Bay”), Wrangell-St. Elias National Park and Preserve (hereafter “Wrangell-St. Elias”), Sitka National Historical Park (hereafter “Sitka”) and Klondike Gold Rush National Historical Park (hereafter “Klondike Gold Rush”). We sampled pelagic communities with midwater trawls, demersal fish communities with bottom trawls, and nearshore fish communities with beach seines. Our objectives were to: 1) document presence and relative abundance of =90% of expected demersal marine fishes in Glacier Bay proper, 2) document presence and relative abundance of =90% of expected pelagic marine fishes at depths below 50m in Glacier Bay proper, 3) document presence and relative abundance of =90% of expected marine fish assemblages in Glacier Bay outer waters, 4) document presence and relative abundance of =90% of expected marine fish assemblages in Wrangell-St. Elias, 5) document presence and relative abundance of =90% of expected nearshore marine and estuarine fishes at Sitka and Klondike Gold Rush parks, 6) review historical marine fishes data compiled under the Alaska Natural Heritage Program (ANHP) project and other data sources.

## **METHODS**

### **Study Area**

The four national parks included in this study are located in southeast and central Alaska (Fig. 1). Glacier Bay has 1897 coastal km within its boundaries. Because of its large size, we divided Glacier Bay into two functional units, Glacier Bay proper and Glacier Bay outer waters. The main body of Glacier Bay proper is a recently (<200 yr) de-glaciated fjord that splits into two narrow arms. The Fairweather mountain range and Brady ice field border the bay to the northwest. Thus, the head of the bay contains several tidewater and hanging glaciers, and coastal mountain peaks over 3000 m in elevation. Tidal fluctuation reaches 7.5 m, and the maximum water depth is 458 m. For the purposes of this study, Glacier Bay outer waters are defined as all park waters outside of the main bay and within 5.6 km of the shore, including Excursion Inlet, Dundas Bay, Icy Strait, Cross Sound, and nearshore areas of the Gulf of Alaska between Cape Spencer and Sea Otter Creek. Glacier Bay has a variety of habitats including deep silty fjords, rocky reefs, and kelp forests. The nearshore habitat varies, including features such as sand and gravel, silty flats, shale, cobble, estuarine river mouths and rocky intertidal reef. Glacier Bay outer waters contain open ocean coast as well as semi-protected bays in contrast to the protected waters of Glacier Bay proper.

Wrangell-St. Elias waters include 202 coastal km within Yakutat Bay and Icy Bay to the north. Both areas have extensive ice fields and are bordered by the St. Elias Mountains. Wrangell-St. Elias' diverse habitat ranges in characteristics from mud and silt to boulder fields.

Sitka is on Baranof Island, which is located in the outer waters of the inside passage and borders the North Pacific Ocean. The 1.7 km of coastline within park boundaries are in Sitka Sound, which provides protection from the open coast. Habitat in Sitka varies from sandy estuarine areas to boulder and cobble intertidal areas. Sampling was done at the mouth of the Indian River.

Klondike Gold Rush, with 3.2 coastal km, is located at the head of Lynn Canal in Skagway, Alaska. Klondike Gold Rush habitat features extensive silt and sand flats to gravel and cobble with scattered mussel beds. Sampling in the park was conducted in the Taiya River Estuary.

## Sampling Design

All sampling in 1999 and 2000 was conducted during surveys of forage fishes and marine predators (Robards et al. 2003). Midwater trawling in Glacier Bay proper during 1999 was conducted in conjunction with a hydroacoustic survey of pelagic fish abundance. All navigable areas of the bay were systematically surveyed, and fish aggregations, identified with a Biosonic DT4000 digital echo sounder (120 kHz), were targeted with the trawl. In 2000, even-numbered stations from an earlier oceanography study (Hooge 2002) were selected for monthly midwater trawl sites in order to achieve systematic sampling and consistency with monthly oceanographic data collection. The majority of sampling in 1999 and 2000 was in the top 50 m of the water column (see Robards et al. 2003 for detailed methods).

Midwater sampling in Glacier Bay proper during 2001 concentrated on waters >50 m deep. Midwater trawl stations were randomly selected (without replacement) from cells created by a 2.5 km square grid overlaid on Glacier Bay proper. The scale of this grid matched the scale of our previous midwater sampling in Glacier Bay (Robards et al. 2003) and Cook Inlet (Robards et al. 1999), as tows were typically 1.5-2.5 km long. We allocated this sampling among three depth strata: 50-100 m, 100-200 m, and >200 m. Each selected cell was searched for acoustic backscattering layers with the vessel's depth sounder, and fish sign at each depth stratum was fished. The net was equipped with a Furuno net-sounding system to assure the net was fishing at the appropriate depth.

Midwater trawling in Glacier Bay outer waters was allocated among four depth strata: 0-50 m, 50-100 m, 100-200 m, and >200 m, and stations were randomly selected as described for Glacier Bay proper. Bottom trawling was allocated among the same depth strata with the same random stratified sampling design as was used in Glacier Bay proper. All stations in Glacier Bay outer waters were within 5.6 km of the shore.

For the fish inventory sampling that occurred in 2001-2002, we selected bottom trawl stations in Glacier Bay proper using a random stratified design. We used a 1 km<sup>2</sup> grid overlaid on a map of Glacier Bay as our population of potential trawling stations. We stratified our sampling among five depth strata (0-20 m, 20-70 m, 70-120 m, 120-170 m, >170 m) in order to ensure adequate sampling of a range of depths. We suspected that distance from glaciers and/or time since glacial recession would affect demersal

community structure, so we also used four strata of glacial history (<5 km from a current tidewater glacier, <5 km from the head of a recently glaciated fjord, >5 km from the head of a fjord and de-glaciated <140 years, de-glaciated >140 years) to ensure that our sampling included a variety of distances and glacial histories. When all combinations of depth, distance from glacier and time since glacial recession strata were present, our goal was to sample each a minimum of four times to obtain an adequate sample size. Selected trawl stations were searched systematically with the vessel's depth sounder to locate flat, obstruction-free areas that could be trawled effectively. In 2002 we used an underwater video camera to preview the bottom due to extensive damage to the nets during 2001.

Sampling in Wrangell-St. Elias was restricted to Icy Bay and Yakutat Bay, in waters within 5.6 km of the shore. Bottom and midwater trawl stations and depths were selected using the same methods as were used for Glacier Bay proper and Glacier Bay outer waters. Floating ice restricted our sampling to the outer portions of both bays.

Nearshore sampling was conducted on all suitable beaches in Glacier Bay proper, Glacier Bay outer waters and Wrangell-St. Elias. The criteria for suitable beaches were defined as those beaches steep enough to be approached by a skiff, free from obstructions or large cobbles, and protected from waves larger than 30 cm tall. Suitable beaches could not be identified without actual inspection, so random selection of beaches was not practical. Instead we systematically searched for beaches to sample by assessing the shoreline of an area from a skiff.

In Sitka and Klondike Gold Rush, park personnel were trained by the principal investigators to conduct nearshore habitat sampling using beach seines. Stations were selected during training and used throughout the summer. The goal was to sample stations bimonthly around the spring tide. However, weather and sea condition prevented park personnel from conducting sampling at times throughout the 2001 season. In Klondike Gold Rush, commercial minnow traps and intertidal searches (turning over rocks at low tide) were also used in order to document the presence of fishes in areas that were unsuitable for beach seining (e.g., rocky intertidal areas). We did not attempt to quantify sampling effort for these methods, and species documented with these methods are included in our results only when they were not detected in trawls or seines.

## Fishing Protocol

Midwater trawling was conducted from the 22 m R/V *Pandalus* in 1999, from the 10 m R/V *David Grey* in 2000, and from the 21 m R/V *Steller* in 2001-2002. In 2001 and 2002 we sampled pelagic habitats in waters <255 m deep with a modified herring trawl. The trawl had a 50 m<sup>2</sup> mouth opening, with the maximum height of 7 m, variable stretched mesh size ranging from 5 cm at the wings to 1 cm at the cod end, and a 3 mm stretched mesh cod end liner. The collecting cup (1000 µm mesh) was detached and emptied at the end of each tow. Average tow duration was 31 minutes, and average distance towed was 3.98 km. Average tow speed was 2.5 kts/h (=75 m/min).

For inventory purposes in 2001-2002, we used an Isaacs-Kidd midwater trawl to sample pelagic fishes within Glacier Bay proper at depths of 255-360 m. This type of net uses a depressor bar to attain fishing depth (Isaacs and Kidd 1953). It had a mouth opening of 2.8 m<sup>2</sup>, was 0.92 m in height, had 1 cm nylon stretched mesh and a 500 µm mesh collecting cup. The same net was used in 2000 for midwater sampling of forage fishes for shallower sampling (<55 m). Average tow duration for all Isaacs-Kidd midwater trawls was 42 minutes, and average distance towed over ground was 3.6 km. The average tow speed was 3.0 kts/h (=91 m/min).

Bottom trawling was conducted from the R/V *Steller* in 2001-2002 and the R/V *David Grey* in 2002. Demersal fishes were sampled using a 3.05 m wide, plumb staff beam trawl with 7 mm stretched mesh, and a 4 mm stretched mesh cod end liner (Gunderson and Ellis 1986). The mouth opening height was 0.78 m. We used two 18 kg lead tip-weights on the beam at depths <170 m, and four tip-weights at depths >170 m. Average tow duration was eight minutes, and the average distance towed was 281 m. Average tow speed was 1.2 kts/h (=36 m/min).

Shallow nearshore habitats in all park units were sampled with beach seines. The nets were 36.6 m long, 2.4 m deep at the mid-point, and tapered to 0.5 m deep at the wings. The seines had wings made of 28 mm nylon stretched mesh and a 6 mm stretch nylon mesh bag in the center (Robards et al. 2003). To deploy the beach seine, the net was set parallel to shore from a skiff, and was pulled in to shore by three or four people. A typical set took between ten to fifteen minutes to deploy from the skiff and pull in to shore.



## Voucher Collection

For all sampling methods, the catch was sorted by species, and the lengths of up to 50 individuals from each species were recorded. When more than 50 individuals from one species were collected, the remaining individuals were counted and recorded as unmeasured (data transferred to Glacier Bay National Park Data Archives, May 2003). Field identifications were made using the reference texts of Baxter (unpublished 1990), Hart (1973), and Mecklenburg et al. (2002). Unidentified specimens were either frozen or preserved in 10% formaldehyde and seawater solution. At least ten representatives from each species were saved as vouchers. Efforts were made to take digital and analog photographs of fish species in the field when time and weather permitted.

All frozen and preserved unidentified or voucher specimens were taken to the lab for further examination. The identification of troublesome groups was aided by comparison with the voucher collection at the Auke Bay Laboratory Museum at the National Marine Fisheries Service's Alaska Fisheries Science Center in Juneau, Alaska and with the help of local experts Bruce Wing and Catherine Mecklenburg.

All voucher specimens from Glacier Bay and Wrangell-St. Elias were fixed in 10% formaldehyde in seawater, rinsed thoroughly with fresh water, and finally preserved in 70% undenatured ethanol. These collections were sent to the University of Alaska Museum in Fairbanks, Alaska (February 2003) for confirmation of identification and final labeling. Sitka and Klondike Gold Rush voucher collections were identified to the lowest possible taxonomic level, fixed in 10% formaldehyde, and transferred to personnel from their respective parks for final curation (October 2001).

## Analyses

Fish abundance was calculated as catch-per-unit-effort (CPUE). We used individual sets as our sample unit for all analyses. We calculated midwater trawl CPUE as the number of fish caught per km towed, as measured with GPS from trawl start and stop (Robards et al. 1999). For Isaacs-Kidd trawls we calculated CPUE as the number of fish per km<sup>3</sup> of volume towed. For this net the volume sampled was calculated from the distance towed (as measured with a flowmeter) multiplied by area of the net opening (2.8 m<sup>2</sup>) (Isaacs and Kidd 1953). Bottom trawl CPUE was standardized as the number of fish caught per km<sup>2</sup> of area towed. Area towed was calculated as the product of distance

towed, the width of the net (3.05 m), and an efficiency coefficient of 0.74 that accounts for the fact that the net is not perfectly efficient (Gunderson and Ellis 1986). Beach seine CPUE was defined simply as the number of fish caught per set.

We estimated the number of species present for each sampled habitat (pelagic, demersal and nearshore) using a similarity-based approach that has been used to assess sampling sufficiency in fish surveys (Cao et al. 2001). This method uses the proportion of similarity among samples to estimate species richness. We randomly divided all samples from a particular habitat into two groups of equal size. If the sample size was an uneven number, we randomly chose one sample to exclude from the calculation. We then estimated the autosimilarity between the two sets of samples with the Jaccard coefficient (JC) as

$$JC = c / (a + b + c)$$

where  $a$  = the number of species present only in the first group,  $b$  = the number of species present only in the second group, and  $c$  = the number of species present in both groups.

We also calculated the average species richness (SR) of each group of samples as

$$SR = 0.5 (a + b) + c$$

The proportion of all species present detected by sampling is correlated with the JC, such that the true number of species present ( $TSR_{tru}$ ) can be estimated as

$$TSR_{tru} = SR / JC.$$

For each park-habitat variation that we sampled we repeated this process ten times, and we present estimates of  $TSR_{tru}$  as mean  $\pm$  SD values calculated from these ten replicates.

Fish community diversity was estimated with the Shannon-Wiener index ( $H'$ ) (Zar 1999). We defined fish habitat associations in Glacier Bay proper using CPUE and  $H'$  as dependent variables, and depth and latitude as independent variables in general linear models (GLMs) with Type-III sums of squares (SAS Institute 2000). Midwater trawl stations were targeted with scientific hydroacoustic gear in 1999 and with a depth sounder in 2001, and we accounted for this difference by using year as a class variable in our analysis of pelagic habitats. Because depth strata varied between years, we nested depth within year for this analysis. Isaacs-Kidd trawls were excluded from this analysis because they are not directly comparable with herring trawl catches. We tested for interaction effects between depth and latitude in GLM analysis of trawl data, and we removed interaction terms from our models at  $P > 0.10$ . Because multiple beach seine

sets at single sites violate assumptions of independence, we averaged data by site for analysis. All CPUE data were  $\log(x+1)$  transformed before analysis to correct for heteroscedasticity, and we set  $\alpha = 0.05$ .

## RESULTS AND DISCUSSION

### Fish Collections

Among the five park units sampled from 1999 to 2002 our total effort was 531 sets (Table 1). Sample stations and CPUE for fishes in midwater, demersal, and nearshore habitats are shown in Figs. 2-4 respectively.

#### *Glacier Bay Proper*

We collected 25,043 fishes in Glacier Bay proper. Most were returned alive to the ocean. We positively identified 80 species from 25 families, while seven specimens could be identified only to the genus level, and four to the family level. We documented the relative abundance of 32 species in pelagic habitats (Tables 2 and 3), 43 species in demersal habitats (Table 4), and 34 species in nearshore habitats (Table 5).

We collected several poorly documented species in Glacier Bay proper. We captured a single specklemouth eelpout (*Lycodapus psarostomatus*; cat. no. 6325, voucher 202) in a midwater trawl on August 7, 2001 near Muir Glacier, 59.07550N; 136.35117W (NAD83) from a depth of 150 m. This is the seventh documented specimen of this species since it was described (Peden and Anderson 1981); five other specimens have been collected in the Bering Sea, and one has previously been collected in Monterey Bay, California. This record also helped to confirm the identity of a specimen collected from British Columbia (C. Mecklenburg pers. comm. Dec. 16, 2002). While this specimen had characters outside the normal range listed for the species (i.e., fewer vomerine teeth than known specimens), experts agree on the identity of the specimen (C. Mecklenburg and A. Peden pers. comm. Dec. 14, 2002). We also collected one shortmast sculpin (*Nautichthys robustus*; cat. no. 6441, voucher 392) on July 12, 2002 in the lower bay, 58.42500N; 135.94945W, (NAD83) at a depth of 66 m. This species has never been recorded from southeast Alaska, though specimens from British Columbia and the Gulf of Alaska near Kodiak have been documented (Mecklenburg, et al. 2002). Finally, we captured one smallmouth ronquil (*Bathymaster leurolepis*; cat. no. 6451, voucher 336) on

July 18, 2002 in Fingers Bay, 58.58162N; 136.18133W, (NAD83) at a depth of 12 m. This is the second confirmed record of this species in southeast Alaska (Mecklenburg et al. 2002).

#### *Glacier Bay Outer Waters*

We collected 20,284 fish from Glacier Bay outer waters. We positively identified 81 species from 22 families in this area, while three specimens were identified to the genus level, and one to the family level. We documented the presence of 28 species in pelagic habitats (Table 6), 56 species in demersal habitats (Table 7), and 27 species in nearshore habitats (Table 8). Notably, five specimens of the rare frog sculpin (*Myoxocephalus stelleri*; cat. no. 6477, vouchers 432 and 484) were collected on August 11, 2002 in a bottom trawl near Excursion Inlet, 58.3965W; 136.5642N (NAD83), at a depth of 5 m. Mecklenburg et al. (2002) lists only six confirmed voucher records in Alaska.

#### *Wrangell-St. Elias, Sitka, and Klondike Gold Rush*

We collected 8,965 fish specimens in Wrangell-St. Elias. These include 31 species from 15 families, and one specimen that was identified to the genus level. We found 16 species in pelagic habitats (Table 9), 14 species in demersal habitats (Table 10), and 14 species in nearshore habitats (Table 11). There were no unusual fish species collected in Wrangell-St. Elias.

In Klondike Gold Rush we collected 1,461 specimens from the nearshore habitat. We identified eleven species from seven families (Table 12). Additionally, we identified three specimens to the genus level, one specimen to the family level, and one larval fish remained unidentified because it was not collected for laboratory examination. We did not find any notably rare specimens.

In Sitka we collected 548 fish specimens and we identified 23 species from 10 families (Table 13). We identified five specimens to the genus level and one to the family level. We did not collect any unexpected marine fish species in Sitka.

## Species Richness

We estimated that the various habitats in the larger parks in our study (Glacier Bay and Wrangell-St. Elias) each contains 19-52 species, while we estimated that nearshore communities at Sitka and Klondike Gold Rush Parks contain 39 and 13 species, respectively (Table 14). We caution that these estimates of species richness are valid only for the habitats actually sampled, and that more species are undoubtedly present in habitats (kelp forest, rocky reefs, etc.) that could not be sampled with our gear. Our estimates of total species present in Wrangell-St. Elias should also be treated with caution because of our limited sampling effort in those waters, and the higher potential bias in the relationship between total species richness and Jaccard's coefficient at very low sample sizes (Cao et al. 2001). In all cases, sampling was restricted largely to summer months, and more species might be detected by sampling in other seasons.

We detected between 59 and 85 percent of estimated total species present in various habitat-park combinations (Table 14). Expected numbers were detected by using the Cao et al. method (see methods). The NPS service-wide goal of documenting the presence of at least 90% of species expected to occur was nearly reached at Klondike Gold Rush, where a full summer of effort (n=32 beach seine sets) was required to document 85% of estimated species present in a very small park (total shoreline of 3.2 km) with relatively homogenous habitat and a relatively depauperate community. Despite the increased sampling effort in larger parks, we could not reach the same detection level. Two years of beach seine sampling in Glacier Bay proper (n=219 sets) resulted in the detection of only 82% of estimated total species. Especially extensive sampling is required to detect a standard proportion of species in situations where species abundance is left-skewed, with a few extremely abundant species and many more rare species (Cao et al. 2001). This effect probably explains the difference between bottom trawls (83% of species detected with 56 sets) and midwater trawls (62% of species detected with 55 sets) in Glacier Bay proper. Cumulative species detection is a logarithmic function of sampling effort (Cao et al. 2001), so it is likely that 90% species detection in all habitats would have required more than twice the sampling effort employed in the current study. Owing to an almost complete lack of data, this could not be determined prior to sampling. The magnitude of effort required for such a comprehensive inventory of marine fishes in these parks is underscored by the size of the

study area: the total coastline of Glacier Bay park (1,897 km) is approximately three times that of the state of Oregon, and the shortest over-the-water distance between the head of Muir Inlet in Glacier Bay proper and the head of Icy Bay in Wrangell-St. Elias (~500 km) is approximately equal to the straight-line distance between San Francisco and Los Angeles.

## Literature Review

To supplement our inventory of fishes in Glacier Bay, we conducted a literature review of historical records from Alaska Department of Fish and Game, National Marine Fisheries Service, International Pacific Halibut Commission, U.S. Geological Survey, and the National Park Service. Local experts were consulted, and we combed through some obscure but important records (e.g., Bousfield and McAllister 1962). We also searched unpublished documentation from the National Marine Fisheries Service Auke Bay Laboratory's museum collection in Juneau, Alaska to find evidence of unreported species. From all these sources, we compiled an annotated list of 160 fish species known to occur in Glacier Bay and nearby waters (Table 15). In total, we found 259 species whose status in Glacier Bay could be designated as 'present', 'possible', or, 'possible but likely rare' (Appendix 1).

A previous review by the Alaska Natural Heritage Program (ANHP) lists "expected" species determined by range listings (Lenz et al. 2002). We compared the ANHP list to Table 15 and *Fishes of Alaska* (Mecklenburg et al. 2002). Of the 313 species on the ANHP list, 13 species were ambiguous entries due to name changes. Thirty-six species were unlikely to be present because they were not reported or confirmed from the study area. Ten species are unlikely to be present because they are generally deep water, offshore species, or they are reported as rare in Alaska (Mecklenburg et al. 2002).

On the other hand, the ANHP list (Lenz et al. 2002) erred on the conservative side by including incidental or occasional species present during El Nino years. These species are important because they represent a baseline for species such as ocean sunfish and whale sharks (C. Soiseth, pers. comm. April 10, 2003). Our examination of the ANHP list found 63 species possibly present and 36 species possibly present but rare according to Mecklenburg et al. (2002).

## Voucher Collections

The 439 vouchers from Glacier Bay represent 93 species identified by the primary author or with the assistance of local experts C. Mecklenburg and B. Wing (Appendix 2). Unidentified specimens are recorded as *Sebastes* sp., *Careproctus* sp., and *Liparis* spp. Juvenile rockfish and snailfish can be very difficult to identify. Diagnostic characters for rockfish include the shape and number of head spines (Kramer and O'Connell 1995). Juvenile rockfish may lose head spines with development (B. Wing, pers. comm. 2001), so the identification of small specimens to species level with certainty can be challenging. The *Careproctus* sp. (unidentified snailfish) sample, while in very good condition, is too small to be certain of its species at this time (C. Mecklenburg, pers. comm. Dec. 14, 2002). The *Liparis* spp. (unidentified snailfish) specimens that were collected are small and very delicate. Seven of fifteen samples contained larval to early juvenile specimens. One of the most comprehensive guides to early life history stages contains complete developmental descriptions for only one species of larval Liparid from the North Pacific, and three genera from the Atlantic and Arctic regions (Matarese et al. 1989). The other *Liparis* spp. were damaged or are too small to reliably count structures. However, they probably represent two very similar species: *L. gibbus* and *L. dennyi*. All voucher specimens that were unidentified at the time of this report will be further examined at the University of Alaska Fairbanks Museum.

The Wrangell-St. Elias collection had 46 vouchers from 24 identified species (Appendix 3). Larval specimens from the genus *Liparis* were also encountered in this collection. Problems with the identification of these snailfish are described above.

There were 40 vouchers collected in nearshore areas from both Sitka and Klondike Gold Rush representing 11 and 23 species, respectively (Appendices 4 and 5). All of these specimens were identified before *Fishes of Alaska* (Mecklenburg et al. 2002) was published. Inexperience and lack of resources were the main reasons for ambiguous identifications. For example, in Klondike Gold *Lepidopsetta* sp. was identified as *Lepidopsetta bilineata* before it was brought to our attention that there has been a revision of the genus (Orr and Matarese 2000). Also, in both Sitka and Klondike Gold Rush, specimens from the genus *Pholis* were initially identified as *Pholis ornata*. However, because there are no formally documented records of this species' occurrence in Alaska,

we feel this specimen should be re-examined. Unfortunately, lack of time and resources prevented us from revisiting the Sitka and Klondike Gold Rush voucher collections in 2002.

#### Habitat in Glacier Bay Proper

We found effects of depth and latitude on fish communities in Glacier Bay proper. Demersal fish diversity ( $H'$ ) and abundance (log CPUE) were both affected by depth and distance from the head of the bay (for which we use latitude as a proxy) (Table 16). Demersal fish abundance declined with increasing depth ( $R^2=0.16$ ), and was higher at the south end of the bay than at the north end ( $R^2=0.25$ ) (Fig. 5). Demersal diversity was higher at the mouth of the bay than at the head of the bay ( $R^2=0.12$ ), and we also found a weak but statistically significant increase in diversity with depth ( $R^2=0.02$ ) (Fig. 5). Depth is typically the most important environmental factor influencing demersal fish abundance and diversity (Abookire and Norcross 1998). The north-south gradient in log CPUE and  $H'$  suggests that demersal fishes become more abundant and more diverse with increasing distance from glaciers.

