

Recent research activities and stock assessment approaches for the Aleutian Islands region

Steve Barbeaux and James Ianelli
AFSC NMFS/NOAA
Seattle WA 98115

Walleye pollock are distributed throughout the Aleutian Islands with concentrations in areas and depths dependent on season. Generally, larger pollock occur in spawning aggregations during February – April. Three stocks of pollock are identified in the U.S. portion of the Bering Sea for management purposes. These are: eastern Bering Sea which consists of pollock occurring on the eastern Bering Sea shelf from Unimak Pass to the U.S.-Russia Convention line; the Aleutian Islands Region encompassing the Aleutian Islands shelf region from 170°W to the U.S.-Russia Convention line; and the Central Bering Sea—Bogoslof Island pollock. These three management stocks probably have some degree of exchange. The Bogoslof stock is a group that forms a distinct spawning aggregation that has some connection with the deep water region of the Aleutian Basin. Bailey et al. (1999) present a thorough review of population structure of pollock throughout the north Pacific region. Recent genetic studies using mitochondrial DNA methods have found the largest differences to be between pollock from the eastern and western sides of the north Pacific.

The following is largely extracted from Barbeaux et al. (2004). See <http://www.afsc.noaa.gov/refm/docs/2004/AIpollock.pdf> for further details.

Previously, Ianelli et al. (1997) developed a model for Aleutian Islands pollock and concluded that the spatial overlap and the nature of the fisheries precluded a clearly defined “stock” since much of the catch was removed very close to the eastern edge of the region and appeared continuous with catch further to the east. In some years a large portion of the pollock removed in the Aleutian Islands Region was from deep-water regions and appear to be most aptly assigned as “Basin” pollock. This problem was confirmed and can be seen in the spatial distribution of historical catch patterns (Fig. 1). Hence, the data used here are organized to cover a region that is more consistent with survey observations and historical fishing patterns (Fig. 2).

The nature of the pollock fishery in the Aleutian Islands Region has varied considerably since 1977 due to changes in the fleet makeup and in regulations. During the late 1970s through the 1980s the fishing fleet was primarily foreign. In 1989, the domestic fleet began operating in earnest and has continued in the Aleutian Islands Region until 1999 when the North Pacific Fishery Management Council (NPFMC) recommended closing this region for directed pollock fishing due to concerns for Steller sea lion recovery. Length frequency data shows rather distinct characteristics when broken out by regions over this period (Fig. 3). There are notable similarities to the patterns over time for data from the eastern portion of the Aleutian Islands. This can also be seen from the mean-length of fish observed in the catch by these regions (Fig. 4). Another characteristic of the Aleutian Islands pollock is that mean length at age has changed substantially over time (Fig. 5). This pattern reflects the areas that are fished during these periods rather than actual changes in growth. I.e., during the early period, most of the pollock were caught towards the eastern edge of the Aleutian Islands region whereas the more recent period the pollock were from catch broadly distributed throughout the region.

The summer bottom trawl survey showed highly variable success in finding pollock in recent years, often with considerable concentrations toward the eastern edge (Fig. 6).

The R/V Kaiyo Maru conducted a survey between 170°W and 178°W longitude in the winter of 2002 after completing a survey of the Bogoslof region (Nishimura et al 2002; Fig. 7). Due to difficulties in operating their large mid-water trawl on the steep slope area they felt their catches in this area were insufficient for accurate



species identification and biomass estimation. They did however come up with some preliminary biomass estimations. For the entire area from 170°W and 178°W longitudes they estimated a biomass of 93,000 mt of spawning pollock biomass with between 61,000 mt estimated in the NRA east of 173°W and 32,000 mt in the remainder of the survey area to 178°W longitude. The largest aggregations in the NRA area were observed at 174°W longitude north of Atka Island. Most of the pollock echo sign was observed along the slope of the Aleutian Islands relatively near shore.

