

## 2021 Western Gulf of Alaska Nearshore Survey Cruise Report

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This report documents the sampling that was conducted during the fourth annual western Gulf of Alaska nearshore survey of juvenile commercially important fishes.

Sampling was conducted from the 45' vessel *Galactic* between 1 July and 7 August, 2021. Beach seines were the primary sampling method. A total of 68 successful beach seine sets were made at 14 bays on Kodiak Island, the Alaska Peninsula, Shumagin Islands, and Sanak Island (Fig. 1). For each set, habitat information, temperature, and salinity were recorded, and a CTD cast was made in each bay to record temperature and salinity profiles. In addition, 37 baited camera sets were made to evaluate the abundance of age-1 Pacific cod.

A highlight of the survey this year was an exploratory effort to expand sampling westward to Sanak Island. This expansion of the survey area was motivated by a desire to evaluate juvenile Pacific cod dynamics over a wider span of the east-west temperature gradient in the Gulf. However, we found poor habitat for beach seine sampling at Sanak and were only able to make four successful sets in two bays (Caton Harbor and Northeast Harbor). No cod were captured in those sets.

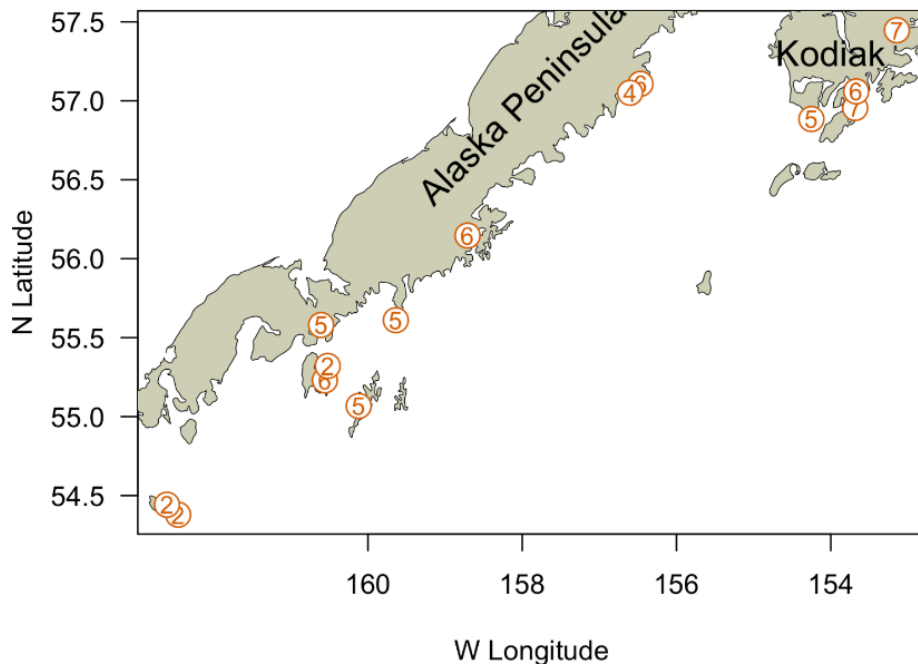


Fig. 1. Survey area, with number of seine sets in each bay.

A total of 26,026 fish from 39 species were captured in seines (Fig. 2). To provide a preliminary estimate of 2021 year class abundance for Pacific cod and walleye pollock, we fit zero-inflated negative binomial Bayesian regression models to data from the western Gulf survey (2018-2021) and long-term data from two bays on Kodiak (2006-2020). These models control for interannual differences in both the

seasonal timing of sampling and the sites and bays sampled. This preliminary model estimates 2021 Pacific cod catch per unit effort (CPUE) as 18 fish / set (95% credible interval: 9 – 38 fish / set), which is near the median log value for the 2006-2020 time series (Fig. 3). The preliminary model for walleye

pollock estimates 2021 CPUE as 0.03 fish / set (95% credible interval: 0.0002 – 2 fish / set), one of the weaker year classes in the time series (Fig. 4).

A total of 1,332 juvenile pink salmon were captured. Average log-transformed ( $x + 1$ ) CPUE by bay are presented in Fig. 5.