Habitat relationship correlates were more complicated for the pelagic community. The latitude x depth (year) interaction was significant, indicating an effect on pelagic fish abundance (Table 17). To interpret this interaction effect we plotted pelagic fish abundance and diversity by depth (<50 m and >50 m) and latitude (north of  $58.84^\circ\text{N}$ , the landmark breakpoint for the east and west arms of Glacier Bay proper, and south of  $58.84^\circ\text{N}$ ) (Figs. 6 and 7, respectively). These figures show that abundance was higher at the head of the bay in waters >50 m deep ( $R^2=0.37$ ), but that latitude had little effect on abundance in waters <50 m deep ( $R^2=0.02$ ) (Fig. 6). Abundance also decreased with depth ( $R^2=0.14$ ) more strongly in the southern part of the bay than in the northern part ( $R^2=0.06$ ) (Fig. 6). This interaction between depth and latitude might be an effect of higher turbidity at the head of the bay. Abookire et al. (2002) reported that turbidity was much higher at the head of the bay than at the mouth, and species that are typically found in mesopelagic waters during the day (northern lampfish [*Stenobrachius leucopsarus*] and northern smoothtongue [*Leuroglossus schmidti*]) were found at 10-15 m during the day in these highly turbid waters. Abookire et al. (2002) attributed the failure of mesopelagic species to exhibit diel migration at the head of Glacier Bay to reduced light



penetration caused by glacial silt. However, this was a localized phenomenon present only near Muir Glacier, where turbidity values were higher than anywhere else in Glacier Bay (Abookire et al. 2002). If applicable bay-wide, this phenomenon would presumably cause pelagic fish abundance to be higher at the surface at the head of the bay and at deeper waters at the mouth of the bay, yet we found the opposite situation. From our broad spatial sampling, we found that pelagic fishes are generally more concentrated at depths <50 m near the head of the bay. The latitude x depth (year) interaction was not significant for diversity, which increased with depth (Fig. 7), but was apparently not affected by latitude (Table 16).

### Sampling Bias

There was bias associated with the sampling methods we applied. Different gear types were selected for sampling in different habitats and the efficiency of fish capture varied among the types of gear. In addition, adverse weather conditions, as well as limitations on vessel charter time, resulted in lower sampling effort in some areas relative to others.

With beach seines, we were unable to sample beaches with very low slope angles, those that were unapproachable by skiff, beaches with substrates larger than cobble rock, or beaches exposed to strong wave action. Nonetheless, beach seines are effective for sampling a wide range of fishes from larvae/early juvenile to adults, and very efficient for sampling nearshore habitats (Robards et al. 1999). However, complex habitats such as kelp forests and rocky intertidal were not adequately sampled. For sampling of demersal habitats, the plumb staff beam trawl worked best on flat, obstruction-free bottom types. This resulted in a tendency to select homogeneous bottom habitats for sampling. Nonetheless, this net was used because it has been shown to be highly effective for sampling demersal fishes (Gunderson and Ellis 1986). Uneven, rocky bottoms are otherwise difficult to sample.

The capture efficiency of different gear also varied with mesh size. The appropriate size of mesh used in trawling, for example, depends on the size of the target organisms and the desired tow speed. Small mesh size, while useful for collecting small individuals, creates less flow through the net and more drag. The resulting pressure wave in front of the net may decrease catch efficiency by pushing organisms away from the

mouth of the net. Furthermore, larger fish are able to escape by swimming faster than the small-meshed research nets.

The use of other types of fishing gear, such as gill nets, long-lines and fyke nets—which might have overcome some of the biases noted above— was considered during the planning phase of this project, and re-considered after the first year of sampling. However, we concluded that the time and effort required to apply these additional methods in a statistically meaningful way outweighed the benefits of the sampling (i.e., the likelihood of capturing new species that would not be caught with the gear types already in use). For the time and funds we had available to us, we focused our efforts on sampling with proven methods and gear types.

Some regions of the study area were more thoroughly sampled than others. Although stations were selected randomly, weather conditions were such that some bays and inlets (e.g., Lituya Bay, Excursion Inlet) were over-represented in our sampling while the open Gulf of Alaska coast was under-represented. Also, we only had one limited period in summer of 2002 in which to sample the outer coast with the charter vessel. In addition to weather constraints, the time needed to travel the large distance to Wrangell-St. Elias further reduced the amount of effort we could expend in Glacier Bay's outer waters. Sampling in Glacier Bay proper was also more extensive than Glacier Bay outer waters because data from the 1999-2000 forage fish study was incorporated into our inventory, thereby adding two more summers worth of fishing effort.

Finally, a lack of time and resources were the main cause for inadequate sampling in parks other than Glacier Bay. Per our original study plan, we could afford to spend only seven days sampling in Wrangell-St. Elias. At Klondike Gold Rush and Sitka our study plan called for only one visit to train park staff in methods for using beach seines and preserving specimens so that we could later identify them. Subsequent sampling differed among these parks depending on the time allocated to the project by park staff.

#### Recommendations for Further Research

After combining records from our study with those from historical studies, it seems likely that we have documented in this report well over 90% of the fish species that occur in Glacier Bay proper. Our analysis further suggests that we have documented between 60% and 85% of species in marine habitats of other parks in central and

southeast Alaska. The latter results fall short of our original 90% goal, although it should be noted that prior to our study, there was little or no data available with which to estimate local species diversity, nor calculate the effort required to measure species richness in any of the parks. In other words, we undertook this task without really knowing how much effort it would require. We now know that two short summers of sampling were not adequate to capture 90% of fish species in all of the areas we surveyed. Given the geographic area we were studying, and funding/logistic constraints on sampling effort, we are not surprised with this outcome. However, we have provided a baseline measure of species richness and archive of documented specimens that future studies can now expand upon systematically.

So, our primary recommendation is that more work be conducted in each area. In particular, surveys using the methods described here and conducted during other seasons (especially fall) and over many more years are going to gradually increase the list of species found in each area of study— particularly when those years include extreme cold or warm water conditions that result in shifts of species' distributions to the north or south. If future work includes the use of different gear types to sample less common habitats in each park, the list of species will also increase over time. In the following, we can make some specific recommendations for each park:

### *Glacier Bay*

While Glacier Bay proper was spatially well-sampled during our study, some gaps remain (as noted above). Heterogeneous habitats such as kelp forests and rocky reefs could be sampled using SCUBA transects, pots, gill nets, fyke nets, or bottom trawls modified with roller gear. Future efforts should also include additional sampling of Glacier Bay's outer waters with the same gears used in our study, especially the outer coast between Cape Spencer and Seaotter Creek. Nearshore areas that were not suitable for beach seining, i.e., rocky or wave-washed areas, could be better sampled with pots, gill-nets, or SCUBA, and examined at low tide by searching under rocks and combing the shoreline with small meshed dip nets. Seasonal changes in fish assemblages of the outer coast should also be examined by sampling throughout the year.

### *Wrangell-St. Elias*

Owing to logistic constraints, our sampling of Icy and Yakutat bays was limited in time and space. We recommend further sampling with gear types employed in our study. As in Glacier Bay, sampling of less common habitats with alternative gear (pots, traps, gill-nets, etc.) would also be useful. Extensive floating ice in Icy and Yakutat Bays restricted the areas that we could sample in this study, and we recommend sampling of the upper reaches of the bays by using smaller vessels. In addition to alternative gear mentioned above, minnow traps and intertidal search methods could also be applied in these areas. As in Glacier Bay, this area would also benefit from pelagic, demersal and nearshore sampling during winter, fall and spring seasons.

### *Sitka*

Voucher specimens identified as *Pholis ornata* by the primary author in 2001 should be re-examined. It is likely that these specimens are representatives of the more common *P. laeta* (see discussion under Voucher Collection). Furthermore, given Sitka's exposed location, there is much potential for diversity in the park's relatively small but rich shoreline. We recommend more effort using beach seines, minnow traps, and intertidal searching at low tide throughout the year to better assess nearshore marine fish communities.

### *Klondike Gold Rush*

We feel that specimens identified in 2001 by the primary author as *Lepidopsetta bilineata* and *Pholis ornata* should be confirmed (see discussion under voucher collection). We also recommend continued sampling using beach seines, minnow traps and intertidal searching over time in order to detect marine fish species that may be present during the fall, winter, or spring seasons.

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Table 1. Summary of total effort for all park units and gear types. Abbreviated park units are as follows: Glacier Bay outer waters, GLBA-OW; Glacier Bay proper, GLBA-PR; Klondike Gold Rush, KLGO; Sitka, SITK; Wrangell-St. Elias, WRST. Glacier Bay outer waters are defined as park waters outside of Glacier Bay proper and Glacier Bay proper is defined as park waters north of a line transecting Pt. Carolus and Pt. Gustavus.

Unit	Gear type	Year	Sampling dates	n
GLBA-OW	beach seine	2001	8/14	6
GLBA-OW	beach seine	2002	7/27 - 8/8	11
GLBA-OW	intertidal search	2002	7/23 - 8/8	3
GLBA-OW	beam trawl	2002	7/25 - 8/11	24
GLBA-OW	herring trawl	2001	8/12 - 8/13	11
GLBA-OW	herring trawl	2002	7/26 - 8/12	24
GLBA-PR	beach seine	1999	6/10 - 6/23	74
				14
GLBA-PR	beach seine	2000	5/31 - 8/10	5
GLBA-PR	beam trawl	2001	7/9 - 8/10	47
GLBA-PR	beam trawl	2002	7/12 - 7/21	9
GLBA-PR	herring trawl	1999	6/10 - 6/24	24
GLBA-PR	herring trawl	2001	6/29 - 8/13	25
GLBA-PR	herring trawl	2002	8/13	1
GLBA-PR	Isaac's-Kidd trawl	2001	7/28 - 8/3	5
GLBA-PR	Isaac's-Kidd trawl	2000	7/26 - 8/13	31
KLGO	beach seine	2001	6/19 - 9/12	32
KLGO	intertidal search	2001	7/13, 8/8	3
KLGO	minnow trap	2001	9/12	1
SITK	beach seine	2001	6/18 - 9/18	12
WRST	beach seine	2002	7/29 - 8/4	14
WRST	beam trawl	2002	7/27 - 8/3	9
WRST	herring trawl	2002	7/31 - 8/4	20

Table 2. Relative abundance (mean CPUE, number of fish/km towed) and standard error (SE) of pelagic fishes sampled by midwater trawl (n=50) in Glacier Bay proper. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Clupeidae	<i>Clupea pallasii</i>	Pacific herring	0.415	0.307
Bathylagidae	<i>Leuroglossus schmidti</i>	northern smoothtongue	9.149	2.954
Osmeridae	<i>Mallotus villosus</i>	capelin	57.912	20.240
Osmeridae	<i>Thaleichthys pacificus</i>	eulachon	0.098	0.071
Myctophidae	<i>Stenobranchius leucopsarus</i>	northern lampfish	6.050	2.255
Merluccidae	<i>Merluccius productus</i>	Pacific hake	0.009	0.009
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock	47.298	19.456
Scorpaenidae	<i>Sebastes aleutianus</i>	rougeye rockfish	0.020	0.017
Scorpaenidae	<i>Sebastes sp.</i>	unid. rockfish	0.008	0.008
Cottidae		unid. sculpin	0.391	0.263
Agonidae	<i>Bathyagonus alascanus</i>	gray starsnout	0.013	0.013
Psychrolutidae	<i>Dasycottus setiger</i>	spineyhead sculpin	0.009	0.009
Psychrolutidae	<i>Malacocottus zonurus</i>	darkfin sculpin	0.040	0.022
Psychrolutidae	<i>Psychrolutes sigalutes</i>	soft sculpin	0.013	0.010
Cyclopteridae	<i>Eumicrotremus orbis</i>	Pacific spiny lumpsucker	0.024	0.023
Liparidae	<i>Careproctus gilberti</i>	smalldisk snailfish	0.089	0.035
Liparidae	<i>Paraliparis deani</i>	prickly snailfish	0.072	0.040
Bathymasteridae	<i>Bathymaster sp.</i>	unid. ronquil	0.019	0.019
Zoarcidae	<i>Lycodapus psarostomatus</i>	specklemouth eelpout	0.009	0.009
Zoarcidae	<i>Lycodapus mandibularis</i>	pallid eelpout	1.548	0.676
Zoarcidae	<i>Lycodes palearis</i>	wattled eelpout	0.003	0.003
Stichaeidae	<i>Lumpenella longirostris</i>	longsnout prickleback	0.040	0.024
Stichaeidae	<i>Lumpenus sagitta</i>	snake prickleback	0.013	0.013
Stichaeidae	<i>Lumpenus maculosus</i>	daubed shanny	0.042	0.034
Stichaeidae	<i>Anisarchus medius</i>	stout eelblenny	0.064	0.039
Stichaeidae		unid. larval prickleback	1.961	0.725
Pholidae	<i>Pholis sp.</i>	unid.gunnel	0.026	0.026
Anarrhichadidae	<i>Anarrhichthys ocellatus</i>	wolf eel	0.023	0.023
Ammodytidae	<i>Ammodytes hexapterus</i>	Pacific sand lance	0.690	0.470
Pleuronectidae	<i>Atheresthes stomias</i>	arrowtooth flounder	0.008	0.008
Pleuronectidae	<i>Hippoglossoides elassodon</i>	flathead sole	0.010	0.007
Pleuronectidae	<i>Pleuronichthys decurrens</i>	curlfin sole	0.041	0.041

Table 3. Relative abundance (mean CPUE, number of fish/m<sup>3</sup>) and standard error (SE) of pelagic fishes sampled by Isaac's Kidd midwater trawl (n=36) in Glacier Bay proper. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Clupeidae	<i>Clupea pallasii</i>	Pacific herring	0.009	0.009
Bathylagidae	<i>Leuroglossus schmidti</i>	northern smoothtongue	0.185	0.084
Osmeridae	<i>Mallotus villosus</i>	capelin	4.091	1.219
Osmeridae		unid. larval smelt	0.002	0.002
Salmonidae	<i>Oncorhynchus gorbuscha</i>	pink salmon	0.003	0.003
Myctophidae	<i>Stenobrachius leucopsarus</i>	northern lampfish	0.142	0.109
Myctophidae		unid. lanternfish	0.642	0.273
Merlucciidae	<i>Merluccius productus</i>	Pacific hake	0.013	0.008
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock	5.866	2.569
Scorpaenidae	<i>Sebastes</i> sp.	unid. rockfish	0.003	0.003
Cottidae	<i>Myoxocephalus</i> sp.	larval sculpin	0.052	0.031
Psychrolutidae	<i>Malacocottus zonurus</i>	darkfin sculpin	0.016	0.011
Liparidae	<i>Careproctus gilberti</i>	small disk snailfish	0.003	0.003
Liparidae	<i>Paraliparis deani</i>	prickly snailfish	0.029	0.028
Bathymasteridae		unid. ronquil	0.007	0.007
Zoarcidae	<i>Lycodapus mandibularis</i>	pallid eelpout	0.072	0.045
Stichaeidae	<i>Lumpenella longirostris</i>	longsnout prickleback	0.147	0.077
Stichaeidae	<i>Lumpenus fabricii</i>	slender eelblenny	0.853	0.332
Stichaeidae		unid. larval prickleback	0.002	0.002
Pholidae	<i>Pholis laeta</i>	crescent gunnel	0.003	0.003
Ammodytidae	<i>Ammodytes hexapterus</i>	Pacific sandlance	0.007	0.005
Pleuronectidae	<i>Glyptocephalus zachirus</i>	rex sole	0.001	0.001
Pleuronectidae		unid. righteyed flounder	0.007	0.007

Table 4. Relative abundance (mean CPUE, number of fish/km<sup>2</sup>) and standard error (SE) of demersal fishes sampled by bottom trawl (n=56) in Glacier Bay proper. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Rajidae	<i>Bathyraja interrupta</i>	sandpaper skate	0.055	0.043
Rajidae	<i>Bathyraja sp.</i>	unid. Skate	0.045	0.028
Rajidae	<i>Raja rhina</i>	longnose skate	0.013	0.013
Bathylagidae	<i>Leuroglossus schmidti</i>	northern smoothtongue	0.130	0.071
Osmeridae	<i>Mallotus villosus</i>	capelin	0.176	0.081
Osmeridae	<i>Thaleichthys pacificus</i>	eulachon	0.032	0.023
Osmeridae		unid. larval smelt	0.041	0.023
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock	0.221	0.063
Scorpaenidae	<i>Sebastes sp</i>	unid. rockfish	0.015	0.015
Cottidae	<i>Icelinus borealis</i>	northern sculpin	0.061	0.042
Cottidae	<i>Triglops pingelii</i>	ribbed sculpin	0.062	0.049
Cottidae	<i>Triglops sp.</i>	unid. sculpin	0.008	0.008
Cottidae	<i>Gymnocanthus galeatus</i>	armorhead sculpin	0.061	0.061
Cottidae	<i>Icelus spiniger</i>	thorny sculpin	0.096	0.066
Cottidae	<i>Myoxocephalus polyacanthocephalus</i>	great sculpin	0.008	0.008
Hemitripterae	<i>Hemitripterus bolini</i>	bigmouth sculpin	0.021	0.021
Psychrolutidae	<i>Dasycottus setiger</i>	spineyhead sculpin	1.315	0.337
Psychrolutidae	<i>Malacocottus zonurus</i>	darkfin sculpin	0.021	0.016
Agonidae	<i>Leptagonus frenatus</i>	sawback poacher	0.012	0.012
Agonidae	<i>Podothecus accipenserinus</i>	sturgeon poacher	0.149	0.135
Agonidae	<i>Bathyagonus cf pentacanthus</i>	(bigeye) poacher	0.011	0.011
Agonidae	<i>Bathyagonus nigripinnis</i>	blackfin poacher	0.143	0.073
Agonidae	<i>Bathyagonus infraspinus</i>	spinycheek starsnout	0.070	0.054
Agonidae	<i>Bathyagonus alascanus</i>	gray starsnout	0.902	0.243
Agonidae	<i>Anoplagonus inermis</i>	smooth alligatorfish	0.012	0.012
Cyclopteridae	<i>Eumicrotremus orbis</i>	Pacific spiny lumpsucker	0.037	0.027
Liparidae	<i>Liparis dennyi</i>	marbled snailfish	0.038	0.022
Liparidae	<i>Liparis sp.</i>	unid. snailfish	0.056	0.040
Liparidae	<i>Paraliparis deani</i>	prickly snailfish	0.532	0.314
Liparidae	<i>Careproctus gilberti</i>	smalldisk snailfish	0.084	0.033
Myctophidae	<i>Stenobranchius leucopsarus</i>	northern lampfish	0.120	0.067
Bathymasteridae	<i>Ronquilus jordani</i>	northern ronquil	0.015	0.012
Bathymasteridae	<i>Bathymaster signatus</i>	searcher	0.003	0.003
Zoarcidae	<i>Bothrocara pusillum</i>	alaska eelpout	0.248	0.153
Zoarcidae	<i>Lycodes palearis</i>	wattled eelpout	0.264	0.090
Zoarcidae	<i>Lycodes brevipes</i>	shortfin eelpout	2.552	0.834
Zoarcidae	<i>Lycodapus mandibularis</i>	pallid eelpout	0.094	0.039

Table 4. Continued

Family	Scientific Name	Common Name	Mean CPUE	SE
Stichaeidae	<i>Lumpenus sagitta</i>	snake prickleback	1.312	0.733
Stichaeidae	<i>Lumpenus maculatus</i>	daubed shanny	0.177	0.108
Stichaeidae	<i>Lumpenella longirostris</i>	longsnout prickleback	1.805	0.781
Stichaeidae	<i>Anisarchus medius</i>	stout eelblenny	8.398	5.374
Stichaeidae	<i>Poroclinus rothrocki</i>	whitebarred prickleback	0.044	0.025
Stichaeidae		unid. larval prickleback	0.218	0.122
Pleuronectidae	<i>Lepidopsetta bilineata</i>	southern rock sole	0.371	0.205
Pleuronectidae	<i>Hippoglossoides elassodon</i>	flathead sole	1.821	0.525
Pleuronectidae	<i>Atheresthes stomias</i>	arrowtooth flounder	0.082	0.044
Pleuronectidae	<i>Limanda aspera</i>	yellowfin sole	0.033	0.017
Pleuronectidae	<i>Microstomus pacificus</i>	dover sole	0.295	0.116
Pleuronectidae	<i>Glyptocephalus zachirus</i>	rex sole	1.605	0.366
Pleuronectidae		unid. righteyed flounder	0.016	0.016
Pleuronectidae		unid. larval fish	0.021	0.015

Table 5. Relative abundance (mean CPUE, number of fish/set) and standard error (SE) of nearshore fishes sampled by beach seine (n=219) in Glacier Bay proper. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Clupeidae	<i>Clupea palasii</i>	Pacific herring	2.155	0.655
Osmeridae	<i>Mallotus villosus</i>	capelin	2.418	0.790
Salmonidae	<i>Oncorhynchus clarkii</i>	cutthroat trout	0.018	0.018
Salmonidae	<i>Oncorhynchus kisutch</i>	coho salmon	0.461	0.160
Salmonidae	<i>Oncorhynchus keta</i>	chum salmon	0.386	0.186
Salmonidae	<i>Oncorhynchus nerka</i>	sockeye salmon	0.436	0.201
Salmonidae	<i>Oncorhynchus gorbuscha</i>	pink salmon	4.482	1.003
Salmonidae	<i>Salvelinus malma</i>	Dolly Varden char	1.286	0.265
Gadidae	<i>Gadus macrocephalus</i>	Pacific cod	0.068	0.047
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock	1.045	0.482
Gasterosteidae	<i>Gasterosteus aculeatus</i>	threespine stickleback	0.027	0.013
Hexagrammidae	<i>Hexagrammos lagocephalus</i>	rock greenling	0.005	0.005
Hexagrammidae	<i>Hexagrammos octogrammus</i>	masked greenling	0.005	0.005
Hexagrammidae	<i>Hexagrammos stelleri</i>	whitespotted greenling	0.023	0.014
Hexagrammidae	<i>Hexagrammos decagrammus</i>	kelp greenling	0.159	0.115
Hexagrammidae	<i>Hexagrammos sp.</i>	unid. greenling	0.032	0.012
Hexagrammidae	<i>Ophiodon elongatus</i>	lingcod	0.005	0.005
Cottidae	<i>Hemilepidotus spinosus</i>	brown Irish lord	0.014	0.010
Cottidae	<i>Enophrys bison</i>	buffalo sculpin	0.032	0.012
Cottidae	<i>Gymnocanthus galeatus</i>	armorhead sculpin	0.273	0.164
Cottidae	<i>Icelinus borealis</i>	northern sculpin	0.014	0.008
Cottidae	<i>Leptocottus armatus</i>	Pacific staghorn sculpin	0.336	0.273
Cottidae	<i>Myoxocephalus scorpius</i>	shorthorn sculpin	0.009	0.006
Cottidae	<i>Myoxocephalus polyacanthocephalus</i>	great sculpin	1.405	0.255
Cottidae		unid. sculpin	0.200	0.116
Hemitripterae	<i>Blepsias cirrhosus</i>	silverspotted sculpin	0.141	0.099
Psychrolutidae	<i>Psychrolutes paradoxus</i>	tadpole sculpin	0.014	0.008
Liparidae	<i>Liparis cyclopus</i>	ribbon snailfish	0.005	0.005
Liparidae	<i>Liparis sp.</i>	unid. snailfish	0.041	0.016
Stichaedae	<i>Lumpenus sagitta</i>	snake prickleback	1.182	0.328
Stichaedae	<i>Lumpenus fabricii</i>	slender eelblenny	0.968	0.339
Pholidae	<i>Apodichthys flavidus</i>	penpoint gunnel	0.005	0.005
Pholidae	<i>Pholis laeta</i>	crescent gunnel	0.136	0.054
Ammodytidae	<i>Ammodytes hexapterus</i>	Pacific sand lance	4.573	1.122
Pleuronectidae	<i>Isopsetta isolepis</i>	butter sole	0.368	0.170
Pleuronectidae	<i>Parophrys vetulus</i>	English sole	0.223	0.182
Pleuronectidae	<i>Platichthys stellatus</i>	starry flounder	0.095	0.024
Pleuronectidae	<i>Lepidopsetta sp.</i>	unid. rock sole	1.564	0.409

Table 6. Relative abundance (mean CPUE, number of fish/km towed) and standard error (SE) of pelagic fishes sampled by herring trawl (n=36) in Glacier Bay outer waters. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Clupeidae	<i>Clupea pallasii</i>	Pacific herring	191.854	186.683
Bathylagidae	<i>Leuroglossus schmidti</i>	northern smoothtongue	0.105	0.096
Osmeridae	<i>Hypomesus pretiosus</i>	surf smelt	0.017	0.017
Osmeridae	<i>Mallotus villosus</i>	capelin	111.222	52.258
Osmeridae	<i>Thaleichthys pacificus</i>	eulachon	1.564	0.729
Salmonidae	<i>Oncorhynchus gorbuscha</i>	pink salmon	2.119	2.088
Myctophidae	<i>Diaphus theta</i>	California headlightfish	0.004	0.004
Myctophidae	<i>Stenobranchius leucopsarus</i>	northern lampfish	5.774	3.056
Gadidae	<i>Microgadus proximus</i>	Pacific tomcod	0.021	0.021
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock	5.041	1.825
Scorpaenidae	<i>Sebastes aleutianus</i>	rougeye rockfish	0.031	0.031
Cottidae	<i>Artedius fenestralis</i>	padded sculpin	0.014	0.014
Cottidae	<i>Blepsias bilobus</i>	crested sculpin	0.508	0.230
Psychrolutidae	<i>Psychrolutes sigalutes</i>	soft sculpin	0.010	0.008
Agonidae	<i>Pallasina barbata</i>	tubenose poacher	0.021	0.021
Cyclopteridae	<i>Eumicrotremus orbis</i>	Pacific spiny lumpsucker	0.059	0.042
Liparidae	<i>Liparis sp.</i>	unid. snailfish	0.093	0.057
Zoarcidae	<i>Bothrocara pusillum</i>	alaska eelpout	0.031	0.031
Zoarcidae	<i>Lycodapus mandibularis</i>	pallid eelpout	0.031	0.031
Stichaeidae	<i>Lumpenella longirostris</i>	longsnout prickleback	0.252	0.217
Stichaeidae	<i>Lumpenus sagitta</i>	snake prickleback	0.641	0.486
Stichaeidae	<i>Lumpenus maculatus</i>	daubed shanny	3.646	2.015
Stichaeidae	<i>Anisarchus medius</i>	stout eelblenny	0.230	0.216
Trichodontidae	<i>Trichodon trichodon</i>	Pacific sandfish	13.147	7.833
Ammodytidae	<i>Ammodytes hexapterus</i>	Pacific sand lance	0.049	0.036
Pleuronectidae	<i>Atheresthes stomias</i>	arrowtooth flounder	0.010	0.007
Pleuronectidae	<i>Glyptocephalus zachirus</i>	rex sole	0.023	0.017
Pleuronectidae	<i>Hippoglossoides ellassodon</i>	flathead sole	0.036	0.021
Pleuronectidae	<i>Lepidopsetta sp.</i>	unid. rock sole	0.006	0.006
Pleuronectidae	<i>Parophrys vetulus</i>	English sole	0.002	0.002
		unid. larval fish	0.044	0.032