Process for setting ABC in Aleutian Islands

For many years, the Aleutian Islands pollock stock has lacked an age-structured model and the SSC has determined that the stock qualified for management under Tier 5 (see section below). In last year's assessment, preliminary explorations of several age-structured models were provided, all of which focused on the portion of the stock to the west of 174°W. For the 2004 management cycle, five alternative age-structured models were developed and evaluated. The 2004 assessment focused on two of those models, one of which (Model 1) uses data only from the portion of the stock to the west of 174°W, and the other of which (Model 1B) includes survey data from the entire Aleutian Islands management area. The Plan Team recommended the use of Model 1B, but due to the uncertainty in the survey catchability coefficient recommended setting the ABC below the maximum permissible level. The Plan Team, in their review of the assessment recommended setting the 2005 ABC at the equilibrium level associated with an $F_{40\%}$ harvest rate, which was 43,200 t.

The SSC determined that the Aleutian pollock stock did not qualify for management under Tier 3 and the stock remained at Tier 5. This was largely for concerns about conservation and acknowledged uncertainty that interacts with stock structure uncertainties and a reliable survey (summer bottom-trawl surveys done every other year are currently undertaken). The SSC therefore recommended a maximum permissible ABC for 2005 was computed as the product of the most recent survey biomass estimate (130,451 t) and 75% of the natural mortality rate (0.30), resulting in an ABC of 29,400 t, and an OFL of 39,100 t. The actual TAC was specified this year by congressional mandate at no more than 19,000 t. Under Tier 5, the stock is technically not evaluated for overfished determinations nor whether it is approaching an overfished condition. Nonetheless, based on the best available information the stock is not considered overfished nor is it approaching an overfished condition.

The 2005 Fishery

The directed Aleutian pollock fishery started in March, but little pollock was harvested. From 20 January – 15 April a total of 2,661 t of pollock were harvested in the Aleutian area out of the total 9,250 t first-season TAC. Preliminary reports from fishermen indicate that there was not adequate pollock sign outside of designated Steller sea lion critical habitat closure areas to justify continuation of the fishery in the first season. Also reported was large quantities of Pacific ocean perch in both the echosign and bycatch in the areas that vessels were allowed to fish. Since this was intended as primarily a roe-fishery, it is expected that much of the 2005 second-season TAC of 9,250 t will not be caught.