In addition to abundance data, we recorded lengths for 640 Pacific cod, 179 pink salmon, and 70 walleye pollock. We retained  $\approx 600$  whole frozen cod and  $\approx 50$  walleye pollock for analysis of body condition, lipid profiles, and otolith aging and microchemistry. Fin clips were taken

from 216 Pacific cod for genetic analysis. In addition, samples were retained for a number of other researchers, including forage fish for saxotoxin analysis by University of Alaska and NOAA researchers, age-0 Pacific cod prey items for Oregon State University researchers, and rockfish and pink salmon samples for Alaska Department of Fish and Game researchers.

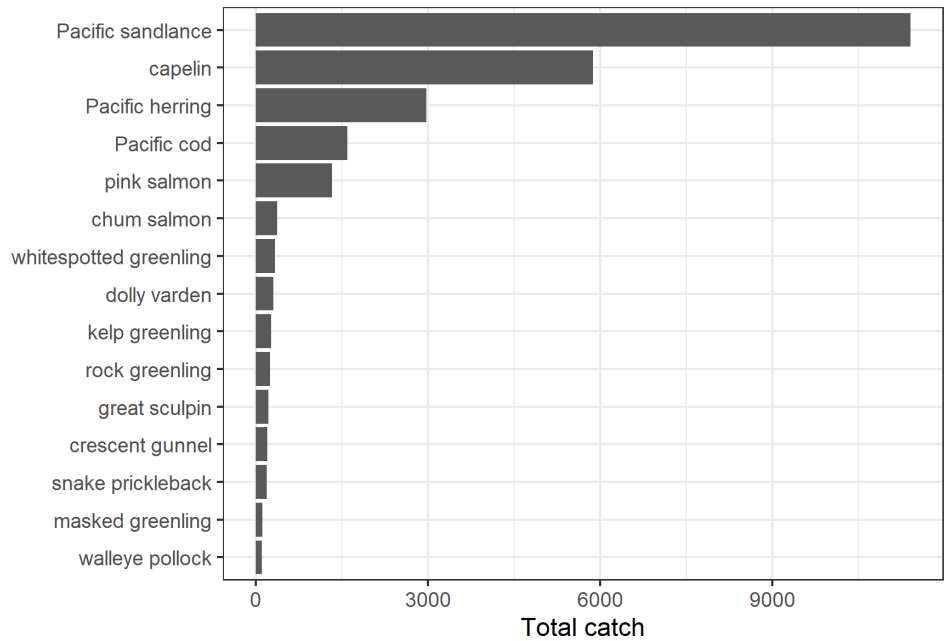
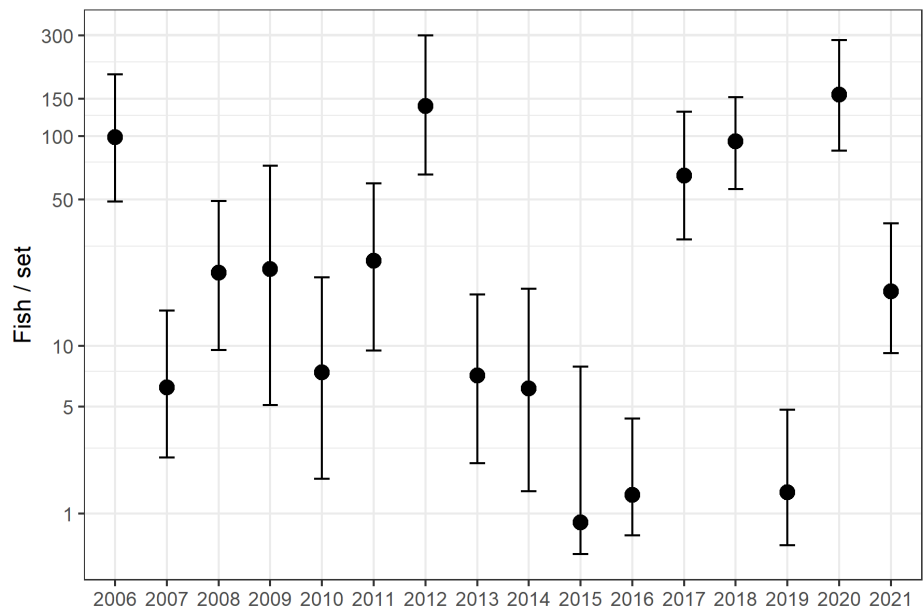


Fig. 2. Total catch for 15 most abundant species.