Table 7. Relative abundance (mean CPUE, number of fish/km<sup>2</sup>) and standard error (SE) of demersal fishes sampled by bottom trawl (n=24) in Glacier Bay outer waters. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Chimaeridae	<i>Hydrolagus colliei</i>	spotted ratfish	0.119	0.071
Clupeidae	<i>Clupea pallasii</i>	Pacific herring	0.014	0.014
Bathylagidae	<i>Leuroglossus schmidti</i>	northern smoothtongue	0.024	0.024
Osmeridae	<i>Thaleichthys pacificus</i>	eulachon	0.033	0.033
Myctophidae	<i>Stenobranchius leucopsarus</i>	northern lampfish	0.034	0.034
Gadidae	<i>Gadus macrocephalus</i>	Pacific cod	0.073	0.054
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock	2.824	1.487
Scorpaenidae	<i>Sebastes aleutianus</i>	rougeye rockfish	0.740	0.500
Scorpaenidae	<i>Sebastes sp.</i>	unid. rockfish	0.033	0.033
Hexagrammidae	<i>Hexagrammos decagrammus</i>	kelp greenling	0.019	0.019
Cottidae	<i>Radulinus asprellus</i>	slim sculpin	0.147	0.070
Cottidae	<i>Triglops pingelii</i>	ribbed sculpin	0.087	0.074
Cottidae	<i>Triglops macellus</i>	roughspine sculpin	0.345	0.200
Cottidae	<i>Icelus spiniger</i>	thorny sculpin	0.018	0.018
Cottidae	<i>Icelinus borealis</i>	northern sculpin	0.016	0.016
Cottidae	<i>Gymnocanthus galeatus</i>	armorhead sculpin	0.292	0.292
Cottidae	<i>Gymnocanthus pistilliger</i>	threaded sculpin	0.235	0.180
Cottidae	<i>Enophrys cf diceraus</i>	(antlered) sculpin	0.097	0.097
Cottidae	<i>Myoxocephalus stelleri</i>	frog sculpin	0.082	0.082
Cottidae	<i>Myoxocephalus polyacanthocephalus</i>	great sculpin	0.325	0.253
Hemitripteridae	<i>Hemitripterus bolini</i>	bigmouth sculpin	0.057	0.040
Hemitripteridae	<i>Nautichthys pribilovius</i>	eyeshade sculpin	0.049	0.049
Psychrolutidae	<i>Dasycottus setiger</i>	spineyhead sculpin	0.742	0.349
Psychrolutidae	<i>Psychrolutes paradoxus</i>	tadpole sculpin	0.065	0.045
Agonidae	<i>Bathyagonus infraspinus</i>	spinycheek starsnout	0.323	0.277
Agonidae	<i>Bathyagonus alascanus</i>	gray starsnout	0.644	0.333
Agonidae	<i>Pallasina barbata</i>	tubenose poacher	0.030	0.021
Agonidae	<i>Podothecus accipenserinus</i>	sturgeon poacher	0.363	0.331
Cyclopteridae	<i>Aptocyclus ventricosus</i>	smooth lumpsucker	0.076	0.055
Cyclopteridae	<i>Eumicrotremus orbis</i>	Pacific spiny lumpsucker	0.031	0.031
Liparidae	<i>Liparis dennyi</i>	marbled snailfish	0.024	0.024
Liparidae	<i>Liparis cyclopus</i>	ribbon snailfish	0.016	0.016
Liparidae	<i>Liparis fucensis</i>	slipskin snailfish	0.054	0.037
Liparidae	<i>Liparis gibbus</i>	variegated snailfish	0.024	0.024
Liparidae	<i>Liparis sp.</i>	unid. Snailfish	0.322	0.152
Bathymasteridae	<i>Bathymaster signatus</i>	searcher	0.579	0.273
Bathymasteridae	<i>Ronquilus jordani</i>	northern ronquil	0.139	0.079
Zoarcidae	<i>Lycodes brevipes</i>	shortfin eelpout	7.473	4.630



Table 7. Continued

Family	Scientific Name	Common Name	Mean CPUE	SE
Zoarcidae	<i>Lycodes palearis</i>	wattled eelpout	0.292	0.143
Zoarcidae	<i>Lycodes pacificus</i>	blackbelly eelpout	0.815	0.531
Stichaeidae	<i>Lumpenella longirostris</i>	longsnout prickleback	8.096	3.764
Stichaeidae	<i>Lumpenus sagitta</i>	snake prickleback	7.827	4.182
Stichaeidae	<i>Lumpenus maculatus</i>	daubed shanny	1.982	0.931
Stichaeidae	<i>Stichaeus punctatus</i>	Arctic shanny	0.033	0.033
Stichaeidae	<i>Anisarchus medius</i>	stout eelblenny	9.402	3.043
Stichaeidae	<i>Poroclinus rothrocki</i>	whitebarred prickleback	1.186	0.581
Pholidae	<i>Pholis laeta</i>	crescent gunnel	0.049	0.049
Pleuronectidae	<i>Atheresthes stomias</i>	arrowtooth flounder	1.226	0.695
Pleuronectidae	<i>Glyptocephalus zachirus</i>	rex sole	1.145	0.379
Pleuronectidae	<i>Hippoglossoides elassondon</i>	flathead sole	12.403	4.560
Pleuronectidae	<i>Hippoglossus stenolepis</i>	Pacific halibut	0.080	0.045
Pleuronectidae	<i>Isopsetta isolepis</i>	butter sole	0.166	0.095
Pleuronectidae	<i>Lepidopsetta bilineata</i>	southern rock sole	3.935	2.134
Pleuronectidae	<i>Lyopsetta exilis</i>	slender sole	0.035	0.035
Pleuronectidae	<i>Microstomus pacificus</i>	dover sole	0.744	0.261
Pleuronectidae	<i>Parophrys vetulus</i>	English sole	0.115	0.115
Pleuronectidae	<i>Limanda aspera</i>	yellowfin sole	0.842	0.432
Pleuronectidae	<i>Psettichthys melanosticus</i>	sand sole	0.249	0.113

Table 8. Relative abundance (mean CPUE, number of fish/set) and standard error (SE) of nearshore fishes sampled by beach seine (n=17) in Glacier Bay outer waters. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Clupeidae	<i>Clupea pallasii</i>	Pacific herring	6.235	4.850
Osmeridae	<i>Hypomesus pretiosus</i>	surf smelt	3.118	2.877
Osmeridae	<i>Mallotus villosus</i>	capelin	18.882	11.495
Osmeridae	<i>Thaleichthys pacificus</i>	eulachon	1.176	1.176
Salmonidae	<i>Oncorhynchus nerka</i>	sockeye salmon	0.176	0.176
Salmonidae	<i>Oncorhynchus gorbuscha</i>	pink salmon	0.529	0.412
Salmonidae	<i>Oncorhynchus kisutch</i>	coho salmon	0.706	0.491
Salmonidae	<i>Oncorhynchus keta</i>	chum salmon	0.882	0.766
Salmonidae	<i>Salvelinus malma</i>	Dolly Varden char	0.941	0.441
Gadidae	<i>Gadus macrocephalus</i>	Pacific cod	0.059	0.059
Hexagrammidae	<i>Hexagrammos stelleri</i>	whitespotted greenling	0.176	0.176
Hexagrammidae	<i>Hexagrammos lagocephalus</i>	rock greenling	0.412	0.412
Cottidae	<i>Artedius fenestralis</i>	padded sculpin	0.529	0.365
Cottidae	<i>Clinocottus acuticeps</i>	sharpnose sculpin	0.059	0.059
Cottidae	<i>Enophrys bison</i>	buffalo sculpin	0.235	0.182
Cottidae	<i>Leptocottus armatus</i>	Pacific staghorn sculpin	0.059	0.059
Cottidae	<i>Myoxocephalus polyacanthocephalus</i>	great sculpin	1.647	0.664
Cottidae	<i>Oligocottus maculosus</i>	tidepool sculpin	0.235	0.106
Psychrolutidae	<i>Psychrolutes sigalutes</i>	soft sculpin	0.294	0.187
Agonidae	<i>Pallasina barbata</i>	tubenose poacher	0.176	0.128
Stichaeidae	<i>Lumpenus sagitta</i>	snake prickleback	0.118	0.118
Pholidae	<i>Apodichthys flavidus</i>	penpoint gunnel	0.059	0.059
Pholidae	<i>Pholis laeta</i>	crescent gunnel	0.353	0.191
Trichodontidae	<i>Trichodon trichodon</i>	Pacific sandfish	0.059	0.059
Pleuronectidae	<i>Lepidopsetta bilineata</i>	southern rock sole	0.059	0.059
Pleuronectidae	<i>Parophrys vetulus</i>	English sole	1.118	1.118
Pleuronectidae	<i>Platichthys stellatus</i>	starry flounder	1.353	1.007
		unid. larval fish	0.235	0.136

Table 9. Relative abundance (mean CPUE, number of fish/km) and standard error (SE) of pelagic fishes sampled by herring trawl (n=20) in Wrangell-St. Elias Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Clupeidae	<i>Clupea pallasii</i>	Pacific herring	0.143	0.081
Osmeridae	<i>Mallotus villosus</i>	capelin	105.225	44.496
Osmeridae	<i>Spirinchus thaleichthys</i>	longfin smelt	0.110	0.066
Osmeridae	<i>Thaleichthys pacificus</i>	eulachon	1.920	6.314
Salmonidae	<i>Oncorhynchus gorbuscha</i>	pink salmon	0.142	0.104
Gadidae	<i>Gadus macrocephalus</i>	Pacific cod	0.109	0.096
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock	5.535	3.561
Psychrolutidae	<i>Psychrolutes sigalutes</i>	soft sculpin	0.696	0.534
Cyclopteridae	<i>Eumicrotremus orbis</i>	Pacific spiny lumpsucker	0.022	0.022
Zoarcidae	<i>Lycodes palearis</i>	wattled eelpout	0.012	0.012
Stichaeidae	<i>Lumpenus sagitta</i>	snake prickleback	0.442	0.317
Stichaeidae	<i>Lumpenus maculatus</i>	daubed shanny	0.810	0.582
Stichaeidae	<i>Anisarchus medius</i>	stout eelblenny	26.536	25.209
Trichodontidae	<i>Trichodon trichodon</i>	Pacific sandfish	46.991	22.422
Ammodytidae	<i>Ammodytes hexapterus</i>	Pacific sand lance	0.111	0.111
Pleuronectidae	<i>Lyopsetta exilis</i>	slender sole	0.055	0.055

Table 10. Relative abundance (mean CPUE, number of fish/km<sup>2</sup>) and standard error (SE) of demersal fishes sampled by bottom trawl (n=9) in Wrangell-St. Elias. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Osmeridae	<i>Mallotus villosus</i>	capelin	0.353	0.205
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock	0.046	0.046
Hemitripterae	<i>Hemitripterus bolini</i>	bigmouth sculpin	0.112	0.075
Psychrolutidae	<i>Dasycottus setiger</i>	spineyhead sculpin	0.470	0.238
Cyclopteridae	<i>Eumicrotremus orbis</i>	Pacific spiny lumpsucker	0.092	0.092
Liparidae	<i>Liparis sp.</i>	unid. snailfish	0.160	0.160
Zoarcidae	<i>Lycodes palearis</i>	wattled eelpout	1.053	0.416
Zoarcidae	<i>Lycodes brevipes</i>	shortfin eelpout	11.437	9.045
Stichaeidae	<i>Lumpenella longirostris</i>	longsnout prickleback	7.421	4.150
Stichaeidae	<i>Lumpenus maculatus</i>	daubed shanny	0.080	0.080
Stichaeidae	<i>Lumpenus sagitta</i>	snake prickleback	1.065	0.770
Stichaeidae	<i>Anisarchus medius</i>	stout eelblenny	10.205	7.047
Pleuronectidae	<i>Atheresthes stomias</i>	arrowtooth flounder	0.080	0.080
Pleuronectidae	<i>Hippoglossoides elassodon</i>	flathead sole	0.080	0.080
Pleuronectidae	<i>Microstomus pacificus</i>	dover sole	0.382	0.317

Table 11. Relative abundance (mean CPUE, number of fish/tow) and standard error (SE) of nearshore fishes sampled by beach seine (n=14) in Wrangell-St. Elias. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Clupeidae	<i>Clupea pallasii</i>	Pacific herring	83.750	82.933
Osmeridae	<i>Hypomesus pretiosus</i>	surf smelt	0.833	0.833
Osmeridae	<i>Mallotus villosus</i>	capelin	4.583	4.405
Salmonidae	<i>Oncorhynchus gorbuscha</i>	pink salmon	6.583	5.813
Hexagrammidae	<i>Hexagrammos lagocephalus</i>	rock greenling	0.083	0.083
Hexagrammidae	<i>Hexagrammos stelleri</i>	whitespotted greenling	0.417	0.336
Cottidae	<i>Enophrys bison</i>	buffalo sculpin	0.083	0.083
Cottidae	<i>Myoxocephalus polyacanthocephalus</i>	great sculpin	0.250	0.179
Cottidae	<i>Oligocottus maculosus</i>	tidepool sculpin	0.417	0.193
Stichaeidae	<i>Lumpenus sagitta</i>	snake prickleback	0.250	0.131
Pholidae	<i>Pholis laeta</i>	crescent gunnel	0.083	0.083
Trichodontidae	<i>Trichodon trichodon</i>	Pacific sandfish	0.250	0.250
Ammodytidae	<i>Ammodytes hexapterus</i>	Pacific sand lance	3.500	2.439
Pleuronectidae	<i>Platichthys stellatus</i>	starry flounder	0.167	0.112

Table 12. Relative abundance (mean CPUE, number of fish/tow) of nearshore fishes sampled by beach seine (n=32) in Klondike Gold Rush. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

\* minnow trap (n=1) or intertidal search (n=3) catch could not be quantified

Family	Scientific Name	Common Name	Mean CPUE	SE
Osmeridae	<i>Mallotus villosus</i>	capelin	7.688	7.372
Salmonidae	<i>Oncorhynchus gorbuscha</i>	pink salmon	1.500	0.917
Salmonidae	<i>Oncorhynchus tshawytscha</i>	chinook salmon	0.031	0.031
Salmonidae	<i>Oncorhynchus keta</i>	chum salmon	0.250	0.191
Salmonidae	<i>Oncorhynchus sp.</i>	unid. salmon	0.031	0.031
Salmonidae	<i>Salvelinus malma</i>	Dolly Varden char	4.097	0.987
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock	0.031	0.031
Cottidae	<i>Leptocottus armatus</i>	Pacific staghorn sculpin	20.344	7.809
Cottidae	<i>Myoxocephalus polyacanthocephalus</i>	great sculpin	0.156	0.128
Cottidae		unid. sculpin	0.031	0.031
Sticheaidae	<i>Anoplarchus purpurescens</i>	high cockscomb	*	
Pholidae	<i>Pholis laeta</i>	crescent gunnel	*	
Pholidae	<i>Pholis sp.</i>	unid. gunnel	*	
Pleuronectidae	<i>Platichthys stellatus</i>	starry flounder	11.594	3.842
Pleuronectidae	<i>Lepidopsetta sp.</i>	unid. rock sole	*	
		unid. larval fish	0.031	0.031

Table 13. Relative abundance (mean CPUE, number of fish/tow) and standard error (SE) of nearshore fishes sampled by beach seine (n=12) in Sitka. Species are arranged taxonomically according to *Fishes of Alaska* (Mecklenberg et al. 2002).

Family	Scientific Name	Common Name	Mean CPUE	SE
Salmonidae	<i>Oncorhynchus gorbuscha</i>	pink salmon	12.833	2.470
Salmonidae	<i>Oncorhynchus tshawytscha</i>	chinook salmon	0.417	0.120
Salmonidae	<i>Oncorhynchus keta</i>	chum salmon	0.083	0.024
Salmonidae	<i>Oncorhynchus kisutch</i>	coho salmon	1.417	0.313
Salmonidae	<i>Oncorhynchus sp.</i>	unid. salmon	0.083	0.024
Gadidae	<i>Gadus macrocephalus</i>	Pacific cod	0.250	0.052
Aulorhynchidae	<i>Aulorhynchus flavidus</i>	tubesnout	0.417	0.083
Scorpaenidae	<i>Sebastes sp. (cf. proroclinus)</i>	unid. rockfish (redstripe)	0.083	0.024
Hexagrammidae	<i>Hexagrammos stelleri</i>	whitespotted greenling	0.083	0.024
Hexagrammidae	<i>Hexagrammos lagocephalus</i>	rock greenling	0.167	0.032
Hexagrammidae	<i>Hexagrammos octogrammus</i>	masked greenling	2.917	0.602
Hexagrammidae	<i>Hexagrammos sp.</i>	unid. greenling	1.083	0.183
Cottidae	<i>Artedius fenestralis</i>	padded sculpin	0.083	0.024
Cottidae	<i>Enophrys bison</i>	buffalo sculpin	0.833	0.127
Cottidae	<i>Hemilepidotus sp.</i>	unid. Irish lord	0.167	0.048
Cottidae	<i>Hemilepidotus hemilepidotus</i>	red Irish lord	0.250	0.052
Cottidae	<i>Leptocottus armatus</i>	Pacific staghorn sculpin	1.083	0.165
Cottidae	<i>Myoxocephalus polyacanthocephalus</i>	great sculpin	0.333	0.054
Cottidae	<i>Oligocottus maculosus</i>	tidepool sculpin	0.167	0.032
Cottidae	<i>Scorpaenichthys marmoratus</i>	cabazon	0.083	0.024
Cottidae	<i>Synchirus gilli</i>	manacled sculpin	0.333	0.096
Cottidae		unid. sculpin	0.083	0.024
Hemitripterae	<i>Blepsias cirrhosus</i>	silverspotted sculpin	0.333	0.065
Agonidae	<i>Pallasina barbata</i>	tubenose poacher	7.000	1.866
Embiotocidae	<i>Cymatogaster aggregata</i>	shiner perch	1.417	0.383
Pholidae	<i>Apodichthys flavidus</i>	penpoint gunnel	0.250	0.052
Pholidae	<i>Pholis laeta</i>	crescent gunnel	0.750	0.072
Pholidae	<i>Pholis sp.</i>	unid. gunnel	0.083	0.024
Pleuronectidae	<i>Platichthys stellatus</i>	starry flounder	1.167	0.251

Table 14. Estimates of mean community diversity (Shannon-Weiner index) with standard error (SE), total species detected, and estimated species richness by study unit and habitat. Abbreviated park units are as follows: Glacier Bay proper, GLBA-PR; Glacier Bay outer waters, GLBA-OW; Wrangell-St. Elias, WRST; Klondike Gold Rush, KLGO; Sitka, SITK. Note that standard deviation (SD) of estimated total species present is a measure of variability among total species estimates generated from ten measures of sample autosimilarity.

Unit	Habitat	<u>Shannon- Wiener Index</u>		Total species documented	<u>Estimated total species</u>		Proportion of estimated species documented (%)
		Mean	SE		Mean	SD	
GLBA-PR	Demersal	1.30	0.07	43	52	3	83
	Nearshore	0.66	0.03	36	44	1	82
	Pelagic	0.77	0.12	30	49	3	62
GLBA-OW	Demersal	1.01	0.14	56	80	7	70
	Nearshore	1.47	0.14	27	43	4	62
	Pelagic	0.64	0.08	28	41	3	68
WRST	Demersal	0.89	0.12	14	19	3	73
	Nearshore	0.45	0.12	14	22	3	63
	Pelagic	0.56	0.10	16	21	2	75
KLGO	Nearshore	0.68	0.07	11	13	1	85
SITK	Nearshore	1.01	0.16	23	39	3	59



Table 15. Species list for Glacier Bay, organized in taxonomic order, with associated location data and comments for species caught in unquantifiable tows or in other studies. Asterisk (\*) indicates species is represented in the 2001-2002 Glacier Bay voucher collection.

Family	Scientific Name	Common Name	Location	Comments
Myxinidae	<i>Epatatretus stoutii</i>	Pacific hagfish		Lenz et al. 2002
Chimaeridae	<i>Hydrolagus colliiei</i>	spotted ratfish	58.30425N; 136.8112W	
Scyliorhinidae	<i>Apisturus brunneus</i>	brown cat shark	Off Icy Point	Mecklenburg et al. 2002
Lamnidae	<i>Lamna ditropis</i>	salmon shark	Pleasant Island, Icy Strait	caught 11/30/71, Streveler, pers. comm. 1/15/03
Lamnidae	<i>Carcharodon carcharias</i>	white shark	Cross Sound	Mecklenburg et al. 2002
Dalatidae	<i>Somniosus pacificus</i>	Pacific sleeper shark	58.9441N; 136.9004W	unpublished Taggart 2002 7/27/67, Streveler, pers. comm. 1/15/03; Bishop et al. 1993
Squalidae	<i>Squalus acanthias</i>	spiney dogfish	upper Dundas Bay	*
Rajidae	<i>Bathyraja interrupta</i>	sandpaper skate		*
Rajidae	<i>Bathyraja trachurs</i>	black skate		Lenz et al. 2002
Rajidae	<i>Raja binoculata</i>	big skate	Lituya Bay	caught with hook and line 8/9/02, Arimitsu
Rajidae	<i>Raja rhina</i>	longnose skate	58.93167N; 136.0943W	*
Clupeidae	<i>Clupea pallasii</i>	Pacific herring		*
Esocidae	<i>Esox lucius</i>	northern pike		Lindsey and McPhail 1986
Bathylagidae	<i>Leuroglossus schmidti</i>	northern smoothtongue		*
Osmeridae	<i>Hypomesus pretiosus</i>	surf smelt		*
Osmeridae	<i>Mallotus villosus</i>	capelin		*
Osmeridae	<i>Spirinchus starksi</i>	night smelt	59.13042N; 138.7719W	NMFS cruise 199601
Osmeridae	<i>Spirinchus thaleichthys</i>	longfin smelt	58.86239N; 137.9784W	NMFS cruise 199601
Osmeridae	<i>Thaleichthys pacificus</i>	eulachon		*
Coregoninae	<i>Thymallus arcticus</i>	Arctic grayling		Lindsey and McPhail 1986
Salmonidae	<i>Oncorhynchus gorbuscha</i>	pink salmon		*
Salmonidae	<i>Oncorhynchus keta</i>	chum salmon	58.2345N; 136.5430W	Bousfield and McAllister 1962
Salmonidae	<i>Oncorhynchus kisutch</i>	coho salmon		*
Salmonidae	<i>Oncorhynchus nerka</i>	sockeye salmon	58.2345N; 136.5431W	Bousfield and McAllister 1962
Salmonidae	<i>Onchrhynchus clarkii</i>	cutthroat trout	58.4675N; 135.9033W	Robards 1999
Salmonidae	<i>Oncorhynchus mykiss</i>	rainbow trout		Streveler, pers comm. 1/15/03
Salmonidae	<i>Salmo salar</i>	Atlantic salmon		Lenz et al. 2002
Salmonidae	<i>Salvelinus malma</i>	Dolly Varden char		*
Scopelarchidae	<i>Benthalbella dentata</i>	northern pearleye	Icy Strait	Mecklenburg et al. 2002
Myctophidae	<i>Diaphus theta</i>	California headlampfish		*
Myctophidae	<i>Stenobranchius leucopsarus</i>	northern lampfish		*
Lampridae	<i>Lampris guttatus</i>	spotted opah	La Perouse Glacier	Mecklenburg et al. 2002
Merlucciidae	<i>Merluccius productus</i>	Pacific hake	58.0245N; 136.1607W	
Gadidae	<i>Gadus macrocephalus</i>	Pacific cod		*
Gadidae	<i>Microgadus proximus</i>	Pacific tomcod		*
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock		*
Scomberesocidae	<i>Cololabis saira</i>	Pacific saury	Cross Sound	stomach contents of coho salmon AB79-56
Aulorhynchidae	<i>Aulorhynchus flavidus</i>	tubesnout		Soiseth 1995

Table 15. Continued

Asterisk (\*) indicates species is represented in the 2001-2002 Glacier Bay voucher collection