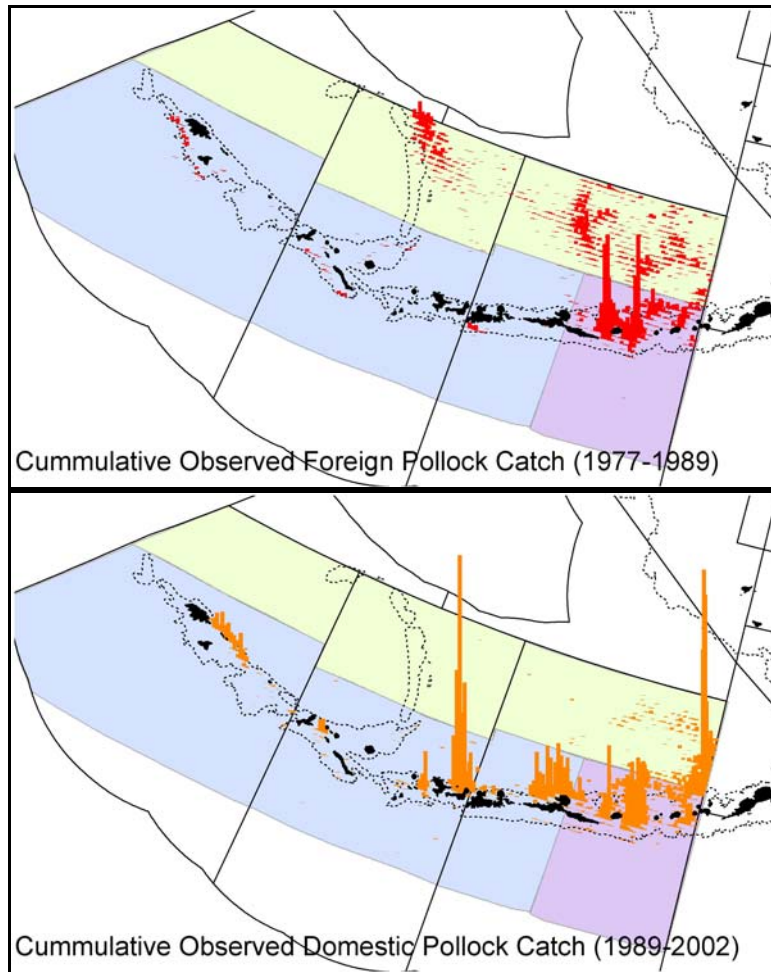


Figure 1. Observed foreign and J.V. (1978-1989), and domestic (1989-2002) pollock catch in the Aleutian Islands Area summed over all years and 10 minute latitude and longitude blocks. Both maps use the same scale (maximum observed catch per 10 minute block: foreign and J.V. 8,000 t and Domestic 19,000 t). Catches of less than 1 t were excluded from cumulative totals.

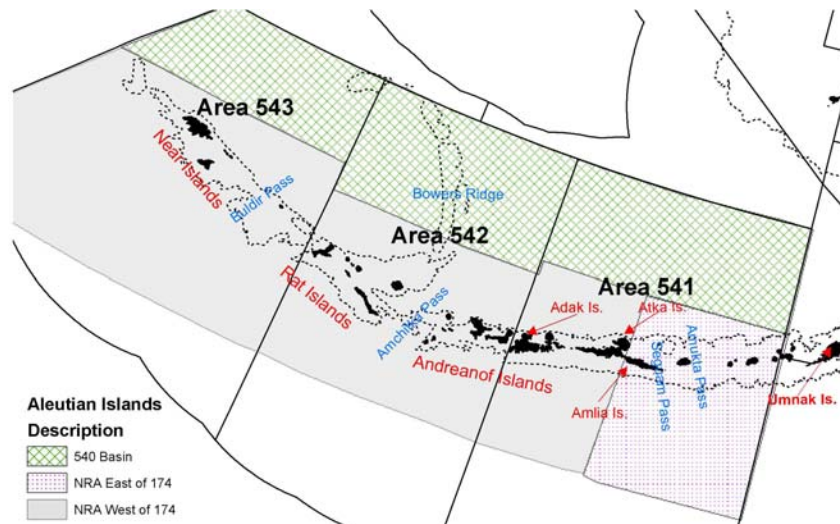


Figure 2. Regions defined for consideration of alternative data partitions for Aleutian Islands Region pollock. The abbreviation “NRA” represents the Near, Rat, and Andreanof Island groups.