Fig. 3. Estimated Pacific cod year class strength at age-0 from beach seine surveys, 2006-2020, with preliminary estimate for 2021: posterior means and 95% credible intervals.



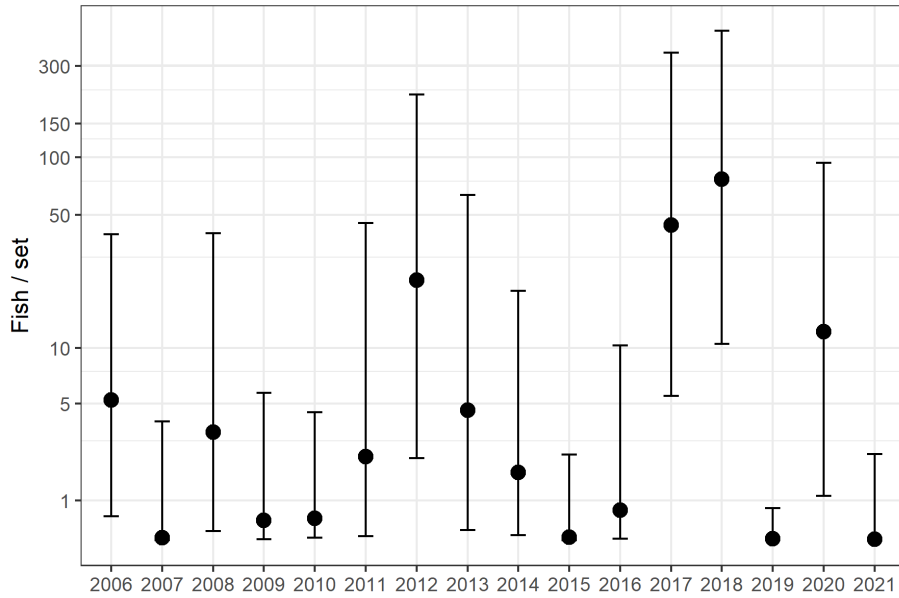


Fig. 4. Estimated walleye pollock year class strength at age-0 from beach seine surveys, 2006-2020, with preliminary estimate for 2021: posterior means and 95% credible intervals.

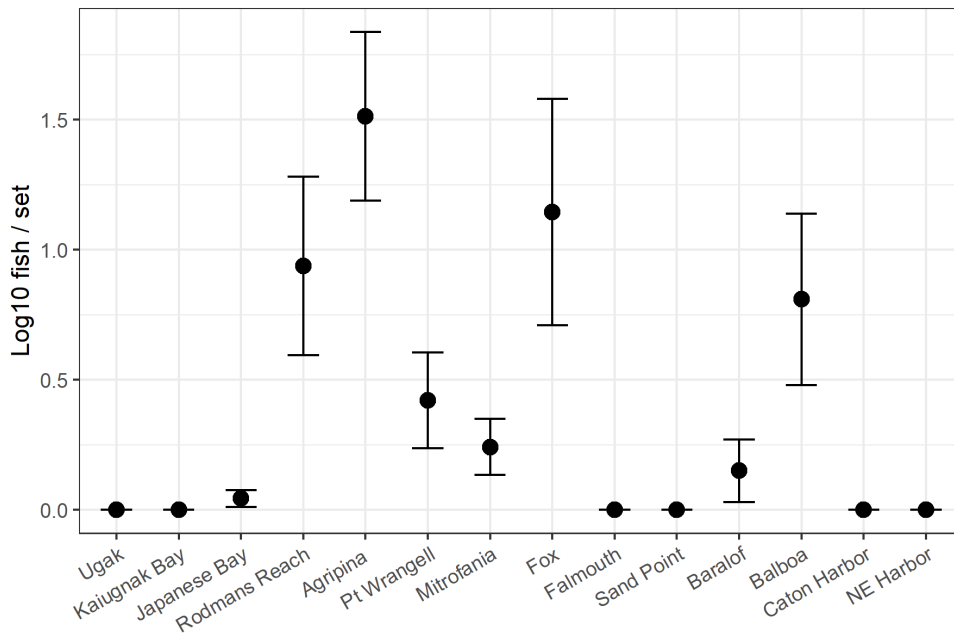


Fig. 5. Log-transformed pink salmon catches by bay in 2021 (mean with 95% confidence interval).