Family	Scientific Name	Common Name	Location	Comments
Gasterosteidae	<i>Gasterosteus aculeatus</i>	threespine stickleback	58.5078N; 135.9300W	Robards 1999
Scorpaenidae	<i>Sebastolobus alascanus</i>	shortspine thornyhead	off Lituya Bay	AB63-31
Scorpaenidae	<i>Sebastes aleutianus</i>	rougeye rockfish		*
Scorpaenidae	<i>Sebastes alutus</i>	Pacific ocean perch		*
Scorpaenidae	<i>Sebastes babcocki</i>	redbanded rockfish	58.6333N; 136.1667W	Bishop et al. 1995, 0.3% of total catch
Scorpaenidae	<i>Sebastes borealis</i>	shortraker rockfish		Lenz et al. 2002
Scorpaenidae	<i>Sebastes brevispinus</i>	silvergry rockfish	58.6333N; 136.1667W	Bishop et al. 1995, 0.3% of total catch
Scorpaenidae	<i>Sebastes ciliatus</i>	dusky rockfish	58.6333N; 136.1667W	Bishop et al. 1995, 0.3% of total catch
Scorpaenidae	<i>Sebastes crameri</i>	darkblotched rockfish	58.487N; 137.53533W	NMFS cruise 198702
Scorpaenidae	<i>Sebastes flavidus</i>	yellowtail rockfish		Lenz et al. 2002
Scorpaenidae	<i>Sebastes jordani</i>	shortbelly rockfish		Lenz et al. 2002
Scorpaenidae	<i>Sebastes melanops</i>	black rockfish	58.86239N; 137.9784W	NMFS cruise 199601
Scorpaenidae	<i>Sebastes maliger</i>	quillback rockfish		Lenz et al. 2002
Scorpaenidae	<i>Sebastes nebulosus</i>	China rockfish		Lenz et al. 2002
Scorpaenidae	<i>Sebastes nigrocinctus</i>	tiger rockfish		Lenz et al. 2002
Scorpaenidae	<i>Sebastes saxicola</i>	stripetail rockfish	outer coast	no voucher, Mecklenburg et al. 2002
Scorpaenidae	<i>Sebastes reedi</i>	yellowmouth rockfish		*
Scorpaenidae	<i>Sebastes ruberrimus</i>	yelloweye rockfish		Lenz et al. 2002
Scorpaenidae	<i>Sebastes variegatus</i>	harlequin rockfish		Lenz et al. 2002
Anoplopomatidae	<i>Anoplopoma fimbria</i>	sable fish	58.6333N; 136.1667W	Bishop et al. 1995, 2.0 % of total catch
Hexagrammidae	<i>Hexagrammos decagrammos</i>	kelp greenling	58.2921N; 136.5464W	
Hexagrammidae	<i>Hexagrammos lagocephalus</i>	rock greenling		*
Hexagrammidae	<i>Hexagrammos octogrammus</i>	masked greenling		Lenz et al. 2002
Hexagrammidae	<i>Hexagrammos stelleri</i>	whitespotted greenling		*
Hexagrammidae	<i>Ophiodon elongatus</i>	lingcod	58.86239N; 137.9784W	NMFS cruise 199601
Hexagrammidae	<i>Pleurogrammus monopterygius</i>	Atka mackerel	Cross sound, 3 Hill Island	stomach contents of coho AB81-47
Rhamphocottidae	<i>Rhamphocottus richardsonii</i>	grunt sculpin		M. Donnellan, pers. comm. 5/1/2003
Cottidae	<i>Artedius fenestralis</i>	padded sculpin		*
Cottidae	<i>Clinocottus acuticeps</i>	sharpnose sculpin		*
Cottidae	<i>Clinocottus embryum</i>	calico sculpin	58.1930N; 136.5100W	Bousfield and McAllister 1962
Cottidae	<i>Clinocottus globiceps</i>	mosshead sculpin	58.1900N; 136.5117W	Bousfield and McAllister 1962
Cottidae	<i>Cottus aleuticus</i>	coastrange sculpin	58.1900N; 136.5117W	Bousfield and McAllister 1962
Cottidae	<i>Enophrys bison</i>	buffalo sculpin		*
Cottidae	<i>Enophrys cf. diceraus</i>	(antlered) sculpin		*C. Mecklenburg, pers. comm.
Cottidae	<i>Gymnocanthus galeatus</i>	armorhead sculpin		*
Cottidae	<i>Gymnocanthus pistilliger</i>	threaded sculpin		*
Cottidae	<i>Hemilepidotus hemilepidotus</i>	red irish lord		*
Cottidae	<i>Hemilepidotus jordani</i>	yellow Irish lord	58.7667N; 135.4500W	cat no. 6941 Donnellan, NPS

Table 15. Continued

Asterisk (\*) indicates species is represented in the 2001-2002 Glacier Bay voucher collection

Family	Scientific Name	Common Name	Location	Comments
Cottidae	<i>Hemilepidotus spinosus</i>	brown Irish Lord	58.6333N; 136.1667W	Bishop et al. 1995, 2.92% of total catch
Cottidae	<i>Icelinus borealis</i>	northern sculpin		*
Cottidae	<i>Icelus spatula</i>	spatulate sculpin	W. side Pt. Gustavus	AB68-505, 8/8/68
Cottidae	<i>Icelus spiniger</i>	thorny sculpin		*
Cottidae	<i>Leptocottus armatus</i>	Pacific staghorn sculpin		*
Cottidae	<i>Myoxocephalus polyacanthocephalus</i>	great sculpin		*
Cottidae	<i>Myoxocephalus stelleri</i>	frog sculpin		*
Cottidae	<i>Oligocottus maculosus</i>	tidepool sculpin		*
Cottidae	<i>Radulinus asprellus</i>	slim sculpin		*
Cottidae	<i>Triglops macellus</i>	roughspine sculpin		*
Cottidae	<i>Triglops pingelii</i>	ribbed sculpin		*
Hemitripterae	<i>Blepsias bilobus</i>	crested sculpin		*
Hemitripterae	<i>Blepsias cirrhosus</i>	silverspot sculpin		*
Hemitripterae	<i>Hemitripterus bolini</i>	bigmouth sculpin		*
Hemitripterae	<i>Nautichthys oculo-fasciatus</i>	sailfin sculpin	58.50858N; 136.0685W	*
Hemitripterae	<i>Nautichthys pribilovius</i>	eyeshade sculpin		*
Hemitripterae	<i>Nautichthys robustus</i>	shortmast sculpin		*
Psychrolutidae	<i>Dasycottus setiger</i>	spineyhead sculpin		*
Psychrolutidae	<i>Malacocottus zonurus</i>	darkfin sculpin		*
Psychrolutidae	<i>Psychrolutes paradoxus</i>	tadpole sculpin		*
Psychrolutidae	<i>Psychrolutes sigalutes</i>	soft sculpin		*
Agonidae	<i>Anoplagonus inermis</i>	smooth aligator fish		*
Agonidae	<i>Bathyagonus alascanus</i>	gray starsnout		*
Agonidae	<i>Bathyagonus cf. pentacanthus</i>	(bigeye) poacher		*(larval-early juvenile)
Agonidae	<i>Bathyagonus infraspinatus</i>	spineycheek starsnout		*
Agonidae	<i>Bathyagonus nigripinnis</i>	blackfin poacher		*
Agonidae	<i>Hypsagonus quadricornis</i>	fourhorn poacher	58.53363N; 135.94582W	cat no. 6877 Donnellan, NPS
Agonidae	<i>Leptagonus frenatus</i>	sawback poacher		*
Agonidae	<i>Pallasina barbata</i>	tubenose poacher		*
Agonidae	<i>Podotroctes accipenserinus</i>	sturgeon poacher		*
Cyclopteridae	<i>Aptocyclus ventricosus</i>	smooth lumpsucker	58.2344N; 135.5742W	*
Cyclopteridae	<i>Eumicrotremus orbis</i>	Pacific spiney lumpsucker		*
Liparidae	<i>Careproctus gilberti</i>	small disk snailfish		*
Liparidae	<i>Careproctus rastrinus</i>	salmon snailfish	58.0095N; 136.9810W	unpublished Taggart 2002, specimen #82
Liparidae	<i>Careproctus scottae</i>	peachskin snailfish		Mecklenburg et al. 2002
Liparidae	<i>Liparis callyodon</i>	spotted snailfish	58.1930N; 136.5100W	Bousfield and McAllister 1962
Liparidae	<i>Liparis cyclopus</i>	ribbon snailfish		*
Liparidae	<i>Liparis dennyi</i>	marbled snailfish		*

Table 15. Continued

Asterisk (\*) indicates species is represented in 2001-2002 Glacier Bay voucher collection

Family	Scientific Name	Common Name	Location	Comments
Liparidae	<i>Liparis fucensis</i>	slipskin snailfish		*
Liparidae	<i>Liparis gibbus</i>	variegated snailfish		*
Liparidae	<i>Liparis pulchellus</i>	showy snailfish		*
Liparidae	<i>Paraliparis deani</i>	prickly snailfish		*
Liparidae	<i>Nectoliparis pelagicus</i>	tadpole snailfish	off Cape Spencer	Mecklenburg et al. 2002
Bramidae	<i>Brama japonica</i>	Pacific pomfret		Orsi et al. 2000
Bathymasteridae	<i>Bathymaster leurolepis</i>	smallmouth ronquil	58.5816N; 136.1813W	*
Bathymasteridae	<i>Bathymaster signatus</i>	searcher		*
Bathymasteridae	<i>Ronquillus jordani</i>	northern ronquil		*
Zoarcidae	<i>Bothrocara pusillum</i>	Alaska eelpout		*
Zoarcidae	<i>Lycodes pacificus</i>	black belly eelpout		*
Zoarcidae	<i>Lycodes palearis</i>	shortfin eelpout		*
Zoarcidae	<i>Lycodapus mandibularis</i>	pallid eelpout		*
Zoarcidae	<i>Lycodapus psarostomatus</i>	specklemouth eelpout	59.0755N; 136.35117W	*
Stichaeidae	<i>Anisarchus medius</i>	stout eelblenny		*
Stichaeidae	<i>Anoplarchus purpureus</i>	high cockscomb		*
Stichaeidae	<i>Chirolophis decoratus</i>	decorated warbonnet		*
Stichaeidae	<i>Leptoclinus maculatus</i>	daubed shanny		*
Stichaeidae	<i>Lumpenella longirostris</i>	longsnout prickleback		*
Stichaeidae	<i>Lumpenus sagitta</i>	snake prickleback		*
Stichaeidae	<i>Poroclinus rothrocki</i>	whitebarred prickleback		*
Stichaeidae	<i>Stichaeus punctatus</i>	Arctic shanny		*
Stichaeidae	<i>Xiphister atropurpureus</i>	black prickleback	58.1900N; 136.5116W	Bousfield and McAllister 1962
Stichaeidae	<i>Xiphister mucosus</i>	rock prickleback	Cape Spencer	Mecklenburg et al. 2002
Cryptacanthodidae	<i>Cryptacanthodes giganteus</i>	giant wrymouth	58.92623N; 136.20757W	unpublished Taggart 2002
Pholidae	<i>Apodichthys flavidus</i>	penpoint gunnel	58.2716N; 136.6833W	
Pholidae	<i>Pholis laeta</i>	crescent gunnel		*
Anarhichadidae	<i>Anarrhichthys ocellatus</i>	wolf eel	58.6157N; 136.1138W	Robards 2003
Ptilichthyidae	<i>Ptilichthys goodei</i>	quillfish		Orsi et al. 2000
Zaproridae	<i>Zaprora silenus</i>	prowfish	S.W. of Lituya Bay	AB 63-31,
Trichodontidae	<i>Trichodon trichodon</i>	Pacific sandfish		*
Gobiesocidae	<i>Rimicola muscarum</i>	kelp clingfish	Bartlett Cove	Mecklenburg et al. 2002
Ammodytidae	<i>Ammodytes hexapterus</i>	Pacific sandlance		*
Paralichthyidae	<i>Citharichthys sordidus</i>	Pacific sanddab	North of Triangle Island	Mecklenburg et al. 2002
Pleuronectidae	<i>Atheresthes stomias</i>	arrowtooth flounder		*
Pleuronectidae	<i>Hippoglossoides elassodon</i>	flathead sole		*
Pleuronectidae	<i>Hippoglossus stenolepis</i>	Pacific halibut		*
Pleuronectidae	<i>Isopsetta isolepis</i>	butter sole		*

Table 15. Continued

Asterisk (\*) indicates species is represented in 2001-2002 Glacier Bay voucher collection

Family	Scientific Name	Common Name	Location	Comments
Pleuronectidae	<i>Lepidopsetta bilineata</i>	southern rock sole		*
Pleuronectidae	<i>Lepidopsetta polyxystra</i>	northern rock sole	W. side Pt. Gustavus	AB 68-505, 8/8/69
Pleuronectidae	<i>Limanda aspera</i>	yellowfin sole		*
Pleuronectidae	<i>Lyopsetta exilis</i>	slender sole		*
Pleuronectidae	<i>Microstomus pacificus</i>	dover sole		*
Pleuronectidae	<i>Parophrys vetulus</i>	English sole		*
Pleuronectidae	<i>Psettichthys melanosticus</i>	sand sole		*
Pleuronectidae	<i>Platichthys stellatus</i>	starry flounder		*

Table16. Effects of depth and north-south gradient on the abundance and diversity of demersal fishes in Glacier Bay: GLM analysis of bottom trawl data.

Response variable	Factor	R <sup>2</sup>	DF	MS	F	P
Abundance (log CPUE)	Model	0.31	2	3.40	11.91	< 0.0001
	Depth		1	1.31	4.58	0.04
	Latitude		1	3.24	11.39	0.001
	Error		52	0.29		
Diversity (H')	Model	0.20	2	1.61	6.64	0.003
	Depth		1	1.30	5.35	0.03
	Latitude		1	2.88	11.85	0.001
	Error		52	0.24		

Table 17. Effects of depth and north-south gradient on the abundance and diversity of pelagic fishes in Glacier Bay: GLM analysis of modified herring trawl data.

Response variable	Factor	R <sup>2</sup>	DF	MS	F	P
Abundance (log CPUE)	Model	0.32	5	1.29	4.07	0.004
	Depth(Year)		2	1.62	5.10	0.01
	Latitude		1	0.07	0.23	0.63
	Latitude x Depth(Year)		2	1.62	5.08	0.01
	Error		44	0.32		
Diversity (H')	Model	0.30	3	1.13	6.56	0.001
	Depth(Year)		2	1.55	9.03	0.001
	Latitude		1	0.03	0.16	0.69
	Error		46	0.17		

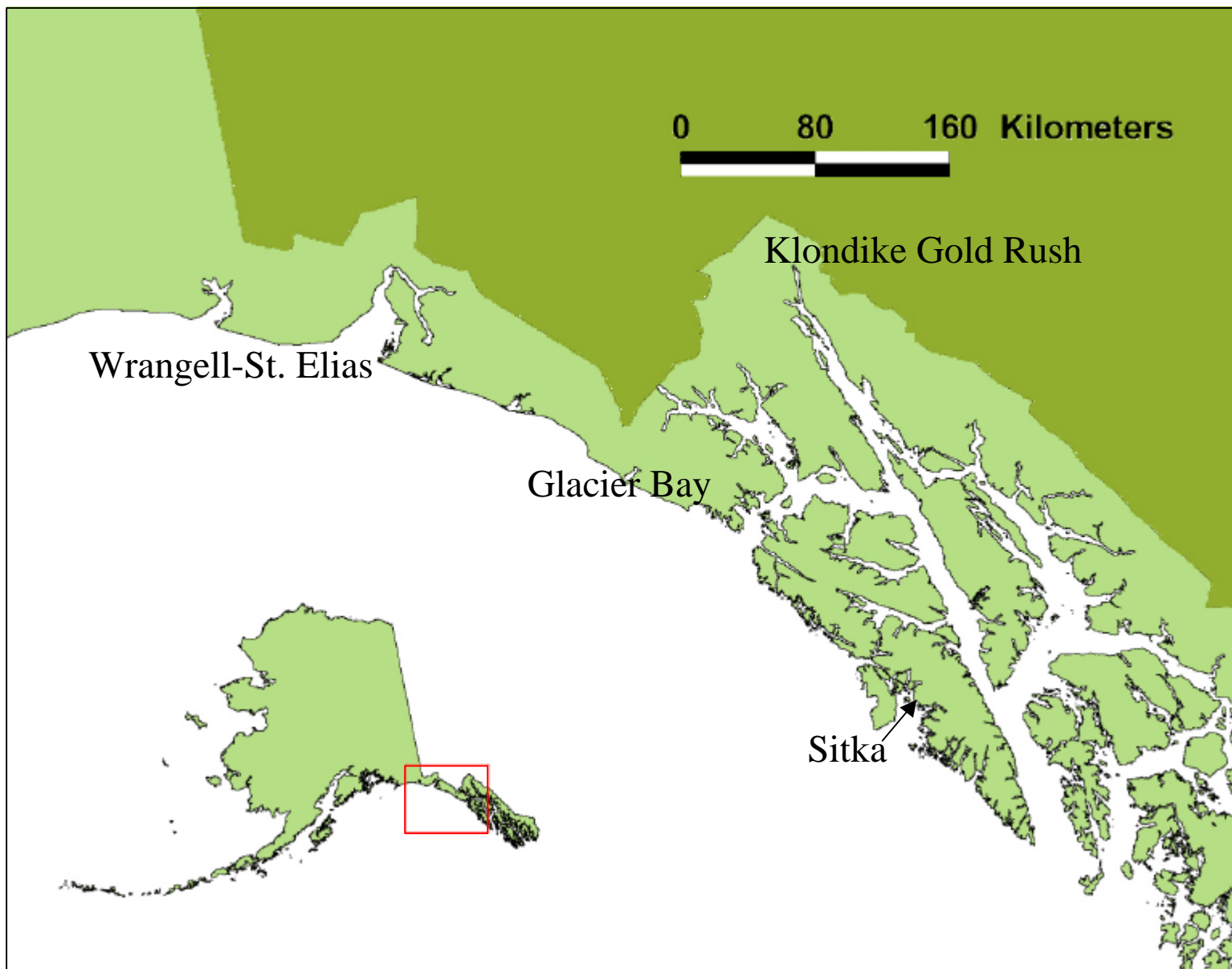


Figure 1. Map of National Parks sampled during the fish inventory of 2001-2002.



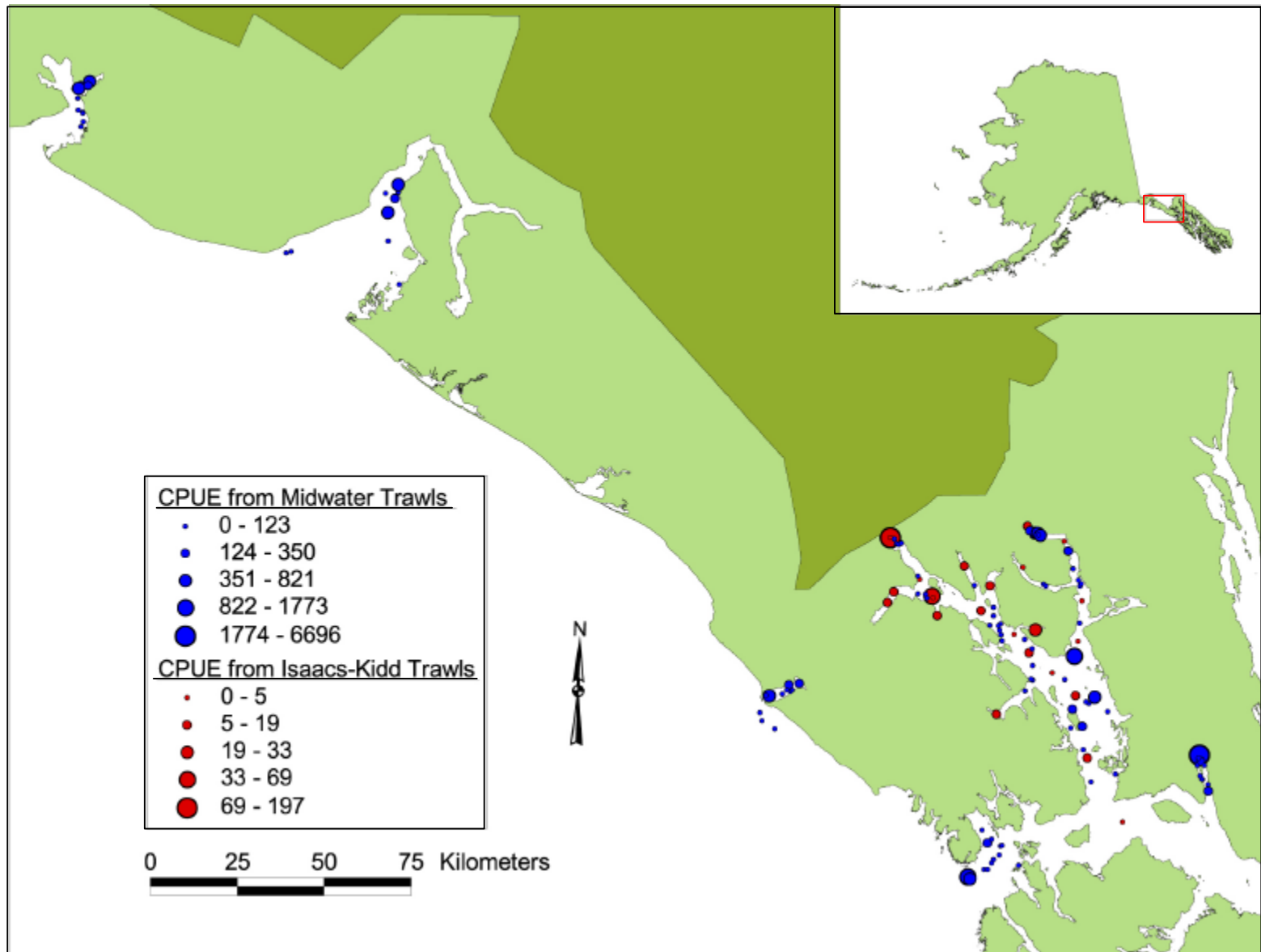


Figure 2. Map of pelagic habitat sample sites with relative catch per unit effort (CPUE) for herring trawls (number of fish/km) and for Isaacs-Kidd trawls (number of fish/km<sup>3</sup>) in Glacier Bay and Wrangell-St. Elias. Note, due to differing net dimensions the CPUE scales are relative by gear type.

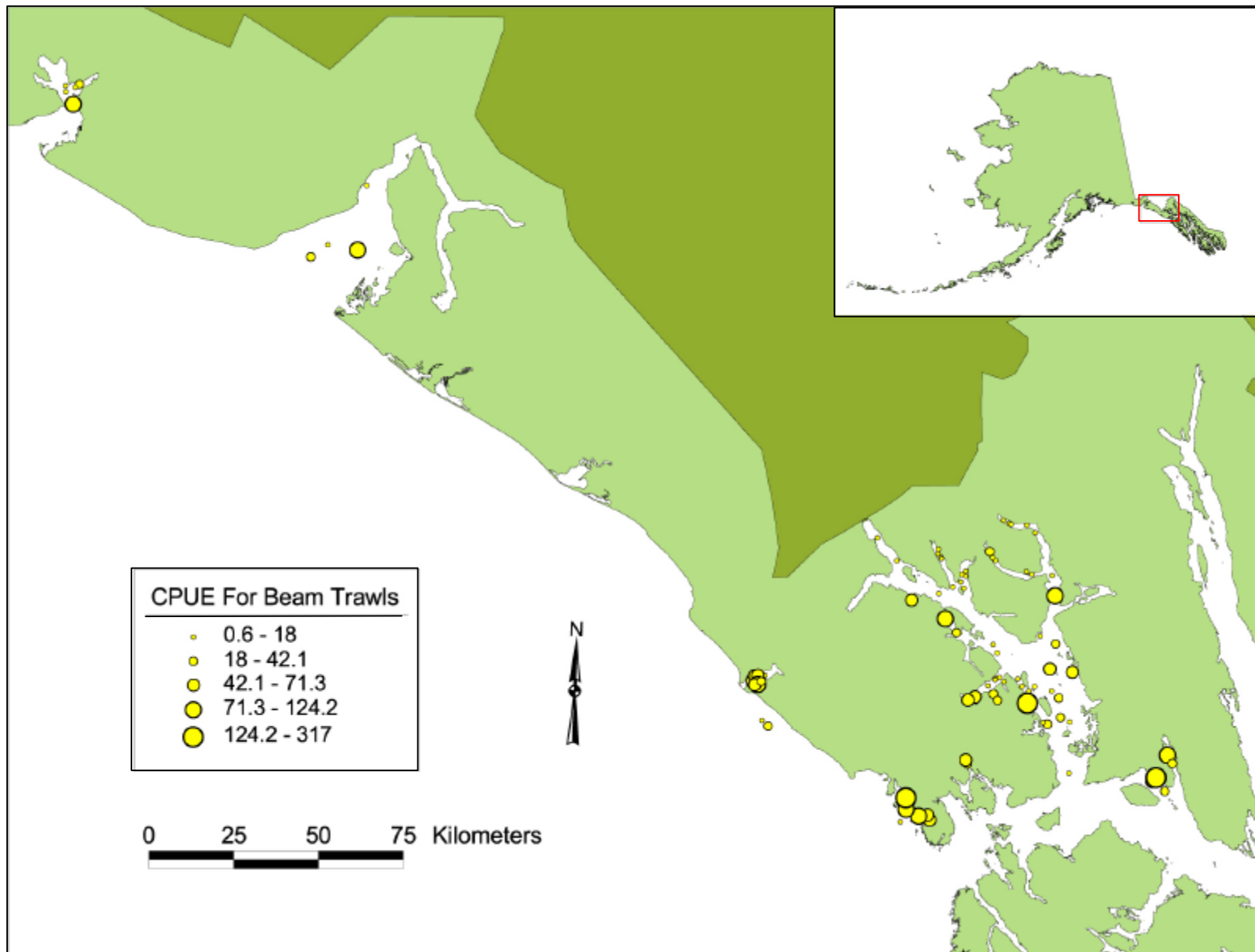


Figure 3. Map of demersal habitat sample sites with relative catch per unit effort (CPUE, number of fish/km<sup>2</sup>) for Glacier Bay and Wrangell-St. Elias.