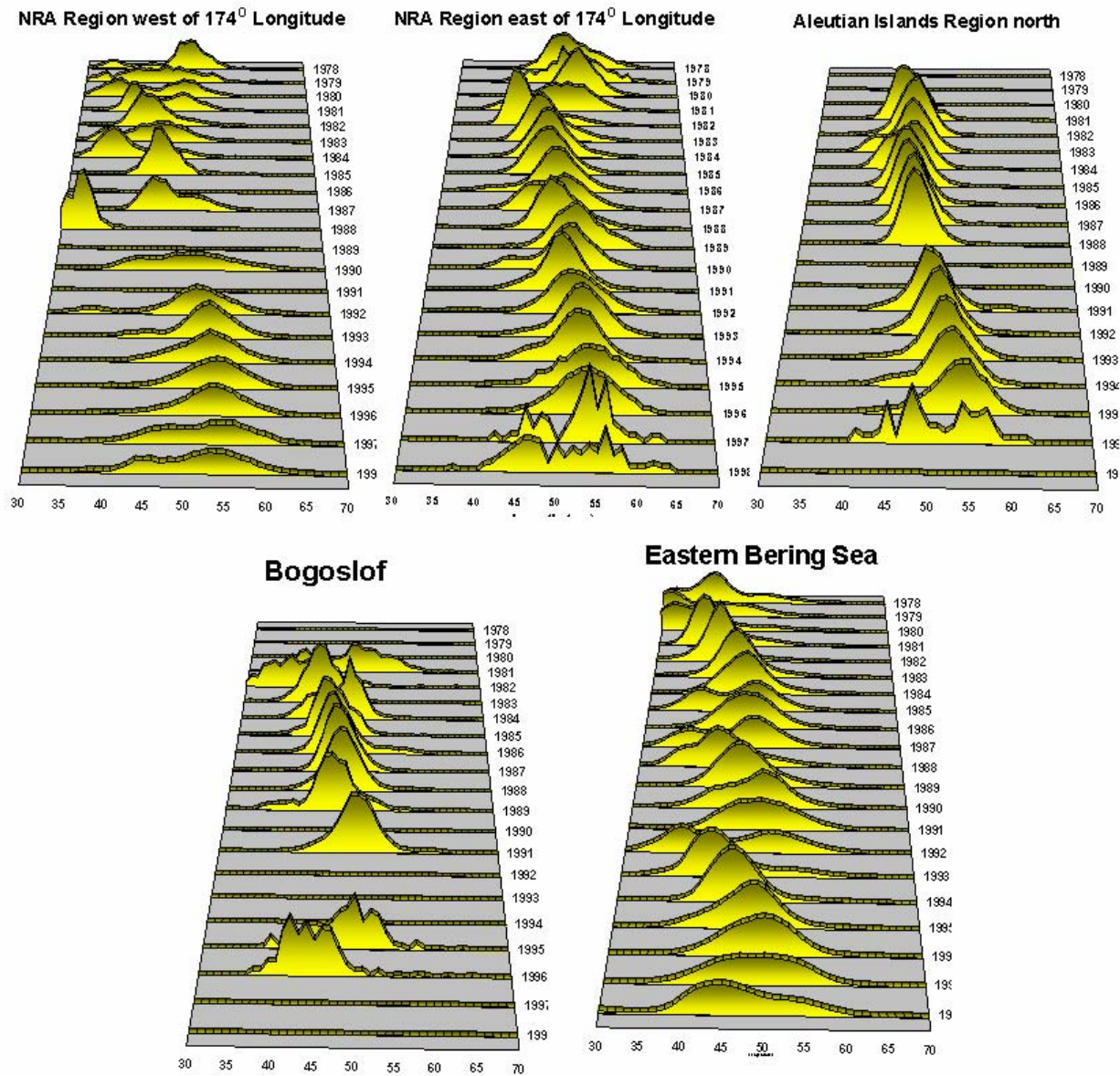


Figure 3. Pollock length frequency distributions by region.

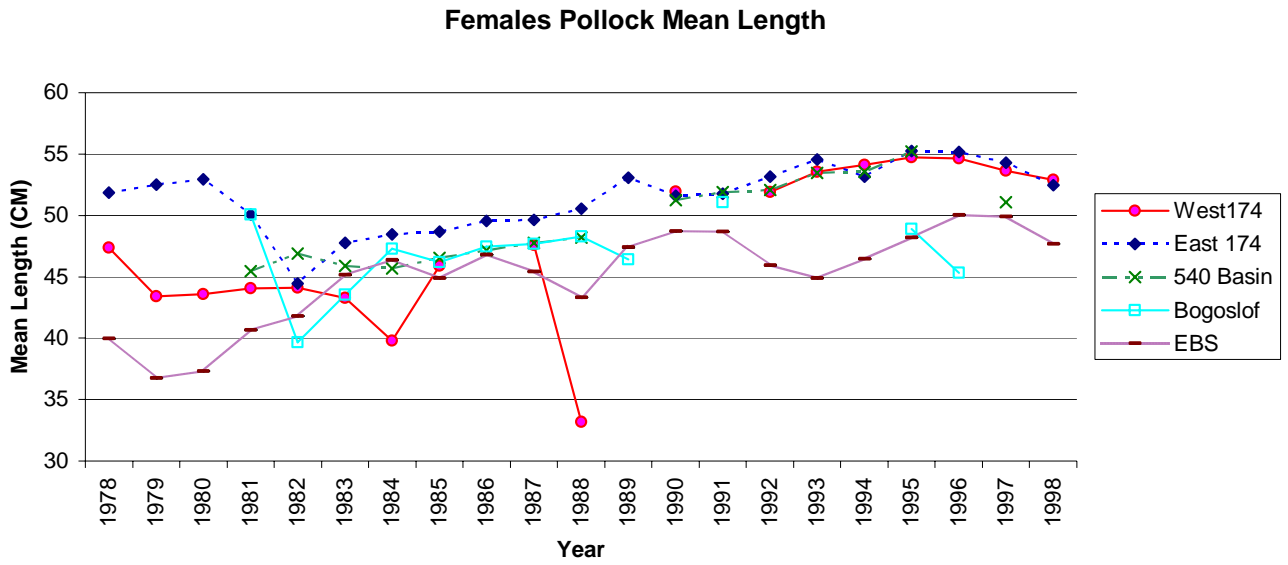


Figure 4. Mean length of female pollock in the catch from various areas based on observer data.

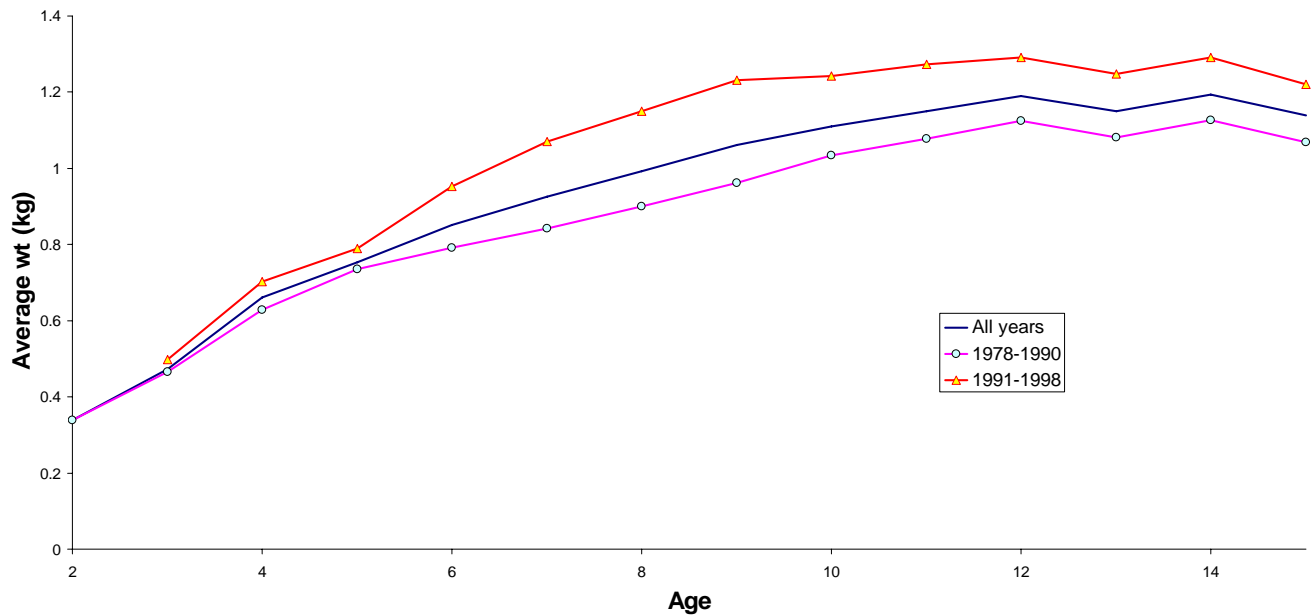


Figure 5. Average weight-at-age for Aleutian Islands pollock for all years combined, 1978-1990, and 1991-1998.