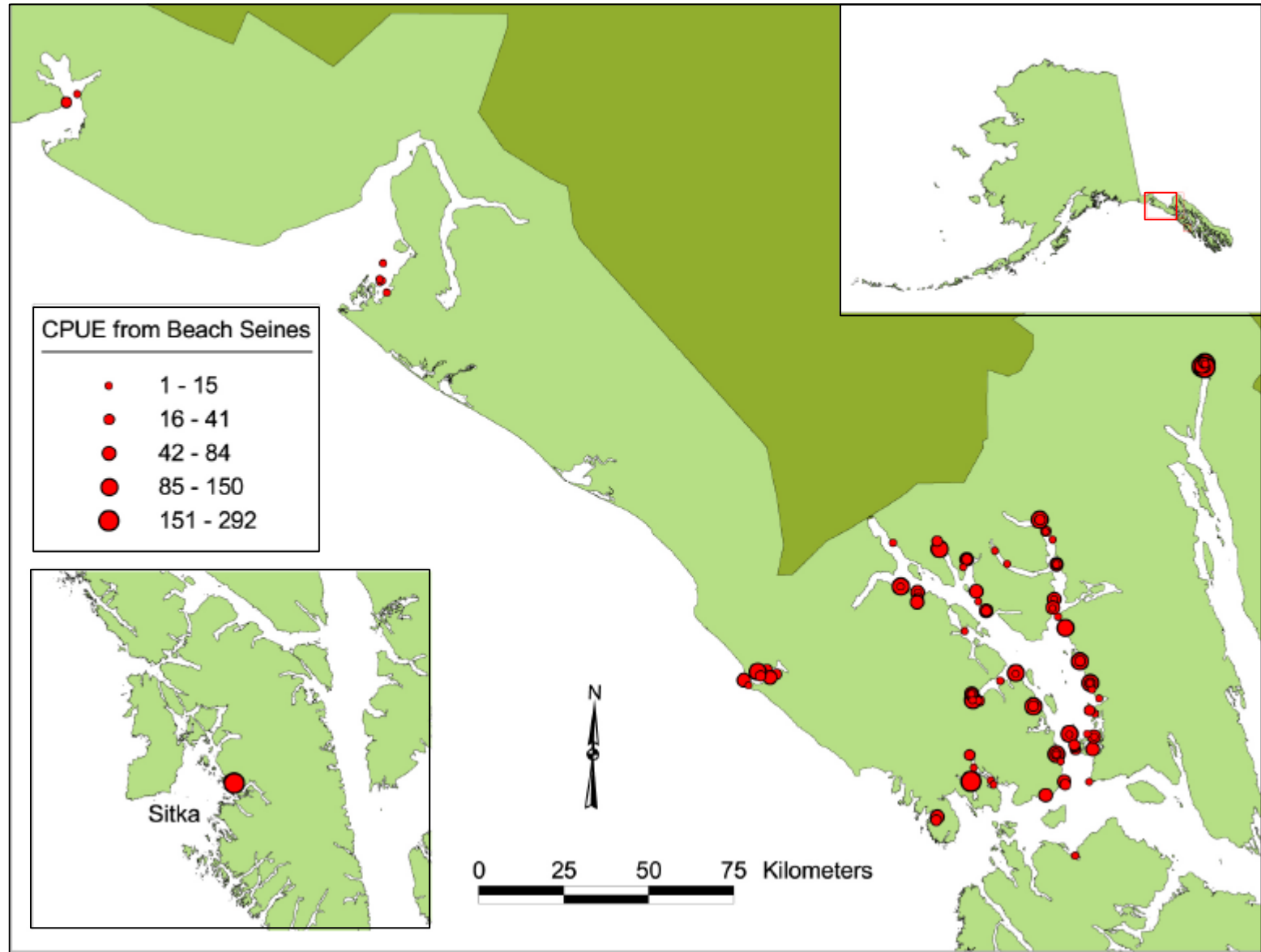


Figure 4. Map of nearshore habitat sample sites with relative catch per unit effort (CPUE, number of fish/set) for Glacier Bay, Wrangell-St. Elias, Sitka (inset), and Klondike Gold Rush.

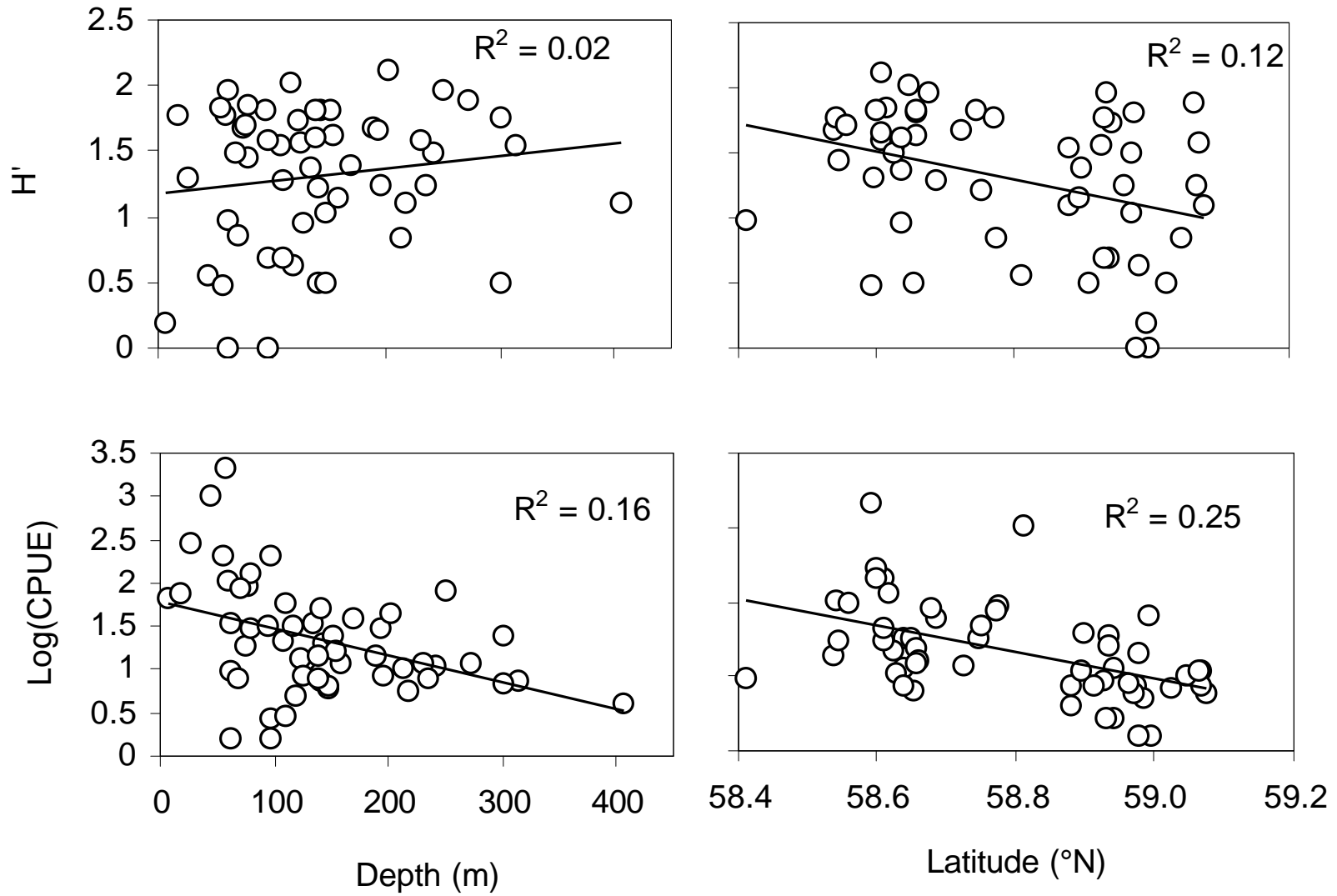


Figure 5. Diversity (Shannon-Wiener Index,  $H'$ ) and abundance (log-transformed CPUE [number of fish/km<sup>2</sup>]) of demersal fishes in Glacier Bay proper in relation to depth and latitude.

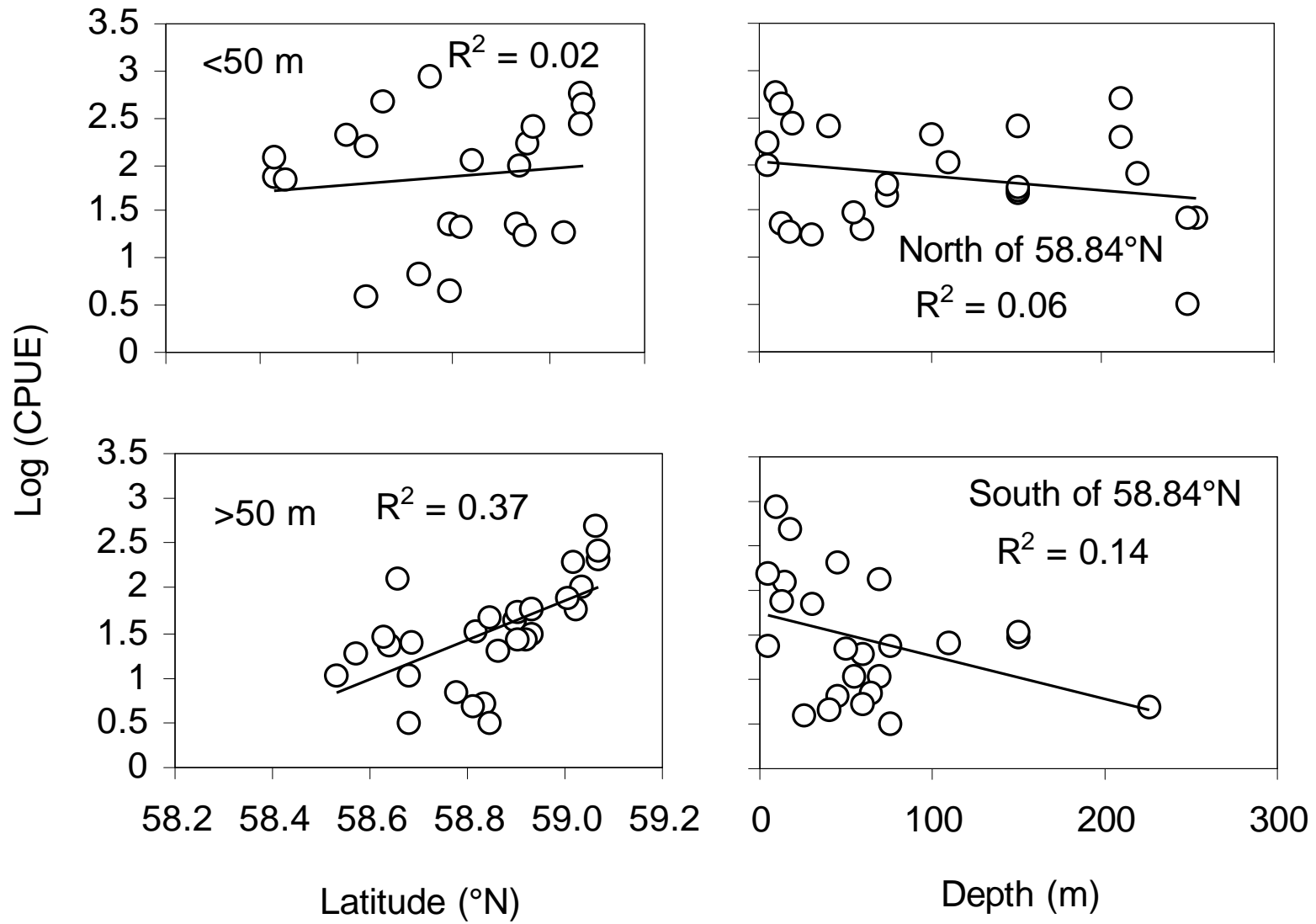


Figure 6. Abundance (log-transformed CPUE [number of fish/km]) of pelagic fishes sampled by herring trawl in Glacier Bay proper in relation to depth and latitude.

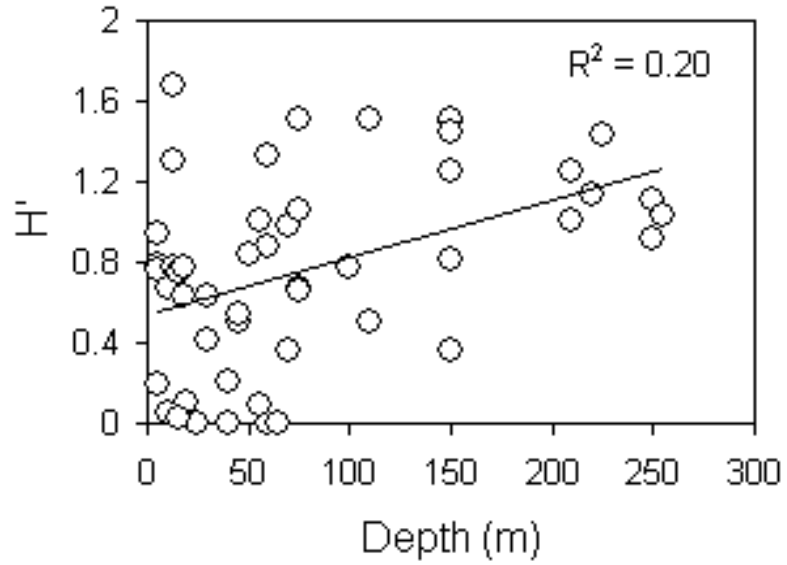


Figure 7. Diversity (Shannon-Wiener Diversity Index,  $H'$ ) of pelagic fishes sampled by herring trawl in relation to depth in Glacier Bay proper

Appendix 1. Revised status of species on Alaska Natural Heritage Program (ANHP) Glacier Bay fish species list (Lenz et al. 2002) after comparison with USGS literature review and *Fishes of Alaska* (Mecklenburg et al. 2002). Species are arranged in the same manner as the ANHP list (alphabetically by family).

Family	Standard Scientific Name	Common Name	ANHP Status	Revised Status
Acipenseridae	<i>Acipenser medirostris</i>	green sturgeon	Probably Present	possibly present
Acipenseridae	<i>Acipenser transmontanus</i>	white sturgeon	Probably Present	possibly present
Agonidae	<i>Agonopsis vulsa</i>	northern spearnose poacher	Probably Present	possibly present, rare
Agonidae	<i>Agonus acipenserinus</i>	sturgeon poacher	False Report	duplicate (name)
Agonidae	<i>Anoplagonus inermis</i>	smooth alligatorfish	Probably Present	present
Agonidae	<i>Aspidophoroides monopterygius</i>	Aleutian alligatorfish	Probably Present	unlikely, not reported from southeast AK
Agonidae	<i>Asterotheca alascana</i>	gray starsnout	Unconfirmed	duplicate (name)
Agonidae	<i>Bathyagonus alascanus</i>	gray starsnout	Probably Present	present
Agonidae	<i>Bathyagonus infraspinatus</i>	spinycheek starsnout	Probably Present	present
Agonidae	<i>Bathyagonus nigripinnis</i>	blackfin poacher	Probably Present	present
Agonidae	<i>Bathyagonus pentacanthus</i>	bigeye poacher	Probably Present	present
Agonidae	<i>Bothragonus swani</i>	rockhead poacher	Probably Present	possibly present, rare
Agonidae	<i>Hypsagonus quadricornis</i>	fourhorn poacher	Probably Present	present
Agonidae	<i>Leptagonus frenatus</i>	sawback poacher	Probably Present	present
Agonidae	<i>Ocella verrucosa</i>	warty poacher	Probably Present	possibly present, rare
Agonidae	<i>Odontopyxis trispinosa</i>	pygmy poacher	Probably Present	possibly present, rare
Agonidae	<i>Pallasina barbata</i>	tubenose poacher	Probably Present	present
Agonidae	<i>Podothecus acipenserinus</i>	sturgeon poacher	Present in Park	present
Agonidae	<i>Xeneretmus latifrons</i>	blacktip poacher	Probably Present	unlikely, not reported from Alaska
Alepisauridae	<i>Alepisaurus ferox</i>	longnose lancetfish	Probably Present	possibly present, rare
Ammodytidae	<i>Ammodytes hexapterus</i>	Pacific sand lance	Present in Park	present
Anarhichadidae	<i>Anarrhichthys ocellatus</i>	wolf-eel	Present in Park	present
Anoplopomatidae	<i>Anoplopoma fimbria</i>	sablefish	Present in Park	present
Anoplopomatidae	<i>Erilepis zonifer</i>	skilfish	Probably Present	unlikely, offshore species
Anotopteridae	<i>Anotopterus pharao</i>	daggertooth	Probably Present	possibly present, rare
Argentinidae	<i>Argentina sialis</i>	Pacific Argentine	Probably Present	unlikely, not reported from Alaska
Aulorhynchidae	<i>Aulorhynchus flavidus</i>	tube-snout	Unconfirmed	present
Bathylagidae	<i>Bathylagus milleri</i>	stout blacksmelt	Probably Present	unlikely, offshore species
Bathylagidae	<i>Leuroglossus schmidtii</i>	northern smoothtongue	Present in Park	present
Bathylagidae	<i>Leuroglossus stilbius</i>	California smoothtongue	Probably Present	unlikely, probably problem with name
Bathymasteridae	<i>Bathymaster caeruleofasciatus</i>	Alaskan ronquil	Probably Present	possibly present
Bathymasteridae	<i>Bathymaster leurolepis</i>	smallmouth ronquil	Probably Present	present
Bathymasteridae	<i>Bathymaster signatus</i>	searcher	Present in Park	present

## Appendix 1. Continued

Family	Standard Scientific Name	Common Name	ANHP Status	Revised Status
Bathymasteridae	<i>Ronquilus jordani</i>	northern ronquil	Present in Park	present
Batrachoididae	<i>Porichthys notatus</i>	plainfin midshipman	Probably Present	unlikely, not confirmed in Alaska
Bramidae	<i>Brama japonica</i>	Pacific pomfret	Present in Park	present
Carangidae	<i>Trachurus symmetricus</i>	jack mackerel	Present in Park	possibly present, rare
Carcharhinidae	<i>Prionace glauca</i>	blue shark	Probably Present	possibly present, rare (B. Wing pers comm. 5/2/03)
Catostomidae	<i>Catostomus catostomus</i>	longnose sucker	Probably Present	possibly present
Centrolophidae	<i>Icichthys lockingtoni</i>	medusafish	Probably Present	unlikely, rare in Alaska
Cetorhinidae	<i>Cetorhinus maximus</i>	basking shark	Probably Present	possibly present
Chauliodontidae	<i>Chauliodus macouni</i>	Pacific viperfish	Probably Present	possibly present
Chimaeridae	<i>Hydrolagus colliei</i>	spotted ratfish	Probably Present	present
Clupeidae	<i>Alosa sapidissima</i>	Atlantic shad	Probably Present	possibly present
Clupeidae	<i>Clupea harengus</i>	Atlantic herring	Unconfirmed	unlikely, probably problem with name
Clupeidae	<i>Clupea pallasii</i>	Pacific herring	Present in Park	present
Cottidae	<i>Artemius fenestralis</i>	padded sculpin	Probably Present	present
Cottidae	<i>Artemius harringtoni</i>	scalyhead sculpin	Probably Present	possibly present
Cottidae	<i>Artemius lateralis</i>	smoothhead sculpin	Probably Present	possibly present
Cottidae	<i>Ascelichthys rhodorus</i>	rosylip sculpin	Probably Present	possibly present
Cottidae	<i>Blepsias bilobus</i>	crested sculpin	Probably Present	present
Cottidae	<i>Blepsias cirrhosus</i>	silverspotted sculpin	Present in Park	present
Cottidae	<i>Clinocottus acuticeps</i>	sharpnose sculpin	Probably Present	present
Cottidae	<i>Clinocottus embryum</i>	calico sculpin	Probably Present	present
Cottidae	<i>Clinocottus globiceps</i>	mosshead sculpin	Probably Present	present
Cottidae	<i>Cottus aleuticus</i>	coastrange sculpin	Present in Park	present
Cottidae	<i>Cottus asper</i>	prickly sculpin	Probably Present	possibly present
Cottidae	<i>Cottus cognatus</i>	slimy sculpin	Probably Present	possibly present
Cottidae	<i>Dasycottus setiger</i>	spinyhead sculpin	Present in Park	present
Cottidae	<i>Enophrys bison</i>	buffalo sculpin	Present in Park	present
Cottidae	<i>Enophrys diceraus</i>	antlered sculpin	Probably Present	present
Cottidae	<i>Enophrys lucasi</i>	leister sculpin	Probably Present	possibly present
Cottidae	<i>Gymnocanthus galeatus</i>	armorhead sculpin	Probably Present	present
Cottidae	<i>Gymnocanthus pistilliger</i>	threaded sculpin	Probably Present	present
Cottidae	<i>Hemilepidotus hemilepidotus</i>	red Irish lord	Present in Park	present
Cottidae	<i>Hemilepidotus jordani</i>	yellow Irish lord	Probably Present	present



## Appendix 1. Continued

Family	Standard Scientific Name	Common Name	ANHP Status	Revised Status
Cottidae	<i>Hemilepidotus spinosus</i>	brown Irish Lord	Present in Park	present
Cottidae	<i>Hemilepidotus zapus</i>	longfin Irish lord	Probably Present	unlikely, not reported from southeast AK
Cottidae	<i>Hemitripterus bolini</i>	bigmouth sculpin	Present in Park	present
Cottidae	<i>Hemitripterus villosus</i>	shaggy sea raven	Present in Park	unlikely, not reported from Alaska
Cottidae	<i>Icelinus borealis</i>	northern sculpin	Present in Park	present
Cottidae	<i>Icelinus burchami</i>	dusky sculpin	Probably Present	possibly present, rare
Cottidae	<i>Icelinus filamentosus</i>	threadfin sculpin	Probably Present	possibly present, rare in southeast AK
Cottidae	<i>Icelinus oculatus</i>	frogmouth sculpin	Probably Present	unlikely, not reported from Alaska
Cottidae	<i>Jordania zonope</i>	longfin sculpin	Probably Present	possibly present
Cottidae	<i>Leptocottus armatus</i>	Pacific staghorn sculpin	Present in Park	present
Cottidae	<i>Malacocottus kincaidi</i>	blackfin sculpin	Probably Present	unlikely, not reported from Alaska
Cottidae	<i>Malacocottus zonurus</i>	darkfin sculpin	Probably Present	present
Cottidae	<i>Myoxocephalus jaok</i>	plain sculpin	Probably Present	possibly present, rare in southeast AK
Cottidae	<i>Myoxocephalus polyacanthocephalus</i>	great sculpin	Present in Park	present
Cottidae	<i>Myoxocephalus quadricornis</i>	fourhorn sculpin	Probably Present	present
Cottidae	<i>Myoxocephalus scorpius</i>	shorthorn sculpin	Probably Present	possibly present
Cottidae	<i>Myoxocephalus stelleri</i>	steller's sculpin	Probably Present	present
Cottidae	<i>Myoxocephalus verrucosus</i>	warty sculpin	Probably Present	duplicate (name)
Cottidae	<i>Nautichthys oculofasciatus</i>	sailfin sculpin	Present in Park	present
Cottidae	<i>Nautichthys pribilovius</i>	eyeshade sculpin	Probably Present	present
Cottidae	<i>Nautichthys robustus</i>	shortmast sculpin	Probably Present	present
Cottidae	<i>Oligocottus maculosus</i>	tidepool sculpin	Present in Park	present
Cottidae	<i>Oligocottus rimensis</i>	saddleback sculpin	Probably Present	possibly present
Cottidae	<i>Oligocottus snyderi</i>	fluffy sculpin	Probably Present	possibly present, rare
Cottidae	<i>Paricelinus hopliticus</i>	thornback sculpin	Probably Present	unlikely, not reported from Alaska
Cottidae	<i>Radulinus asprellus</i>	slim sculpin	Probably Present	present
Cottidae	<i>Rhamphocottus richardsoni</i>	grunt sculpin	Probably Present	present
Cottidae	<i>Scorpaenichthys marmoratus</i>	cabezon	Probably Present	possibly present, rare in southeast AK
Cottidae	<i>Synchirus gilli</i>	manacled sculpin	Probably Present	possibly present
Cottidae	<i>Triglops forficatus</i>	scissortail sculpin	Probably Present	possibly present, rare in southeast AK
Cottidae	<i>Triglops macellus</i>	roughspine sculpin	Probably Present	present

## Appendix 1. Continued

Family	Standard Scientific Name	Common Name	ANHP Status	Revised Status
Cottidae	<i>Triglops pingeli</i>	ribbed sculpin	Probably Present	present
Cottidae	<i>Triglops scepticus</i>	spectacled sculpin	Probably Present	possibly present, rare in southeast AK
Cyclopteridae	<i>Aptocyclus ventricosus</i>	smooth lumpsucker	Present in Park	present
Cyclopteridae	<i>Careproctus colletti</i>	Alaska snailfish	Probably Present	possibly present, rare in southeast AK
Cyclopteridae	<i>Careproctus furcellus</i>	emarginate snailfish	Probably Present	unlikely, not reported from southeast AK
Cyclopteridae	<i>Careproctus gilberti</i>	smalldisk snailfish	Probably Present	present
Cyclopteridae	<i>Careproctus melanurus</i>	blacktail snailfish	Probably Present	possibly present, rare in southeast AK
Cyclopteridae	<i>Careproctus phasma</i>	spectral snailfish	Probably Present	unlikely, not reported from southeast AK
Cyclopteridae	<i>Careproctus rastrinus</i>	salmon snailfish	Probably Present	present
Cyclopteridae	<i>Careproctus scottae</i>	peachskin snailfish	Probably Present	present
Cyclopteridae	<i>Careproctus spectrum</i>	stippled snailfish	Probably Present	possibly present, rare in southeast AK
Cyclopteridae	<i>Eumicrotremus orbis</i>	Pacific spiny lumpsucker	Present in Park	present
Cyclopteridae	<i>Eumicrotremus phrynooides</i>	toad lumpsucker	Probably Present	unlikely, not reported from southeast AK
Cyclopteridae	<i>Liparis beringianus</i>	Bering snailfish	Probably Present	duplicate (name)
Cyclopteridae	<i>Liparis callyodon</i>	spotted snailfish	Probably Present	present
Cyclopteridae	<i>Liparis cyclopus</i>	ribbon snailfish	Probably Present	present
Cyclopteridae	<i>Liparis dennyi</i>	marbled snailfish	Probably Present	present
Cyclopteridae	<i>Liparis floriae</i>	tidepool snailfish	Probably Present	present
Cyclopteridae	<i>Liparis fucensis</i>	slipskin snailfish	Probably Present	present
Cyclopteridae	<i>Liparis gibbus</i>	variegated snailfish	Probably Present	present
Cyclopteridae	<i>Liparis greeni</i>	lobefin snailfish	Probably Present	possibly present, rare in southeast AK
Cyclopteridae	<i>Liparis mucosus</i>	slimy snailfish	Probably Present	possibly present, rare in southeast AK
Cyclopteridae	<i>Liparis pulchellus</i>	showy snailfish	Probably Present	present
Cyclopteridae	<i>Liparis rutteri</i>	ringtail snailfish	Probably Present	possibly present, rare in southeast AK
Cyclopteridae	<i>Nectoliparis pelagicus</i>	tadpole snailfish	Probably Present	present
Cyclopteridae	<i>Paraliparis dactylosus</i>	red snailfish	Probably Present	unlikely, not reported from southeast AK
Cyclopteridae	<i>Paraliparis deani</i>	prickly snailfish	Probably Present	present
Dalatiidae	<i>Somniosus pacificus</i>	Pacific sleeper shark	Present in Park	present
Embiotocidae	<i>Cymatogaster aggregata</i>	shiner perch	Probably Present	possibly present
Embiotocidae	<i>Rhacochilus vacca</i>	pile perch	Probably Present	unlikely, not confirmed in Alaska
Esocidae	<i>Esox lucius</i>	northern pike	Probably Present	present
Gadidae	<i>Eleginus gracilis</i>	saffron cod	Probably Present	possibly present, rare
Gadidae	<i>Gadus macrocephalus</i>	Pacific cod	Present in Park	present