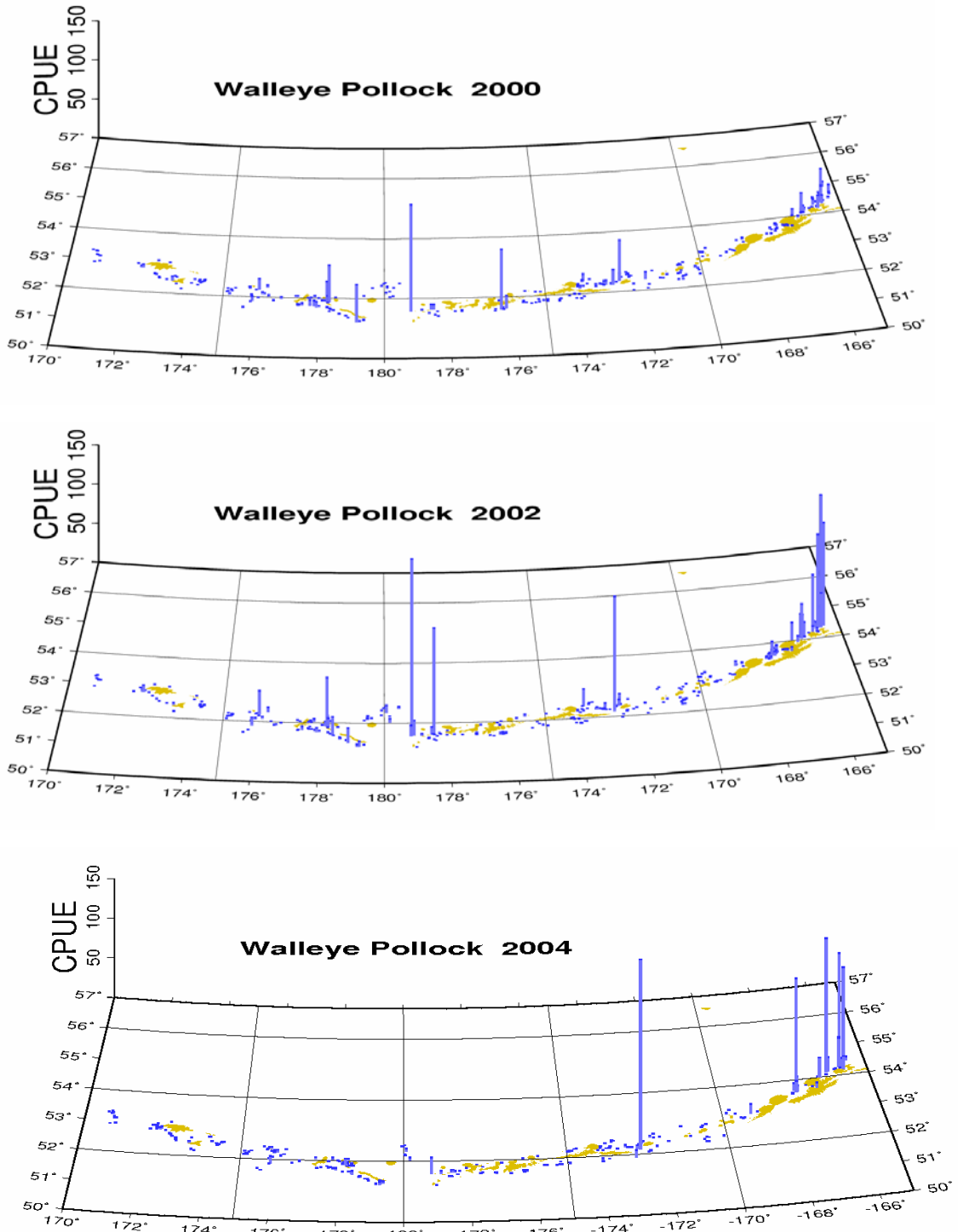


Figure 6. Catch per tow of pollock in the Aleutian Islands Region and east of 170°W during summer months from bottom-trawl surveys, 2000-2004.

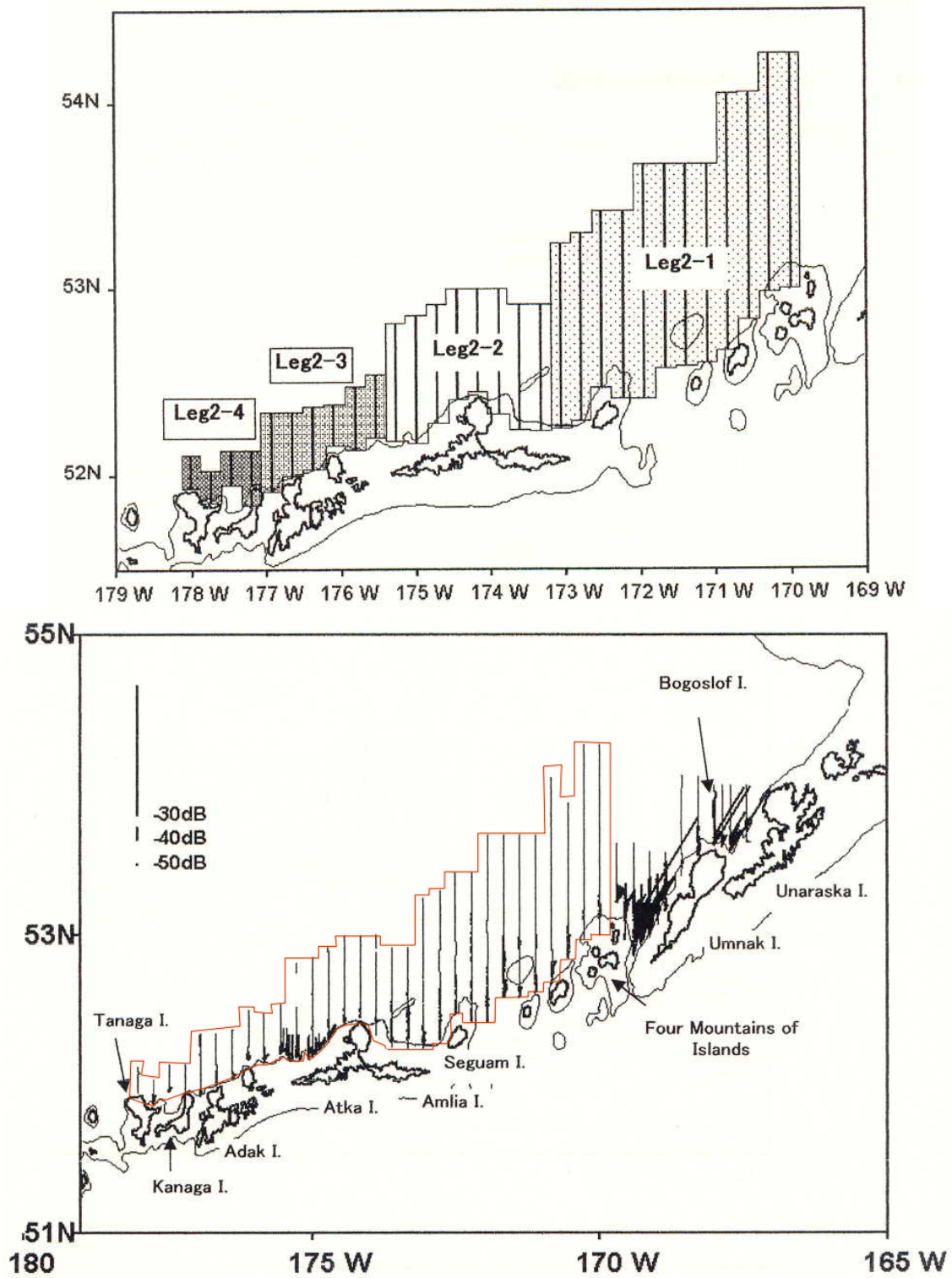


Figure 7. R/V Kaiyo Maru 2002 echo integration-trawl survey (above) strata for leg2 and below observed S_A in both legs. Please note that in the bottom picture the encircled area is leg 2.