## Appendix 1. Continued

Family	Standard Scientific Name	Common Name	ANHP Status	Revised Status
Gadidae	<i>Microgadus proximus</i>	Pacific tomcod	Probably Present	present
Gadidae	<i>Theragra chalcogramma</i>	walleye pollock	Present in Park	present
Gasterosteidae	<i>Gasterosteus aculeatus</i>	threespine stickleback	Present in Park	present
Gobiesocidae	<i>Gobiesox maeandricus</i>	northern clingfish	Probably Present	possibly present
Gobiesocidae	<i>Rimicola muscarum</i>	kelp clingfish	Present in Park	present
Hexagrammidae	<i>Hexagrammos decagrammus</i>	kelp greenling	Present in Park	present
Hexagrammidae	<i>Hexagrammos lagocephalus</i>	rock greenling	Present in Park	present
Hexagrammidae	<i>Hexagrammos octogrammus</i>	masked greenling	Present in Park	present
Hexagrammidae	<i>Hexagrammos stelleri</i>	whitespotted greenling	Present in Park	present
Hexagrammidae	<i>Ophiodon elongatus</i>	lingcod	Present in Park	present
Hexagrammidae	<i>Oxylebius pictus</i>	painted greenling	Probably Present	possibly present
Hexagrammidae	<i>Pleurogrammus monoptyerygius</i>	atka mackerel	Probably Present	present
Hexanchidae	<i>Hexanchus griseus</i>	bluntnose sixgill shark	Probably Present	unlikely, rare in Alaska
Hexanchidae	<i>Notorynchus cepedianus</i>	sevengill shark	Probably Present	unlikely, not confirmed in Alaska
Icelidae	<i>Icelus euryops</i>	wide-eye sculpin	Probably Present	unlikely, not reported from southeast AK
Icelidae	<i>Icelus spatula</i>	spatulate sculpin	Probably Present	present
Icelidae	<i>Icelus spiniger</i>	thorny sculpin	Probably Present	present
Icelidae	<i>Icelus uncinalis</i>	uncinate sculpin	Probably Present	unlikely, not reported from southeast AK
Icosteidae	<i>Icosteus aenigmaticus</i>	ragfish	Probably Present	possibly present
Lamnidae	<i>Carcharodon carcharias</i>	white shark	Probably Present	present
Lamnidae	<i>Lamna ditropis</i>	salmon shark	Present in Park	present
Lampridae	<i>Lampris guttatus</i>	opah	Probably Present	present
Lotidae	<i>Lota lota</i>	burbot	Probably Present	possibly present, rare
Macrouridae	<i>Albatrossia pectoralis</i>	giant grenadier	Probably Present	unlikely, offshore species
Macrouridae	<i>Coryphaenoides acrolepis</i>	roughscale rattail	Probably Present	possibly present, rare
Macrouridae	<i>Coryphaenoides cinereus</i>	popeye grenadier	Probably Present	unlikely, offshore species
Macrouridae	<i>Coryphaenoides filifera</i>	filamented rattail	Probably Present	unlikely, not reported from southeast AK
Melamphaidae	<i>Poromitra crassa</i>	crested bigscale	Probably Present	possibly present
Melanostomiidae	<i>Tactostoma macropus</i>	longfin dragonfish	Probably Present	possibly present
Merlucciidae	<i>Merluccius productus</i>	Pacific hake	Probably Present	present
Molidae	<i>Mola mola</i>	ocean sunfish	Probably Present	possibly present
Moridae	<i>Antimora microlepis</i>	Pacific flatnose	Probably Present	unlikely, offshore species
Myctophidae	<i>Diaphus theta</i>	California headlightfish	Probably Present	present

## Appendix 1. Continued

Family	Standard Scientific Name	Common Name	ANHP Status	Revised Status
Myctophidae	<i>Lampanyctus jordani</i>	brokenline lanternfish	not on list	possibly present
Myctophidae	<i>Lampanyctus regalis</i>	pinpoint lampfish	Probably Present	possibly present
Myctophidae	<i>Protomyctophum thompsoni</i>	bigeye lanternfish	not on list	possibly present
Myctophidae	<i>Stenobrachius leucopsarus</i>	northern lampfish	Present in Park	present
Myctophidae	<i>Tarletonbeania crenularis</i>	blue lanternfish	not on list	possibly present
Myxinidae	<i>Eptatretus deani</i>	black hagfish	Probably Present	unlikely, rare in Alaska
Myxinidae	<i>Eptatretus stouti</i>	Pacific hagfish	Present in Park	present
Nemichthyidae	<i>Nemichthys scolopaceus</i>	slender snipe eel	Probably Present	possibly present, rare
Ophidiidae	<i>Brosmophycis marginata</i>	red brotula	Probably Present	possibly present, rare in southeast AK
Osmeridae	<i>Hypomesus pretiosus</i>	surf smelt	Probably Present	possibly present
Osmeridae	<i>Mallotus villosus</i>	capelin	Present in Park	present
Osmeridae	<i>Osmerus mordax</i>	rainbow smelt	Probably Present	possibly present
Osmeridae	<i>Spirinchus starksi</i>	night smelt	Probably Present	present
Osmeridae	<i>Spirinchus thaleichthys</i>	longfin smelt	Probably Present	present
Osmeridae	<i>Thaleichthys pacificus</i>	eulachon	Present in Park	present
Paralichthyidae	<i>Citharichthys sordidus</i>	Pacific sanddab	Probably Present	present
Paralichthyidae	<i>Citharichthys stigmaeus</i>	speckled sanddab	Probably Present	possibly present
Petromyzontidae	<i>Lampetra ayresi</i>	river lamprey	Probably Present	possibly present
Petromyzontidae	<i>Lampetra richardsoni</i>	western brook lamprey	Probably Present	possibly present
Petromyzontidae	<i>Lampetra tridentata</i>	Pacific lamprey	Probably Present	possibly present
Pholidae	<i>Apodichthys flavidus</i>	penpoint gunnel	Probably Present	present
Pholidae	<i>Pholis clemensi</i>	longfin gunnel	Probably Present	unlikely, rare in Alaska
Pholidae	<i>Pholis laeta</i>	crescent gunnel	Present in Park	present
Pholidae	<i>Pholis ornata</i>	saddleback gunnel	Probably Present	unlikely, not confirmed in Alaska
Pleuronectidae	<i>Atheresthes stomias</i>	arrowtooth flounder	Present in Park	present
Pleuronectidae	<i>Embassichthys bathybius</i>	deepsea sole	Probably Present	unlikely, offshore species
Pleuronectidae	<i>Eopsetta jordani</i>	petrale sole	Present in Park	present
Pleuronectidae	<i>Glyptocephalus zachirus</i>	rex sole	Present in Park	present
Pleuronectidae	<i>Hippoglossoides elassodon</i>	flathead sole	Present in Park	present
Pleuronectidae	<i>Hippoglossus stenolepis</i>	Pacific halibut	Present in Park	present
Pleuronectidae	<i>Isopsetta isolepis</i>	butter sole	False Report	present
Pleuronectidae	<i>Lepidopsetta bilineata</i>	southern rock sole	not on list	present
Pleuronectidae	<i>Lepidopsetta polyxystra</i>	northern rock sole	not on list	present

## Appendix 1. Continued

Family	Standard Scientific Name	Common Name	ANHP Status	Revised Status
Pleuronectidae	<i>Limanda aspera</i>	yellowfin sole	False Report	present
Pleuronectidae	<i>Lyopsetta exilis</i>	slender sole	Present in Park	present
Pleuronectidae	<i>Lyopsetta exilis</i>	slender sole	False Report	duplicate (name)
Pleuronectidae	<i>Microstomus pacificus</i>	Dover sole	Probably Present	present
Pleuronectidae	<i>Parophrys vetulus</i>	English sole	False Report	present
Pleuronectidae	<i>Platichthys stellatus</i>	starry flounder	Present in Park	present
Pleuronectidae	<i>Pleuronectes asper</i>	yellowfin sole	Present in Park	duplicate (name)
Pleuronectidae	<i>Pleuronectes bilineatus</i>	rock sole	Present in Park	split into two species
Pleuronectidae	<i>Pleuronectes isolepis</i>	butter sole	Probably Present	duplicate (name)
Pleuronectidae	<i>Pleuronectes quadrituberculatus</i>	Alaska plaice	Probably Present	possibly present
Pleuronectidae	<i>Pleuronectes vetulus</i>	English sole	Present in Park	duplicate (name)
Pleuronectidae	<i>Pleuronichthys coenosus</i>	c-o sole	Probably Present	possibly present, rare
Pleuronectidae	<i>Pleuronichthys decurrens</i>	curlfin sole	Present in Park	present
Pleuronectidae	<i>Psettichthys melanostictus</i>	sand sole	Probably Present	present
Pleuronectidae	<i>Reinhardtius hippoglossoides</i>	Greenland halibut	Probably Present	possibly present
Psychrolutidae	<i>Eurymen gyrinus</i>	smoothcheek sculpin	Probably Present	unlikely, not reported from southeast AK
Psychrolutidae	<i>Gilbertidia sigalutes</i>	soft sculpin	False Report	duplicate (name)
Psychrolutidae	<i>Psychrolutes paradoxus</i>	tadpole sculpin	Present in Park	present
Psychrolutidae	<i>Psychrolutes sigalutes</i>	soft sculpin	Present in Park	present
Ptilichthyidae	<i>Ptilichthys goodei</i>	quillfish	Present in Park	possibly present
Rajidae	<i>Bathyraja aleutica</i>	Aleutian skate	Probably Present	possibly present
Rajidae	<i>Bathyraja interrupta</i>	sandpaper skate	Probably Present	present
Rajidae	<i>Bathyraja parmifera</i>	Alaska skate	Probably Present	possibly present
Rajidae	<i>Bathyraja trachura</i>	black skate	Present in Park	present
Rajidae	<i>Raja binoculata</i>	big skate	Present in Park	present
Rajidae	<i>Raja rhina</i>	longnose skate	Present in Park	present
Rajidae	<i>Raja stellulata</i>	starry skate	Present in Park	unlikely, possibly not from Alaska
Salmonidae	<i>Coregonus clupeaformis</i>	lake whitefish	Probably Present	unlikely, not reported from southeast AK
Salmonidae	<i>Oncorhynchus</i>	Pacific salmon	Unconfirmed	No species name, remove from list
Salmonidae	<i>Oncorhynchus clarkii</i>	cutthroat trout	Present in Park	present
Salmonidae	<i>Oncorhynchus gorbuscha</i>	pink salmon	Present in Park	present
Salmonidae	<i>Oncorhynchus keta</i>	chum salmon	Present in Park	present
Salmonidae	<i>Oncorhynchus kisutch</i>	Coho salmon	Present in Park	present

## Appendix 1. Continued

Family	Standard Scientific Name	Common Name	ANHP Status	Revised Status
Salmonidae	<i>Oncorhynchus mykiss</i>	rainbow trout	Present in Park	present
Salmonidae	<i>Oncorhynchus nerka</i>	sockeye salmon	Present in Park	present
Salmonidae	<i>Oncorhynchus tshawytscha</i>	chinook salmon	Present in Park	possibly present (C. Soiseth pers. comm. 4/10/03)
Salmonidae	<i>Prosopium coulteri</i>	pygmy whitefish	Probably Present	possibly present, rare
Salmonidae	<i>Prosopium cylindraceum</i>	round whitefish	Probably Present	possibly present
Salmonidae	<i>Salmo salar</i>	Atlantic salmon	Present in Park	present
Salmonidae	<i>Salvelinus malma</i>	dolly varden	Present in Park	present
Salmonidae	<i>Salvelinus namaycush</i>	lake trout	Probably Present	possibly present
Salmonidae	<i>Thymallus arcticus</i>	Arctic grayling	Present in Park	present
Scomberesocidae	<i>Cololabis saira</i>	Pacific saury	Present in Park	present
Scombridae	<i>Scomber japonicus</i>	chub mackerel	Probably Present	possibly present, rare in southeast AK
Scombridae	<i>Thunnus alalunga</i>	albacore	Probably Present	possibly present, rare
Scopelarchidae	<i>Benthalbella dentata</i>	northern pearleye	Probably Present	present
Scorpaenidae	<i>Sebastes aleutianus</i>	rougheye rockfish	Present in Park	present
Scorpaenidae	<i>Sebastes alutus</i>	Pacific Ocean perch	Probably Present	present
Scorpaenidae	<i>Sebastes auriculatus</i>	brown rockfish	Probably Present	possibly present
Scorpaenidae	<i>Sebastes babcocki</i>	redbanded rockfish	Present in Park	present
Scorpaenidae	<i>Sebastes borealis</i>	shortraker rockfish	Present in Park	present
Scorpaenidae	<i>Sebastes brevispinis</i>	silvergray rockfish	Present in Park	present
Scorpaenidae	<i>Sebastes caurinus</i>	copper rockfish	Probably Present	possibly present
Scorpaenidae	<i>Sebastes ciliatus</i>	dusky rockfish	Present in Park	present
Scorpaenidae	<i>Sebastes crameri</i>	darkblotched rockfish	Probably Present	present
Scorpaenidae	<i>Sebastes diploproa</i>	splitnose rockfish	Probably Present	unlikely, not confirmed in Alaska
Scorpaenidae	<i>Sebastes elongatus</i>	greenstriped rockfish	Probably Present	possibly present
Scorpaenidae	<i>Sebastes emphaeus</i>	Puget Sound rockfish	Probably Present	possibly present
Scorpaenidae	<i>Sebastes entomelas</i>	widow rockfish	Probably Present	possibly present
Scorpaenidae	<i>Sebastes flavidus</i>	yellowtail rockfish	Present in Park	possibly present
Scorpaenidae	<i>Sebastes helvomaculatus</i>	rosethorn rockfish	Probably Present	possibly present
Scorpaenidae	<i>Sebastes jordani</i>	shortbelly rockfish	Present in Park	present
Scorpaenidae	<i>Sebastes maliger</i>	quillback rockfish	Present in Park	present
Scorpaenidae	<i>Sebastes melanops</i>	black rockfish	Present in Park	present
Scorpaenidae	<i>Sebastes melanostomus</i>	blackgill rockfish	Probably Present	unlikely, not confirmed in Alaska
Scorpaenidae	<i>Sebastes miniatus</i>	vermillion rockfish	Probably Present	unlikely, not confirmed in Alaska

## Appendix 1. Continued

Family	Standard Scientific Name	Common Name	ANHP Status	Revised Status
Scorpaenidae	<i>Sebastes mystinus</i>	blue rockfish	Probably Present	unlikely, not confirmed in Alaska
Scorpaenidae	<i>Sebastes nebulosus</i>	China rockfish	Present in Park	present
Scorpaenidae	<i>Sebastes nigrocinctus</i>	tiger rockfish	Present in Park	present
Scorpaenidae	<i>Sebastes paucispinis</i>	bocaccio	Probably Present	possibly present
Scorpaenidae	<i>Sebastes pinniger</i>	Canary rockfish	Probably Present	possibly present, rare in southeast AK
Scorpaenidae	<i>Sebastes polyspinis</i>	northern rockfish	Probably Present	possibly present
Scorpaenidae	<i>Sebastes proriger</i>	redstripe rockfish	Probably Present	possibly present
Scorpaenidae	<i>Sebastes reedi</i>	yellowmouth rockfish	Probably Present	present
Scorpaenidae	<i>Sebastes ruberrimus</i>	yelloweye rockfish	Present in Park	possibly present
Scorpaenidae	<i>Sebastes rubrivinctus</i>	flag rockfish	Probably Present	duplicate (name)
Scorpaenidae	<i>Sebastes saxicola</i>	stripetail rockfish	Probably Present	unlikely, not confirmed in Alaska
Scorpaenidae	<i>Sebastes serranoides</i>	olive rockfish	Probably Present	unlikely, not reported from Alaska
Scorpaenidae	<i>Sebastes variegatus</i>	harlequin rockfish	Present in Park	possibly present
Scorpaenidae	<i>Sebastes wilsoni</i>	pygmy rockfish	Probably Present	possibly present
Scorpaenidae	<i>Sebastes zacentrus</i>	sharpchin rockfish	Probably Present	possibly present
Scorpaenidae	<i>Sebastolobus alascanus</i>	shortspine thornyhead	Probably Present	present
Scorpaenidae	<i>Sebastolobus altivelis</i>	longspine thornyhead	Probably Present	possibly present, rare in southeast AK
Scyliorhinidae	<i>Apristurus brunneus</i>	brown cat shark	Probably Present	present
Scytalinidae	<i>Scytalina cerdale</i>	graveldiver	Probably Present	possibly present
Sphyraenidae	<i>Sphyraena argentea</i>	Pacific barracuda	Probably Present	possibly present, rare
Squalidae	<i>Squalus acanthias</i>	spiny dogfish	Present in Park	present
Squatinae	<i>Squatina californica</i>	Pacific angel shark	Probably Present	unlikely, not reported from Alaska
Stichaeidae	<i>Anisarchus medius</i>	stout eelblenny	Probably Present	present
Stichaeidae	<i>Anoplarchus insignis</i>	slender cockscomb	Probably Present	possibly present
Stichaeidae	<i>Anoplarchus purpurescens</i>	high cockscomb	Probably Present	present
Stichaeidae	<i>Bryozoichthys lysimus</i>	nutcracker prickleback	Probably Present	unlikely, not reported from southeast AK
Stichaeidae	<i>Bryozoichthys marjorius</i>	pearly prickleback	Probably Present	possibly present, rare
Stichaeidae	<i>Chirolophis decoratus</i>	decorated warbonnet	Probably Present	present
Stichaeidae	<i>Chirolophis nugator</i>	mosshead warbonnet	Probably Present	possibly present
Stichaeidae	<i>Cryptacanthodes aleutensis</i>	dwarf wrymouth	Probably Present	possibly present
Stichaeidae	<i>Cryptacanthodes gigantea</i>	giant wrymouth	Probably Present	present
Stichaeidae	<i>Leptoclinus maculatus</i>	daubed shanny	Unconfirmed	present
Stichaeidae	<i>Lumpenella longirostris</i>	longsnout prickleback	Probably Present	present

## Appendix 1. Continued

Family	Standard Scientific Name	Common Name	ANHP Status	Revised Status
Stichaeidae	<i>Lumpenus fabricii</i>	slender eelblenny	Probably Present	present
Stichaeidae	<i>Lumpenus maculatus</i>	daubed shanny	Probably Present	duplicate (name)
Stichaeidae	<i>Lumpenus sagitta</i>	snake prickleback	Present in Park	present
Stichaeidae	<i>Phytichthys chirus</i>	ribbon prickleback	Probably Present	possibly present
Stichaeidae	<i>Poroclinus rothrocki</i>	whitebarred prickleback	Probably Present	present
Stichaeidae	<i>Stichaeus punctatus</i>	Arctic shanny	Probably Present	present
Stichaeidae	<i>Xiphister atropurpureus</i>	black prickleback	Probably Present	present
Stichaeidae	<i>Xiphister mucosus</i>	rock prickleback	Probably Present	present
Syngnathidae	<i>Syngnathus griseolineatus</i>	bay pipefish	Probably Present	possibly present
Trachipteridae	<i>Trachipterus altivelis</i>	king-of-the-salmon	Probably Present	possibly present, rare
Trichodontidae	<i>Trichodon trichodon</i>	Pacific sandfish	Present in Park	present
Zaproridae	<i>Zaprora silenus</i>	prowfish	Present in Park	present
Zoarcidae	<i>Bothrocara brunneum</i>	twoline eelpout	Probably Present	unlikely, offshore species
Zoarcidae	<i>Bothrocara molle</i>	soft eelpout	Probably Present	unlikely, not reported from southeast AK
Zoarcidae	<i>Bothrocara pusillum</i>	Alaska eelpout	Probably Present	present
Zoarcidae	<i>Embryx crotalina</i>	snakehead eelpout	Probably Present	possibly present, rare
Zoarcidae	<i>Gymnelis viridis</i>	fish doctor	Probably Present	unlikely, not reported from southeast AK
Zoarcidae	<i>Lycodapus fierasfer</i>	blackmouth eelpout	Probably Present	unlikely, not reported from southeast AK
Zoarcidae	<i>Lycodapus mandibularis</i>	pallid eelpout	Probably Present	present
Zoarcidae	<i>Lycodes brevipes</i>	shortfin eelpout	Probably Present	present
Zoarcidae	<i>Lycodes diapterus</i>	black eelpout	Probably Present	possibly present
Zoarcidae	<i>Lycodes palearis</i>	wattled eelpout	Probably Present	present
Zoarcidae	<i>Lycodopsis pacifica</i>	blackbelly eelpout	Probably Present	present



## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
decorated warbonnet	<i>Chirolophis decoratus</i>	1	011400101	1	06/28/01	6346
ribbed sculpin	<i>Triglops pingelii</i>	2	011400102	1	06/28/01	6347
blackfin poacher	<i>Bathyagonus nigripinnis</i>	3	011403602	2	08/05/01	6384
walleye pollock	<i>Theragra chalcogramma</i>	4	011100401	10	06/29/01	6308
northern lampfish	<i>Stenobranchius leucopsarus</i>	5	011100501	10	06/29/01	6309
eulachon	<i>Thaleichthys pacificus</i>	6	011100501	2	06/29/01	6309
eulachon	<i>Thaleichthys pacificus</i>	7	011100501	7	06/29/01	6309
capelin	<i>Mallotus villosus</i>	8	011100501	9	06/29/01	6309
eulachon	<i>Thaleichthys pacificus</i>	9	011100601	1	06/29/01	6310
pallid eelpout	<i>Lycodapus mandibularis</i>	10	011100601	1	06/29/01	6310
pallid eelpout	<i>Lycodapus mandibularis</i>	11	011101001	3	06/30/01	6313
northern smoothtongue	<i>Leuroglossus schmidti</i>	12	011101001	10	06/30/01	6313
capelin	<i>Mallotus villosus</i>	13	011101001	2	06/30/01	6313
pallid eelpout	<i>Lycodapus mandibularis</i>	14	011101101	3	06/30/01	6314
pallid eelpout	<i>Lycodapus mandibularis</i>	15	011101301	3	07/02/01	6316
small disk snailfish	<i>Careproctus gilberti</i>	16	011101501	1	07/02/01	6317
small disk snailfish	<i>Careproctus gilberti</i>	17	011101601	1	07/02/01	6318
small disk snailfish	<i>Careproctus gilberti</i>	18	011101801	1	07/03/01	6319
northern smoothtongue	<i>Leuroglossus schmidti</i>	19	011101801	4	07/03/01	6319
longsnout prickleback	<i>Lumpenella longirostris</i>	20	011101801	2	07/03/01	6319
longsnout prickleback	<i>Lumpenella longirostris</i>	21	011101901	3	07/03/01	6320
small disk snailfish	<i>Careproctus gilberti</i>	22	011101901	2	07/03/01	6320
Pacific sandlance	<i>Ammodytes hexapterus</i>	23	011101901	2	07/03/01	6320
stout eelblenny	<i>Anisarchus medius</i>	24	011101901	1	07/03/01	6320
southern rock sole	<i>Lepidopsetta bilineata</i>	25	011400302	2	07/09/01	6348
ribbed sculpin	<i>Triglops pingelii</i>	26	011400302	1	07/09/02	6348
southern rock sole	<i>Lepidopsetta bilineata</i>	27	011400401	3	07/09/01	6349
dover sole	<i>Microstomus pacificus</i>	28	011400401	5	07/09/01	6349
northern sculpin	<i>Icelinus borealis</i>	29	011400401	1	07/09/01	6349
gray starsnout	<i>Bathyagonus alascanus</i>	30	011400403	8	07/09/01	6350
flathead sole	<i>Hippoglossoides elassodon</i>	32	011400501	1	07/10/01	6351
northern sculpin	<i>Icelinus borealis</i>	33	011400502	1	07/10/01	6352
gray starsnout	<i>Bathyagonus alascanus</i>	34	011400502	2	07/10/01	6352
rex sole	<i>Glyptocephalus zachirus</i>	35	011400502	5	07/10/01	6352
northern ronquil	<i>Ronquilus jordani</i>	36	011400502	1	07/10/01	6352
daubed shanny	<i>Leptoclinus maculatus</i>	37	011400502	1	07/10/01	6352
sturgeon poacher	<i>Podothecus accipenserinus</i>	38	011400602	3	07/10/01	6353
rex sole	<i>Glyptocephalus zachirus</i>	39	011400602	3	07/10/01	6353
dover sole	<i>Microstomus pacificus</i>	40	011400602	1	07/10/01	6353
sturgeon poacher	<i>Podothecus accipenserinus</i>	41	011400602	5	07/10/01	6353
northern sculpin	<i>Icelinus borealis</i>	42	011400702	3	07/10/01	6354

## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	43	011400702	2	07/10/01	6354
northern ronquil	<i>Ronquilus jordani</i>	44	011400702	1	07/10/01	6354
smooth aligator fish	<i>Anoplagonus inermis</i>	45	011400702	1	07/10/01	6354
spineyhead sculpin	<i>Dasycottus setiger</i>	46	011400801	4	07/11/01	6355
flathead sole	<i>Hippoglossoides elassodon</i>	48	011400901	1	07/11/01	6356
whitebarred prickleback	<i>Poroclinus rothrocki</i>	49	011400901	1	07/11/01	6356
longsnout prickleback	<i>Lumpenella longirostris</i>	50	011400901	1	07/11/01	6356
spineyhead sculpin	<i>Dasycottus setiger</i>	51	011401001	4	07/12/01	6357
longsnout prickleback	<i>Lumpenella longirostris</i>	52	011401001	2	07/12/01	6357
flathead sole	<i>Hippoglossoides elassodon</i>	53	011401101	1	07/12/01	6358
pallid eelpout	<i>Lycodapus mandibularis</i>	54	011102301	7	07/29/01	6323
longsnout prickleback	<i>Lumpenella longirostris</i>	55	011401101	7	07/12/01	6358
spineyhead sculpin	<i>Dasycottus setiger</i>	56	011401101	2	07/12/01	6358
sandpaper skate	<i>Bathyraja interupta</i>	57	011401201	1	07/12/01	6359
arrowtooth flounder	<i>Atheresthes stomias</i>	59	011401202	1	07/12/01	6360
whitebarred prickleback	<i>Poroclinus rothrocki</i>	60	011401202	1	07/12/01	6360
wattled eelpout	<i>Lycodes palearis</i>	61	011401202	3	07/12/01	6360
Pacific ocean perch	<i>Sebastes alutus</i>	62	011401202	1	07/12/01	6360
prickly snailfish	<i>Paraliparis deani</i>	63	011401302	1	07/13/01	6361
stout eelblenny	<i>Anisarchus medius</i>	64	011401401	2	07/13/01	6362
flathead sole	<i>Hippoglossoides elassodon</i>	69	011401501	1	07/13/01	6363
stout eelblenny	<i>Anisarchus medius</i>	70	011401501	2	07/13/01	6363
thorny sculpin	<i>Icelus spiniger</i>	71	011401501	5	07/13/01	6363
daubed shanny	<i>Leptoclinus maculatus</i>	72	011401501	1	07/13/01	6363
prickly snailfish	<i>Paraliparis deani</i>	73	011200301	10	07/29/01	6337
small disk snailfish	<i>Careproctus gilberti</i>	74	011200301	1	07/29/01	6337
small disk snailfish	<i>Careproctus gilberti</i>	75	011200401	1	07/29/01	6338
stout eelblenny	<i>Anisarchus medius</i>	76	011200401	1	07/29/01	6338
small disk snailfish	<i>Careproctus gilberti</i>	77	011102301	2	07/29/01	6323
wattled eelpout	<i>Lycodes palearis</i>	78	011102301	1	07/29/01	6323
pallid eelpout	<i>Lycodapus mandibularis</i>	79	011102301	3	07/29/01	6323
rougeye rockfish	<i>Sebastes aleutianus</i>	80	011102301	1	07/29/01	6323
northern smoothtongue	<i>Leuroglossus schmidti</i>	81	011401601	1	07/29/01	6364
wattled eelpout	<i>Lycodes palearis</i>	82	011401701	1	07/30/01	6365
flathead sole	<i>Hippoglossoides elassodon</i>	83	011401701	1	07/30/01	6365
stout eelblenny	<i>Anisarchus medius</i>	84	011401701	8	07/30/01	6365
prickly snailfish	<i>Paraliparis deani</i>	85	011402401	1	08/01/01	6366
thorny sculpin	<i>Icelus spiniger</i>	86	011402601	3	08/02/01	6367
darkfin sculpin	<i>Malacocottus zonurus</i>	87	011402601	1	08/02/01	6367
dover sole	<i>Microstomus pacificus</i>	88	011402601	1	08/02/01	6367
flathead sole	<i>Hippoglossoides elassodon</i>	89	011402601	2	08/02/01	6367

## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
prickly snailfish	<i>Paraliparis deani</i>	90	011402701	1	08/02/01	6368
wattled eelpout	<i>Lycodes palearis</i>	91	011402901	1	08/02/01	6369
blackfin poacher	<i>Bathyagonus nigripinnis</i>	92	011402901	2	08/02/01	6369
darkfin sculpin	<i>Malacocottus zonurus</i>	93	011402901	1	08/02/01	6369
dover sole	<i>Microstomus pacificus</i>	94	011403001	1	08/02/01	6370
wattled eelpout	<i>Lycodes palearis</i>	95	011403001	2	08/02/01	6370
gray starsnout	<i>Bathyagonus alascanus</i>	96	011403101	2	08/03/01	6371
sawback poacher	<i>Leptagonus frenatus</i>	97	011403201	1	08/03/01	6372
darkfin sculpin	<i>Malacocottus zonurus</i>	98	011403301	1	08/03/01	6373
thorny sculpin	<i>Icelus spiniger</i>	99	011403301	1	08/03/01	6373
sawback poacher	<i>Leptagonus frenatus</i>	100	011403401	2	08/05/01	6375
blackfin poacher	<i>Bathyagonus nigripinnis</i>	101	011403501	1	08/05/01	6376
rougeye rockfish	<i>Sebastes aleutianus</i>	102	011102601	1	08/07/01	6326
soft sculpin	<i>Psychrolutes sigalutes</i>	103	011102401	1	08/07/01	6324
rougeye rockfish	<i>Sebastes aleutianus</i>	104	011405102	1	08/10/01	6382
thorny sculpin	<i>Icelus spiniger</i>	105	011405102	1	08/10/01	6382
sawback poacher	<i>Leptagonus frenatus</i>	106	011405201	1	08/10/01	6383
Pacific sandfish	<i>Trichodon trichodon</i>	107	011102901	8	08/12/01	6328
Pacific sandlance	<i>Ammodytes hexapterus</i>	108	011102901	1	08/12/01	6328
Pacific herring	<i>Clupea pallasii</i>	109	011102901	1	08/12/01	6328
Pacific sandfish	<i>Trichodon trichodon</i>	110	011103001	2	08/12/01	6329
Pacific sandlance	<i>Ammodytes hexapterus</i>	111	011103201	1	08/12/01	6330
crested sculpin	<i>Blepsias bilobus</i>	112	011103301	1	08/12/01	6331
Pacific herring	<i>Clupea pallasii</i>	113	011103501	1	08/13/01	6332
California headlampfish	<i>Diaphus theta</i>	114	011103801	1	08/13/01	6335
tubenose poacher	<i>Pallasina barbata</i>	115	011300401	1	08/14/01	6343
starry flounder	<i>Platichthys stellatus</i>	116	011300101	1	08/14/01	6341
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	117	011300101	1	08/14/01	6341
pink salmon	<i>Oncorhynchus gorbuscha</i>	118	011300301	4	08/14/01	6342
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	119	011300301	2	08/14/01	6342
rock greenling	<i>Hexagrammos lagocephalus</i>	120	011300301	1	08/14/01	6342
coho salmon	<i>Oncorhynchus kisutch</i>	121	011300301	10	08/14/01	6342
rock greenling	<i>Hexagrammos lagocephalus</i>	122	011300501	3	08/14/01	6344
rock greenling	<i>Hexagrammos lagocephalus</i>	123	011300601	1	08/14/01	6345
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	124	011300601	1	08/14/01	6345
crescent gunnel	<i>Pholis laeta</i>	125	011300601	1	08/14/01	6345
southern rock sole	<i>Lepidopsetta bilineata</i>	126	011300601	1	08/14/01	6345
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	127	011300501	1	08/14/01	6344
crescent gunnel	<i>Pholis laeta</i>	128	011300501	1	08/14/01	6344
prickly snailfish	<i>Paraliparis deani</i>	129	011101901	1	07/03/01	6320
northern smoothtongue	<i>Leuroglossus schmidti</i>	130	011101301	1	07/02/01	6316

## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
armorhead sculpin	<i>Gymnocanthus galeatus</i>	131	011400302	4	07/09/01	6348
shortfin eelpout	<i>Lycodes brevipes</i>	132	011400801	3	07/11/01	6355
shortfin eelpout	<i>Lycodes brevipes</i>	133	011400901	3	07/11/01	6356
marbled snailfish	<i>Liparis dennyi</i>	134	011403101	1	08/03/01	6371
variegated snailfish	<i>Liparis gibbus</i>	135	011403201	2	08/03/01	6372
marbled snailfish	<i>Liparis dennyi</i>	136	011403201	1	08/03/01	6372
unid snailfish	<i>Liparis sp.</i>	137	011404801	1	08/09/01	6381
marbled snailfish	<i>Liparis dennyi</i>	138	011404801	1	08/09/01	6381
unid snailfish	<i>Liparis sp.</i>	139	011404701	1	08/09/01	6380
unid snailfish	<i>Liparis sp.</i>	140	011403101	2	08/03/01	6371
marbled snailfish	<i>Liparis dennyi</i>	141	011402901	2	08/02/01	6369
unid snailfish	<i>Liparis sp.</i>	142	011400403	2	07/09/01	6350
(showy) snailfish	<i>Liparis cf pulchellus</i>	143	011400602	1	07/10/01	6353
unid snailfish	<i>Liparis sp.</i>	144	011400602	3	07/10/01	6353
unid snailfish	<i>Liparis sp.</i>	145	011401001	1	07/11/01	6357
unid snailfish	<i>Liparis sp.</i>	146	011400901	1	07/12/01	6356
unid snailfish	<i>Liparis sp.</i>	147	011401101	1	07/12/01	6358
unid snailfish	<i>Liparis sp.</i>	148	011401202	1	07/10/01	6360
gray starsnout	<i>Bathyagonus alascanus</i>	149	011400602	7	07/02/01	6353
capelin	<i>Mallotus villosus</i>	150	011102001	10	07/13/01	6321
Pacific herring	<i>Clupea pallasii</i>	151	011101201	7	07/02/01	6315
unid snailfish	<i>Liparis cf pulchellus</i>	152	011400602	3	07/10/01	6353
walleye pollock	<i>Theragra chalcogramma</i>	153	011101201	7	07/02/01	6315
darkfin sculpin	<i>Malacocottus zonurus</i>	154	011101201	2	07/02/01	6315
gray starsnout	<i>Bathyagonus alascanus</i>	155	011101201	2	07/02/01	6315
northern smoothtongue	<i>Leuroglossus schmidti</i>	156	011101201	1	07/02/01	6315
small disk snailfish	<i>Careproctus gilberti</i>	157	011403901	1	08/06/01	6377
stout eelblenny	<i>Anisarchus medius</i>	158	011401201	1	07/12/01	6359
stout eelblenny	<i>Anisarchus medius</i>	159	011404102	1	08/06/01	6378
daubed shanny	<i>Leptoclinus maculatus</i>	160	011202301	3	07/29/01	6340
daubed shanny	<i>Leptoclinus maculatus</i>	161	011200501	1	08/03/01	6339
darkfin sculpin	<i>Malacocottus zonurus</i>	162	011102101	1	07/14/01	6322
daubed shanny	<i>Leptoclinus maculatus</i>	163	011102101	2	07/13/01	6322
spineyhead sculpin	<i>Dasycottus setiger</i>	164	011101601	1	07/02/01	6318
soft sculpin	<i>Psychrolutes sigalutes</i>	165	011103501	2	08/13/01	6332
darkfin sculpin	<i>Malacocottus zonurus</i>	166	011103201	3	08/12/01	6330
soft sculpin	<i>Psychrolutes sigalutes</i>	167	011103201	1	08/12/01	6330
soft sculpin	<i>Psychrolutes sigalutes</i>	168	011103301	1	08/12/01	6331
darkfin sculpin	<i>Malacocottus zonurus</i>	169	011200101	1	07/28/01	6336
soft sculpin	<i>Psychrolutes sigalutes</i>	170	011103701	1	08/13/01	6334
spineyhead sculpin	<i>Dasycottus setiger</i>	171	011101501	1	07/02/01	6317

## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
darkfin sculpin	<i>Malacocottus zonurus</i>	172	011200501	1	08/03/01	6339
darkfin sculpin	<i>Malacocottus zonurus</i>	173	011102701	2	08/07/01	6327
rex sole	<i>Glyptocephalus zachirus</i>	174	011103501	1	08/13/01	6332
rex sole	<i>Glyptocephalus zachirus</i>	175	011103601	1	08/13/01	6333
flathead sole	<i>Hippoglossoides elassodon</i>	176	011103601	1	08/13/01	6333
shortfin eelpout	<i>Lycodes brevipes</i>	177	011401101	10	07/12/01	6358
flathead sole	<i>Hippoglossoides elassodon</i>	178	011100201	2	06/29/01	6306
spineycheek starsnout	<i>Bathyagonus infraspinatus</i>	179	011400502	1	07/10/01	6352
spineyhead sculpin	<i>Dasycottus setiger</i>	180	011101301	1	07/02/01	6316
flathead sole	<i>Hippoglossoides elassodon</i>	181	011401701	1	07/30/01	6365
flathead sole	<i>Hippoglossoides elassodon</i>	182	011401202	4	07/12/01	6360
slender sole	<i>Lyopsetta exilis</i>	183	011403001	1	08/02/01	6370
southern rock sole	<i>Lepidopsetta bilineata</i>	184	011400602	15	07/10/01	6353
unid snailfish	<i>Liparis sp.</i>	185	011103601	1	08/13/01	6333
unid snailfish	<i>Liparis sp.</i>	186	011100301	1	06/29/01	6307
gray starsnout	<i>Bathyagonus alascanus</i>	187	011404301	2	08/08/01	6379
gray starsnout	<i>Bathyagonus alascanus</i>	188	011100801	3	06/30/01	6311
unid snailfish	<i>Liparis sp.</i>	189	011103001	3	08/12/01	6329
gray starsnout	<i>Bathyagonus alascanus</i>	190	011103201	1	08/03/01	6330
unid snailfish	<i>Liparis sp.</i>	191	011103801	4	08/13/01	6335
blackfin poacher	<i>Bathyagonus nigripinnis</i>	192	011405101	1	08/10/01	6382
(bigeye) poacher	<i>Bathyagonus cf. pentacanthus</i>	193	011403901	1	08/06/01	6377
gray starsnout	<i>Bathyagonus alascanus</i>	194	011403101	3	08/03/01	6371
Alaska eelpout	<i>Bothrocara pusillum</i>	195	011403001	3	08/02/01	6370
pallid eelpout	<i>Lycodapus mandibularis</i>	196	011101301	2	07/02/01	6316
unid snailfish	<i>Liparis sp.</i>	197	011103501	7	08/13/01	6332
unid snailfish	<i>Careproctus sp.</i>	198	011403302	1	08/03/01	6374
gray starsnout	<i>Bathyagonus alascanus</i>	199	011100901	5	06/30/01	6312
pallid eelpout	<i>Lycodapus mandibularis</i>	200	011101901	1	07/03/01	6320
Alaska eelpout	<i>Bothrocara pusillum</i>	201	011403501	1	08/05/01	6376
specklemouth eelpout	<i>Lycodapus psarostomatus</i>	202	011102501	1	08/07/01	6325
Alaska eelpout	<i>Bothrocara pusillum</i>	203	011402901	7	08/02/01	6369
capelin	<i>Mallotus villosus</i>	204	021100101	5	07/26/02	6384
walleye pollock	<i>Theragra chalcogramma</i>	205	021100101	1	07/26/02	6384
Pacific sandfish	<i>Trichodon trichodon</i>	206	021100201	7	07/26/02	6385
crested sculpin	<i>Blepsias bilobus</i>	207	021100201	1	07/26/02	6385
wattled eelpout	<i>Lycodes palearis</i>	208	021401501	2	07/19/02	6452
walleye pollock	<i>Theragra chalcogramma</i>	209	021100201	3	07/26/02	6385
tadpole sculpin	<i>Psychrolutes paradoxus</i>	210	021401901	1	07/27/02	6457
searcher	<i>Bathymaster signatus</i>	211	021401901	6	07/27/02	6457
yellowfin sole	<i>Limanda aspera</i>	212	021401901	12	07/27/02	6457

## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
English sole	<i>Parophrys vetulus</i>	213	021401901	5	07/27/02	6457
northern ronquil	<i>Ronquilus jordani</i>	214	021401901	1	07/27/02	6457
tubenose poacher	<i>Pallasina barbata</i>	215	021300401	2	07/27/02	6417
Pacific sandfish	<i>Trichodon trichodon</i>	217	021300401	1	07/27/02	6417
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	218	021300401	1	07/27/02	6417
whitespotted greenling	<i>Hexagrammos stelleri</i>	219	021300301	3	07/27/02	6416
Pacific staghorn sculpin	<i>Leptocottus armatus</i>	220	021300101	12	07/27/02	6414
starry flounder	<i>Platichthys stellatus</i>	221	021300101	5	07/27/02	6414
tubenose poacher	<i>Pallasina barbata</i>	222	021300101	1	07/27/02	6414
butter sole	<i>Isopsetta isolepis</i>	253	021403002	1	08/06/02	6463
bigmouth sculpin	<i>Hemitripterus bolini</i>	254	021403201	1	08/06/02	6464
northern ronquil	<i>Ronquilus jordani</i>	255	021403301	1	08/06/02	6465
searcher	<i>Bathymaster signatus</i>	256	021403301	1	08/06/02	6465
butter sole	<i>Isopsetta isolepis</i>	257	021403501	1	08/06/02	6466
searcher	<i>Bathymaster signatus</i>	258	021403501	1	08/06/02	6466
yellowfin sole	<i>Limanda aspera</i>	259	021403501	7	08/06/02	6466
Pacific halibut	<i>Hippoglossus stenolepis</i>	260	021403501	2	08/06/02	6466
northern ronquil	<i>Ronquilus jordani</i>	261	021403601	2	08/06/02	6467
bigmouth sculpin	<i>Hemitripterus bolini</i>	262	021403701	1	08/06/02	6468
bigmouth sculpin	<i>Hemitripterus bolini</i>	263	021102401	1	08/07/02	6398
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	264	021102801	1	08/07/02	6400
tubenose poacher	<i>Pallasina barbata</i>	265	021103201	1	08/07/02	6402
pacific herring	<i>Clupea pallasii</i>	266	021103301	1	08/07/02	6403
surf smelt	<i>Hypomesus pretiosus</i>	267	021302001	4	08/08/02	6430
crescent gunnel	<i>Pholis laeta</i>	268	021302001	3	08/08/02	6430
padded sculpin	<i>Artedius fenestralis</i>	269	021302001	2	08/08/02	6430
surf smelt	<i>Hypomesus pretiosus</i>	270	021302301	1	08/08/02	6433
tidepool sculpin	<i>Artedius fenestralis</i>	271	021302301	1	08/08/02	6433
buffalo sculpin	<i>Enophrys bison</i>	272	021302301	2	08/08/02	6433
crescent gunnel	<i>Pholis laeta</i>	274	021302101	1	08/08/02	6431
padded sculpin	<i>Artedius fenestralis</i>	275	021302101	7	08/08/02	6431
crescent gunnel	<i>Pholis laeta</i>	276	intertidal	1	08/08/02	6481
surf smelt	<i>Hypomesus pretiosus</i>	277	021302201	1	08/08/02	6432
high cockscomb	<i>Anoplarchus purpurescens</i>	278	intertidal	2	08/08/02	6481
crescent gunnel	<i>Pholis laeta</i>	279	intertidal	4	08/08/02	6481
crescent gunnel	<i>Pholis laeta</i>	280	intertidal	11	08/08/02	6481
english sole	<i>Parophrys vetulus</i>	281	021302401	11	08/08/02	6434
Pacific herring	<i>Clupea pallasii</i>	282	021302701	1	08/08/02	6437
Pacific herring	<i>Clupea pallasii</i>	283	021302601	1	08/08/02	6436
surf smelt	<i>Hypomesus pretiosus</i>	284	021302601	1	08/08/02	6436
searcher	<i>Bathymaster signatus</i>	285	021403801	1	08/09/02	6469

## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
whitebarred prickleback	<i>Poroclinus rothrocki</i>	286	021403801	3	08/09/02	6469
slender sole	<i>Lyopsetta exilis</i>	287	021403801	2	08/09/02	6469
whitebarred prickleback	<i>Poroclinus rothrocki</i>	288	021403901	3	08/09/02	6470
searcher	<i>Bathymaster signatus</i>	289	021403901	1	08/09/02	6470
Pacific halibut	<i>Hippoglossus stenolepis</i>	290	021404001	1	08/09/02	6471
searcher	<i>Bathymaster signatus</i>	291	021404001	4	08/09/02	6471
northern ronquil	<i>Ronquillus jordani</i>	292	021404001	3	08/09/02	6471
whitebarred prickleback	<i>Poroclinus rothrocki</i>	293	021404101	8	08/09/02	6472
searcher	<i>Bathymaster signatus</i>	294	021404201	2	08/09/02	6473
Pacific halibut	<i>Hippoglossus stenolepis</i>	295	021404501	1	08/09/02	6476
Pacific cod	<i>Gadus macrocephalus</i>	296	021404501	1	08/09/02	6476
silverspot sculpin	<i>Blepsias cirrhosus</i>	297	021404501	1	08/09/02	6476
(antlered) sculpin	<i>Enophrys cf. diceraus</i>	298	021404501	4	08/09/02	6476
tadpole sculpin	<i>Psychrolutes paradoxus</i>	299	021404501	8	08/09/02	6476
arctic shanny	<i>Stichaeus punctatus</i>	300	021404601	2	08/11/02	6477
Pacific cod	<i>Gadus macrocephalus</i>	301	021404601	3	08/11/02	6477
sturgeon poacher	<i>Podothecus accipenserinus</i>	302	021404601	2	08/11/02	6477
tubenose poacher	<i>Pallasina barbata</i>	303	021404601	1	08/11/02	6477
eyeshade sculpin	<i>Nautichthys pribilovius</i>	304	021404601	2	08/11/02	6477
tubenose poacher	<i>Pallasina barbata</i>	305	021404701	1	08/11/02	6478
arrowtooth flounder	<i>Atheresthes stomias</i>	306	021405001	1	08/11/02	6479
silverspot sculpin	<i>Blepsias cirrhosus</i>	307	021405101	2	08/11/02	6480
crested sculpin	<i>Blepsias bilobus</i>	308	021103701	3	08/12/02	6404
crested sculpin	<i>Blepsias bilobus</i>	309	021103901	3	08/12/02	6405
Pacific herring	<i>Clupea pallasii</i>	310	021104001	4	08/12/02	6406
crested sculpin	<i>Blepsias bilobus</i>	311	021104101	5	08/12/02	6407
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	312	021104401	1	08/12/02	6409
crested sculpin	<i>Blepsias bilobus</i>	313	021104401	3	08/12/02	6409
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	314	021104601	1	08/13/02	6411
spineyhead sculpin	<i>Dasycottus setiger</i>	315	021401001	3	07/16/02	6448
arrowtooth flounder	<i>Atheresthes stomias</i>	316	021404401	1	08/10/02	6475
tadpole sculpin	<i>Psychrolutes paradoxus</i>	317	021403901	1	08/09/02	6470
roughspine sculpin	<i>Triglops macellus</i>	318	021403901	1	08/09/02	6470
black belly eelpout	<i>Lycodes pacificus</i>	319	021403901	10	08/09/02	6470
yellowfin sole	<i>Limanda aspera</i>	320	021401801	3	07/25/02	6456
Pacific cod	<i>Gadus macrocephalus</i>	321	021300401	1	07/27/02	6417
sharpnose sculpin	<i>Clinocottus acuticeps</i>	322	021300401	2	07/27/02	6417
tidepool sculpin	<i>Oligocottus maculosus</i>	323	021300401	1	07/27/02	6417
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	324	021300401	1	07/27/02	6417
buffalo sculpin	<i>Enophrys bison</i>	325	021302101	1	08/08/02	6431
coho salmon	<i>Oncorhynchus kisutch</i>	326	021300401	3	07/27/02	6417

## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
dolly varden	<i>Salvelinus malma</i>	327	021300401	1	07/27/02	6417
coho salmon	<i>Oncorhynchus kisutch</i>	328	021302601	1	08/08/02	6436
rock greenling	<i>Hexagrammos lagocephalus</i>	329	021300401	7	07/27/02	6417
surf smelt	<i>Hypomesus pretiosus</i>	330	021300201	1	07/27/02	6415
slipskin snailfish	<i>Liparis fucensis</i>	331	intertidal	2	08/08/02	6481
rock greenling	<i>Hexagrammos lagocephalus</i>	332	021302501	1	08/08/02	6435
flathead sole	<i>Hippoglossoides elassodon</i>	333	021401301	12	07/17/02	6450
thorny sculpin	<i>Icelus spiniger</i>	334	021401001	1	07/16/02	6448
spineyhead sculpin	<i>Dasycottus setiger</i>	335	021401201	1	07/17/02	6449
smallmouth ronquil	<i>Bathymaster leurolepis</i>	336	021401401	1	07/18/02	6451
southern rock sole	<i>Lepidopsetta bilineata</i>	337	021401401	1	07/18/02	6451
starry flounder	<i>Platichthys stellatus</i>	338	021400701	1	07/15/02	6446
butter sole	<i>Isopsetta isolepis</i>	339	021403501	2	08/06/02	6466
snake prickleback	<i>Lumpenus sagitta</i>	341	021400301	3	07/13/02	6443
yellowfin sole	<i>Limanda aspera</i>	342	021400301	2	07/13/02	6443
dover sole	<i>Microstomus pacificus</i>	343	021400301	2	07/13/02	6443
arrowtooth flounder	<i>Atheresthes stomias</i>	344	021400301	1	07/13/02	6443
spineycheek starsnout	<i>Bathyagonus infraspinus</i>	345	021400301	1	07/13/02	6443
whitebarred prickleback	<i>Poroclinus rothrocki</i>	346	021400201	2	07/13/02	6442
longsnout prickleback	<i>Lumpenella longirostris</i>	347	021400201	1	07/13/02	6442
rex sole	<i>Glyptocephalus zachirus</i>	348	021400301	7	07/13/02	6443
gray starsnout	<i>Bathyagonus alascanus</i>	349	021400201	2	07/13/02	6442
spineycheek starsnout	<i>Bathyagonus infraspinus</i>	350	021400301	1	07/13/02	6443
daubed shanny	<i>Leptoclinus maculatus</i>	351	021400301	12	07/13/02	6443
coho salmon	<i>Oncorhynchus kisutch</i>	352	021300201	8	07/27/02	6415
pink salmon	<i>Oncorhynchus gorbuscha</i>	353	021300201	1	07/27/02	6415
dolly varden	<i>Salvelinus malma</i>	354	021300201	5	07/27/02	6415
shortfin eelpout	<i>Lycodes brevipes</i>	355	021400201	4	07/13/02	6442
padded sculpin	<i>Artedius fenestralis</i>	356	021103101	1	08/07/02	6401
spineycheek starsnout	<i>Bathyagonus infraspinus</i>	357	021401701	1	07/25/02	6455
southern rock sole	<i>Lepidopsetta bilineata</i>	358	021404701	30	08/11/02	6478
spineyhead sculpin	<i>Dasycottus setiger</i>	359	021400901	1	07/16/02	6447
daubed shanny	<i>Leptoclinus maculatus</i>	362	021103101	5	08/07/02	6401
tadpole sculpin	<i>Psychrolutes paradoxus</i>	364	021404601	1	08/11/02	6477
tadpole sculpin	<i>Psychrolutes paradoxus</i>	365	021405001	2	08/11/02	6479
sturgeon poacher	<i>Podothecus accipenserinus</i>	367	021404701	24	08/11/02	6478
searcher	<i>Bathymaster signatus</i>	368	021401901	1	07/27/02	6457
surf smelt	<i>Hypomesus pretiosus</i>	369	021300101	5	07/27/02	6414
tidepool sculpin	<i>Oligocottus maculosus</i>	370	021300101	1	07/27/02	6414
sailfin sculpin	<i>Nautichthys oculofasciatus</i>	371	021104901	1	08/13/02	6413
smooth aligatorfish	<i>Anoplagonus inermis</i>	372	024100101	2	07/12/02	6439



## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
capelin	<i>Mallotus villosus</i>	373	021401601	6	07/20/02	6453
spineycheek starsnout	<i>Bathyagonus infraspinatus</i>	374	021400501	3	07/14/02	6445
northern ronquil	<i>Ronquillus jordani</i>	375	021405101	1	08/11/02	6480
spineycheek starsnout	<i>Bathyagonus infraspinatus</i>	376	021405101	1	08/11/02	6480
shortfin eelpout	<i>Lycodes palearis</i>	377	021400501	1	07/14/02	6445
ribbed sculpin	<i>Triglops pingelii</i>	378	021404501	3	08/11/02	6476
dover sole	<i>Microstomus pacificus</i>	379	021401501	2	07/19/02	6452
flathead sole	<i>Hippoglossoides elassodon</i>	380	021401301	7	07/17/02	6450
padded sculpin	<i>Artedius fenestralis</i>	381	021404601	1	08/11/02	6477
tidepool sculpin	<i>Oligocottus maculosus</i>	382	021300101	7	07/27/02	6414
whitebarred prickleback	<i>Poroclinus rothrocki</i>	383	021404401	1	08/10/02	6475
snake prickleback	<i>Lumpenus sagitta</i>	384	021404001	3	08/10/02	6471
whitebarred prickleback	<i>Poroclinus rothrocki</i>	385	021403901	1	08/09/02	6470
stout eelblenny	<i>Anisarchus medius</i>	386	021400201	4	07/13/02	6442
gray starsnout	<i>Bathyagonus alascanus</i>	387	021403801	4	08/09/02	6469
spineycheek starsnout	<i>Bathyagonus infraspinatus</i>	388	021404401	7	08/10/02	6475
black belly eelpout	<i>Lycodes pacificus</i>	389	021404201	1	08/10/02	6473
northern lampfish	<i>Stenobranchius leucopsarus</i>	390	021104101	2	08/12/02	6407
slim sculpin	<i>Radulinus asprellus</i>	391	021403901	1	08/09/02	6470
shortmast sculpin	<i>Nautichthys robustus</i>	392	021400104	1	07/12/02	6441
slim sculpin	<i>Radulinus asprellus</i>	393	021404101	1	08/10/02	6472
northern sculpin	<i>Icelinus borealis</i>	394	021400101	1	07/12/02	6439
bigmouth sculpin	<i>Hemitripterus bolini</i>	395	021401601	2	07/20/02	6453
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	396	021401601	2	07/20/02	6453
slim sculpin	<i>Radulinus asprellus</i>	397	021404201	3	08/10/02	6473
northern lampfish	<i>Stenobranchius leucopsarus</i>	398	021100201	7	07/26/02	6385
tadpole sculpin	<i>Psychrolutes paradoxus</i>	399	021404301	1	08/10/02	6474
slim sculpin	<i>Radulinus asprellus</i>	400	021403801	2	08/09/02	6469
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	401	021400104	1	07/12/02	6441
bigmouth sculpin	<i>Hemitripterus bolini</i>	402	021401603	3	07/21/02	6454
black belly eelpout	<i>Lycodes pacificus</i>	403	021403801	2	08/09/02	6469
black belly eelpout	<i>Lycodes pacificus</i>	404	021404101	14	08/10/02	6472
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	405	021400102	1	07/12/02	6440
red Irish lord	<i>Hemilepidotus hemilepidotus</i>	406	021400101	1	07/12/02	6439
daubed shanny	<i>Leptoclinus maculatus</i>	407	021401601	10	07/20/02	6453
spineyhead sculpin	<i>Dasycottus setiger</i>	408	021400501	2	07/14/02	6445
Pacific tomcod	<i>Microgadus proximus</i>	409	021103201	1	08/07/02	6402
snake prickleback	<i>Lumpenus sagitta</i>	410	021400501	8	07/14/02	6445
snake prickleback	<i>Lumpenus sagitta</i>	411	021400501	8	07/15/02	6445
walleye pollock	<i>Theragra chalcogramma</i>	412	021401601	1	07/20/02	6453
eulachon	<i>Thaleichthys pacificus</i>	413	021400501	2	07/13/02	6445

## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
spineycheek starsnout	<i>Bathyagonus infraspinatus</i>	415	021400402	1	07/14/02	6444
spineycheek starsnout	<i>Bathyagonus infraspinatus</i>	416	021400501	2	07/14/02	6445
soft sculpin	<i>Psychrolutes sigalutes</i>	417	021104601	12	08/13/02	6411
northern sculpin	<i>Icelinus borealis</i>	418	021403501	1	08/06/02	6466
high cockscomb	<i>Anoplarchus purpurescens</i>	419	intertidal	1	07/25/02	6482
high cockscomb	<i>Anoplarchus purpurescens</i>	420	intertidal	4	07/23/02	6483
Alaska eelpout	<i>Bothrocara pusillum</i>	421	021104501	1	08/12/02	6410
dover sole	<i>Microstomus pacificus</i>	423	021400501	1	07/14/02	6445
dover sole	<i>Microstomus pacificus</i>	425	021400402	1	07/13/02	6444
rex sole	<i>Glyptocephalus zachirus</i>	426	021400402	1	07/13/02	6444
rex sole	<i>Glyptocephalus zachirus</i>	427	021400201	1	07/13/02	6442
dover sole	<i>Microstomus pacificus</i>	428	021401601	4	07/19/02	6453
flathead sole	<i>Hippoglossoides elassodon</i>	429	021401501	3	07/19/02	6452
southern rock sole	<i>Lepidopsetta bilineata</i>	430	021404001	8	08/10/02	6471
dover sole	<i>Microstomus pacificus</i>	431	021400201	1	07/13/02	6442
frog sculpin	<i>Myoxocephalus stelleri</i>	432	021404601	2	08/11/02	6477
northern smoothtongue	<i>Leuroglossus schmidti</i>	434	021104501	1	08/12/02	6410
rougeye rockfish	<i>Sebastes aleutianus</i>	436	021401901	1	07/27/02	6457
rougeye rockfish	<i>Sebastes aleutianus</i>	437	021403801	1	08/09/02	6469
rougeye rockfish	<i>Sebastes aleutianus</i>	438	021404001	1	08/10/02	6471
rougeye rockfish	<i>Sebastes aleutianus</i>	439	021404401	7	08/10/02	6475
yellowmouth rockfish	<i>Sebastes reedi</i>	440	021400402	1	07/14/02	6444
smooth lumpsucker	<i>Aptocyclus ventricosus</i>	441	021404501	2	08/11/02	6476
smooth lumpsucker	<i>Aptocyclus ventricosus</i>	442	021405001	1	08/11/02	6479
ribbed sculpin	<i>Triglops pingelii</i>	443	021404701	1	08/11/02	6478
high cockscomb	<i>Anoplarchus purpurescens</i>	444	intertidal	1	08/08/02	6481
ribbon snailfish	<i>Liparis cyclopus</i>	445	intertidal	1	08/08/02	6481
threaded sculpin	<i>Gymnocanthus pistilliger</i>	446	021404601	4	08/11/02	6477
threaded sculpin	<i>Gymnocanthus pistilliger</i>	447	021404501	17	08/11/02	6476
armorhead sculpin	<i>Gymnocanthus galeatus</i>	448	021404501	1	08/11/02	6476
northern smoothtongue	<i>Leuroglossus schmidti</i>	449	021104201	6	08/12/02	6408
capelin	<i>Mallotus villosus</i>	450	021302301	10	08/08/02	6433
Pacific herring	<i>Clupea pallasii</i>	451	021302301	2	08/08/02	6433
flathead sole	<i>Hippoglossoides elassodon</i>	452	021404401	10	08/10/02	6475
arrowtooth flounder	<i>Atheresthes stomias</i>	453	021404201	2	08/10/02	6473
arrowtooth flounder	<i>Atheresthes stomias</i>	454	021403901	6	08/09/02	6470
arrowtooth flounder	<i>Atheresthes stomias</i>	455	021404101	5	08/10/02	6472
butter sole	<i>Isopsetta isolepis</i>	456	021404701	2	08/11/02	6478
butter sole	<i>Isopsetta isolepis</i>	457	021404601	1	08/11/02	6477
butter sole	<i>Isopsetta isolepis</i>	458	021401901	1	07/27/02	6457
arrowtooth flounder	<i>Atheresthes stomias</i>	459	021404301	3	08/10/02	6474

## Appendix 2. Glacier Bay Voucher List

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
pallid eelpout	<i>Lycodapus mandibularis</i>	460	021104501	1	08/12/02	6410
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	461	021104701	1	08/13/02	6412
thorny sculpin	<i>Icelus spiniger</i>	462	021403801	1	08/09/02	6469
(showy) snailfish	<i>Liparis cf pulchellus</i>	464	021404401	2	08/10/02	6475
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	465	021302001	9	08/08/02	6430
slipskin snailfish	<i>Liparis fucensis</i>	466	021404301	1	08/10/02	6474
(showy) snailfish	<i>Liparis cf pulchellus</i>	467	021404301	4	08/10/02	6474
marbled snailfish	<i>Liparis dennyi</i>	468	021404501	1	08/11/02	6476
slipskin snailfish	<i>Liparis fucensis</i>	469	021403002	1	08/06/02	6463
marbled snailfish	<i>Liparis dennyi</i>	470	021405101	1	08/11/02	6480
ribbon snailfish	<i>Liparis cyclopus</i>	471	021405101	1	08/11/02	6480
(showy) snailfish	<i>Liparis cf pulchellus</i>	472	021405101	2	08/11/02	6480
variegated snailfish	<i>Liparis gibbus</i>	473	021404001	1	08/10/02	6471
(showy) snailfish	<i>Liparis cf pulchellus</i>	474	021404701	1	08/11/02	6478
(showy) snailfish	<i>Liparis cf pulchellus</i>	475	021401901	1	07/27/02	6457
ribbon snailfish	<i>Liparis cyclopus</i>	476	021404601	1	08/11/02	6477
wattled eelpout	<i>Lycodes palearis</i>	480	21401601	10	07/20/02	6453
unid larval snailfish	<i>Liparis sp.</i>	481	21403801	1	08/09/02	6469
unid rockfish	<i>Sebastes sp.</i>	483	21403901	1	08/09/02	6470
frog sculpin	<i>Myoxocephalus stelleri</i>	484	21404601	3	08/11/02	6477
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	485	21404601	3	08/11/02	6477
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	486	21302101	2	08/08/02	6431
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	487	21302701	2	08/08/02	6437
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	488	21302301	1	08/08/02	6433
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	490	21404501	9	08/11/02	6476
wattled eelpout	<i>Lycodes palearis</i>	491	21403301	1	08/06/02	6465
eulachon	<i>Thaleichthys pacificus</i>	492	21102501	1	08/07/02	6399
eulachon	<i>Thaleichthys pacificus</i>	493	21403501	2	08/06/02	6466
rougheyeye rockfish	<i>Sebastes aleutianus</i>	495	21404101	15	08/10/02	6472

Appendix 3. Wrangell-St. Elias Voucher Collection  
 Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
starry flounder	<i>Platichthys stellatus</i>	223	021300801	3	07/29/02	6420
Pacific sandfish	<i>Trichodon trichodon</i>	224	021300901	3	07/29/02	6421
Pacific sandlance	<i>Ammodytes hexapterus</i>	225	021300901	16	07/29/02	6421
bigmouth sculpin	<i>Hemitripterus bolini</i>	226	021402401	1	07/30/02	6458
Pacific sandlance	<i>Ammodytes hexapterus</i>	227	021100601	2	07/31/02	6386
longfin smelt	<i>Spirinchus thaleichthys</i>	228	021101101	1	07/31/02	6388
longfin smelt	<i>Spirinchus thaleichthys</i>	229	021101201	3	07/31/02	6389
longfin smelt	<i>Spirinchus thaleichthys</i>	230	021101301	4	07/31/02	6390
pink salmon	<i>Oncorhynchus gorbuscha</i>	231	021101401	1	08/01/02	6391
pink salmon	<i>Oncorhynchus gorbuscha</i>	232	021101501	1	08/02/02	6392
tadpole sculpin	<i>Psychrolutes paradoxus</i>	233	021101601	1	08/02/02	6393
pacific cod	<i>Gadus macrocephalus</i>	234	021101601	4	08/02/02	6393
bigmouth sculpin	<i>Hemitripterus bolini</i>	235	021402501	7	08/02/02	6459
bigmouth sculpin	<i>Hemitripterus bolini</i>	236	021402502	1	08/02/02	6460
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	237	021402502	2	08/02/02	6460
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	238	021102001	2	08/02/02	6394
soft sculpin	<i>Psychrolutes sigalutes</i>	239	021102001	8	08/02/02	6394
soft sculpin	<i>Psychrolutes sigalutes</i>	240	021102002	10	08/02/02	6395
Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>	241	021102002	1	08/02/02	6395
Pacific sandlance	<i>Ammodytes hexapterus</i>	242	021301401	22	08/03/02	6424
crescent gunnel	<i>Pholis laeta</i>	243	021301401	1	08/03/02	6424
Pacific herring	<i>Clupea pallasii</i>	244	021301301	1	08/03/02	6423
whitespotted greenling	<i>Hexagrammos stelleri</i>	245	021301301	1	08/03/02	6423
buffalo sculpin	<i>Enophrys bison</i>	246	021301901	1	08/04/02	6429
tidepool sculpin	<i>Oligocottus maculosus</i>	247	021301701	1	08/04/02	6427
whitespotted greenling	<i>Hexagrammos stelleri</i>	248	021301501	4	08/04/02	6425
pink salmon	<i>Oncorhynchus gorbuscha</i>	249	021301501	9	08/04/02	6425
tidepool sculpin	<i>Oligocottus maculosus</i>	250	021301801	1	08/04/02	6428
tidepool sculpin	<i>Oligocottus maculosus</i>	251	021301602	1	08/04/02	6426
Pacific cod	<i>Gadus macrocephalus</i>	252	021102101	1	08/04/02	6396
tidepool sculpin	<i>Oligocottus maculosus</i>	340	021301901	2	08/04/02	6429
soft sculpin	<i>Psychrolutes sigalutes</i>	360	021102301	6	08/04/02	6397
daubed shanny	<i>Leptoclinus maculatus</i>	361	021102301	8	08/04/02	6397
snake prickleback	<i>Lumpenus sagitta</i>	363	021101201	10	07/31/02	6389
wattled eelpout	<i>Lycodes palearis</i>	366	021101201	1	07/31/02	6389
capelin	<i>Mallotus villosus</i>	414	021100601	10	07/31/02	6386
coho salmon	<i>Oncorhynchus kisutch</i>	422	021301301	1	08/03/02	6423
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	433	021300301	3	07/27/02	6416
sockeye salmon	<i>Oncorhynchus nerka</i>	435	021101401	1	08/01/02	6391
(showy) snailfish	<i>Liparis cf pulchellus</i>	463	021402802	2	08/03/02	6462
unid larval snailfish	<i>Liparis sp.</i>	477	021300501	1	07/29/02	6418

Appendix 3. Wrangell-St. Elias Voucher Collection

Common names in parentheses indicate compare form (cf) specimens.

Common name	Scientific Name	Voucher	Set #	Count	Date	Cat. no.
unid larval snailfish	<i>Liparis sp.</i>	478	021300501	1	07/29/02	6418
wattled eelpout	<i>Lycodes palearis</i>	479	021402601	1	08/02/02	6461
unid larval snailfish	<i>Liparis sp.</i>	482	021300601	2	07/29/02	6419
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	489	021301001	2	07/29/02	6422
slender sole	<i>Lyopsetta exilis</i>	494	021101001	1	07/31/02	6387

## Appendix 4. Sitka Voucher Collection

Common names in parentheses indicate compare form (cf) specimens.

Common Name	Scientific Name	Voucher	Count	Date
penpoint gunnel	<i>Apodichthys flavidus</i>	1	1	6/18/2001
crescent gunnel	<i>Pholis laeta</i>	2	2	6/18/2001
padded sculpin	<i>Artedius fenestralis</i>	3	1	6/18/2001
red Irish lord	<i>Hemilepidotus hemilepidotus</i>	4	2	6/18/2001
tubenose poacher	<i>Pallasina barbata</i>	5	2	6/18/2001
coho salmon	<i>Oncorhynchus kisutch</i>	6	3	6/18/2001
starry flounder	<i>Platichthys stellatus</i>	7	9	6/18/2001
buffalo sculpin	<i>Enophrys bison</i>	8	4	6/18/2001
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	9	2	6/18/2001
pink salmon	<i>Oncorhynchus gorbuscha</i>	10	6	6/18/2001
silverspotted sculpin	<i>Blepsias cirrhosus</i>	12	2	6/18/2001
masked greenling	<i>Hexagrammos octogrammus</i>	13	8	6/18/2001
tubesnout	<i>Aulorhynchus flavidus</i>	40	2	7/23/2001
tubenose poacher	<i>Pallasina barbata</i>	41	3	9/18/2001
tubesnout	<i>Aulorhynchus flavidus</i>	42	3	9/18/2001
whitespotted greenling	<i>Hexagrammos stelleri</i>	43	1	6/18/2001
silverspotted sculpin	<i>Blepsias cirrhosus</i>	44	1	9/18/2001
staghorn sculpin	<i>Leptocottus armatus</i>	45	9	6/19/2001
coho salmon	<i>Oncorhynchus kisutch</i>	46	7	6/18/2001
buffalo sculpin	<i>Enophrys bison</i>	47	3	6/18/2001
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	48	4	6/18/2001
unid. gunnel	<i>Pholis sp.</i>	49	2	6/18/2001
rock greenling	<i>Hexagrammos lagocephalus</i>	50	1	9/18/2001
tidepool sculpin	<i>Oligocottus maculosus</i>	51	1	6/19/2001
chum salmon	<i>Oncorhynchus keta</i>	52	1	6/18/2001
rock greenling	<i>Hexagrammos lagocephalus</i>	53	1	7/23/2001
masked greenling	<i>Hexagrammos octogrammus</i>	54	1	7/23/2001
Pacific cod	<i>Gadus macrocephalus</i>	55	2	7/23/2001
Pacific cod	<i>Gadus macrocephalus</i>	56	1	7/23/2001
cabazon	<i>Scorpaenichthys marmoratus</i>	58	1	9/18/2001
shiner perch	<i>Cymatogaster aggregata</i>	59	8	6/18/2001
shiner perch	<i>Cymatogaster aggregata</i>	60	2	6/18/2001
masked greenling	<i>Hexagrammos octogrammus</i>	61	1	9/18/2001
manacled sculpin	<i>Synchirus gilli</i>	62	3	9/18/2001
red Irish lord	<i>Hemilepidotus hemilepidotus</i>	63	1	7/23/2001
tidepool snailfish	<i>Liparis florae</i>	64	1	6/19/2001
(redstripe) rockfish	<i>Sebastes cf proriger</i>	65	1	7/23/2001
king salmon	<i>Oncorhynchus tshawytscha</i>	66	5	7/23/2001
buffalo sculpin	<i>Enophrys bison</i>	67	1	6/18/2001
tidepool sculpin	<i>Oligocottus maculosus</i>	68	1	7/23/2001

Appendix 5. Klondike Gold Voucher List

Common Name	Scientific Name	Voucher	Set #	Count	Date
Dolly Varden char	<i>Salvelinus malma</i>	1	1	6	6/19/2001
starry flounder	<i>Platichthys stellatus</i>	5	1	8	6/19/2001
capelin	<i>Mallotus villosus</i>	7	7	10	6/19/2001
unid. gunnel	<i>Pholis sp.</i>	8	Minnow trap	1	6/19/2001
starry flounder	<i>Platichthys stellatus</i>	40	2	1	8/8/2001
unid. gunnel	<i>Pholis sp.</i>	41	Minnow trap	1	7/10/2001
high cockscomb	<i>Anoplarchus purpurescens</i>	42	Intertidal search	3	7/13/2001
high cockscomb	<i>Anoplarchus purpurescens</i>	43	Intertidal search	5	8/8/2001
walleye pollock	<i>Theragra chalcogramma</i>	44	Minnow trap	1	9/12/2001
high cockscomb	<i>Anoplarchus purpurescens</i>	45	Minnow trap	1	8/9/2001
crescent gunnel	<i>Pholis laeta</i>	46	Intertidal search	1	7/13/2001
walleye pollock	<i>Theragra chalcogramma</i>	47	1	1	9/7/2001
Pacific staghorn sculpin	<i>Leptocottus armatus</i>	48	1	2	9/12/2001
chum salmon	<i>Oncorhynchus keta</i>	49	3	1	7/12/2001
Pacific staghorn sculpin	<i>Leptocottus armatus</i>	50	4	1	9/17/2001
unid. rock sole	<i>Lepidopsetta sp.</i>	51	Intertidal search	1	7/13/2001
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	52	3	1	7/12/2001
Pacific staghorn sculpin	<i>Leptocottus armatus</i>	53	3	1	7/12/2001
starry flounder	<i>Platichthys stellatus</i>	54	4	1	8/8/2001
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	55	2	1	8/8/2001
great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	56	3	3	7/12/2001
unid. gunnel	<i>Pholis sp.</i>	57	Minnow trap	3	9/12/2001
Dolly Varden char	<i>Salvelinus malma</i>	58	2	3	7/10/2001
Dolly Varden char	<i>Salvelinus malma</i>	59	3	3	7/10/2001
Pacific staghorn sculpin	<i>Leptocottus armatus</i>	60	5	35	7/10/2001
pink salmon	<i>Oncorhynchus gorbuscha</i>	61	5	1	7/10/2001
Pacific staghorn sculpin	<i>Leptocottus armatus</i>	62	2	2	7/10/2001
chinook salmon	<i>Oncorhynchus tshawytscha</i>	63	2	1	6/19/2001
Pacific staghorn sculpin	<i>Leptocottus armatus</i>	64	4	1	7/12/2001
pink salmon	<i>Oncorhynchus gorbuscha</i>	65	4	1	7/12/2001
pink salmon	<i>Oncorhynchus gorbuscha</i>	66	2	2	7/12/2001
Dolly Varden char	<i>Salvelinus malma</i>	67	4	1	6/19/2001
pink salmon	<i>Oncorhynchus gorbuscha</i>	68	4	3	7/10/2001
chum salmon	<i>Oncorhynchus keta</i>	69	5	3	6/19/2001
Dolly Varden char	<i>Salvelinus malma</i>	70	5	6	6/19/2001
chum salmon	<i>Oncorhynchus keta</i>	71	5	1	6/19/2001
Dolly Varden char	<i>Salvelinus malma</i>	72	1	4	7/10/2001
pink salmon	<i>Oncorhynchus gorbuscha</i>	73	8	3	6/19/2001
Dolly Varden char	<i>Salvelinus malma</i>	74	8	5	6/19/2001
chum salmon	<i>Oncorhynchus keta</i>	75	6	6	6/19/2001