Alaska Fisheries Science Center
Resource Ecology & Fisheries Management
7600 Sand Point Way NE, Bldg. 4
Seattle, WA 98115
November 13, 2007

Cruise Report
F/T Seafisher Cruise
SF200701 (October 9 – October 25, 2007)

Project Title: Atka Mackerel Tag Recovery Kiska Island and Seguam Pass, Aleutian Islands Alaska

Field Party Chief: Susanne McDermott
Alaska Fisheries Science Center
National Marine Fisheries Service
7600 Sand Point Way NE, Bldg. 4
Seattle, WA 98115-0070

Scientific Purpose

The objective of our tag release-recovery studies is to determine the efficacy of trawl exclusion zones as a management tool to maintain prey abundance/availability for Steller sea lions at local scales. Trawl exclusion zones were established around sea lion rookeries as a precautionary measure to protect critical sea lion habitat, including local populations of prey such as Atka mackerel. Localized fishing may affect Atka mackerel abundance and distribution near sea lion rookeries. Tagging experiments are being used to estimate abundance and movement between areas open and closed to the Atka mackerel fishery. From 1999-2003 approximately 65,000 tagged fish were released during NMFS chartered tag release cruises in Seguam Pass, Tanaga Pass and Amchitka Island. In July of 2006 a cooperative venture between the Nort6h Pacific Fisheries Foundation and NMFS released approximately 7,900 fish near the Kiska Island area and 7,200 fish near Seguam Pass area. Recovery of tagged fish is supplied by the fishery in the open area outside the trawl exclusion zone. In addition NMFS tag recovery cruises are conducted to recover tagged fish in the closed areas. To compare charter recoveries to fishery recoveries, the NMFS cruises also provides recovery in the area open to fishing and open areas. In 2006 and 2007 NMFS has been working cooperatively with the North Pacific Fisheries Foundation to conduct field work under a Memorandum of Agreement as a cooperative venture. Our tagging studies to date have focused on Atka mackerel movement and abundance in the presence of a fishery. In addition to the data gathered from the tag and release experiment, biological data such as stomachs, gonad samples, age structures, sexed length frequencies, genetics and catch composition are also collected for each haul during the tag recovery charter.

Personnel SF200701 (Seguam Pass on 10/10 and Kiska Island 10/12 – 10/22)

Name	Sex/Natl.	Position	Organization
1. S.McDermott	F/USA	Field Party Chief	AFSC
2. P.Munro	M/USA	Watch Leader	AFSC
3. J.Conner	M/USA	Fish Biologist	AFSC
4. J.Nielsen	F/USA	Fish Biologist	AF
5. Amy West	F/USA	Fish Biologist	NPFF
6. Beth Daudistel	F/USA	Fish Biologist	NPFF

AFSC = Alaska Fisheries Science Center
AF = Aquatic Farms
NPFF = North Pacific Fisheries Foundation

Cruise Schedule and Activities SF200701

9 October	Board vessel @ 1200, Dutch Harbor, AK
10	Transit to Seguam Pass
10	Biological sampling tows, Seguam Pass
10-12	Transit to Kiska Island.
12-17	Recovery tows, Kiska Island
17	Partial offload in Kiska Harbor
18-22	Recovery tows, Kiska Island
22-24 October	Transit to Dutch Harbor, AK, offload vessel

Summary of Results

During the years 1999-2002 NMFS released ~ 37,000 tags in Seguam Pass. No fish were tagged and released during 2003 - 2005 at Seguam pass . In July 2006 NMFS released ~7,200 tags in each of the 4 strata at Seguam pass as shown in Figure 1. During the same cruise ~7,900 fish were tagged and released near Kiska Island in strata 1 and 2 as shown in Figure 2. The tag recovery effort in 2007 primarily focused on Kiska Island where 41 tows were conducted, whereas at Seguam pass only 5 tows were conducted primarily for biological data collecting. There were no tags recovered at Seguam Pass and 29 tags recovered at Kiska Island in 2007. For Kiska Island, the hauls in which tags were recovered are circled in black in Figure 2. Table 1 shows the distribution of tows among the strata at Seguam Pass and at Kiska Island . Table 2 shows the distribution of Atka mackerel catch by strata in each study area. A total of 131 MT was caught in Seguam Pass and 863 MT at Kiska Island. The total catch of Atka mackerel was 994 MT and 336 MT of bycatch (species other than Atka mackerel).

Length-frequency distribution

Approximately 150 fish were randomly collected, sexed and lengthed per haul in both study areas (Table 4). Figure 3 illustrates the percent length frequency distributions for Atka mackerel in Seguam Pass. The length-frequency distribution of fish at Seguam Pass was similar for both sexes and unimodal at 41 cm. Figure 4 shows the percent length frequency distribution near Kiska Island. The length distribution of fish was a unimodal distribution at 37 cm.

Species Catch Composition

Although the focus of the tag recovery was to catch Atka mackerel, other species were caught during the hauls in each of the study areas (Table 7). The most abundant bycatch species were Northern rockfish (198 mt) , Pacific cod (69.4 mt) , Pacific ocean perch (55.38 mt) and walleye Pollock (2.55 mt). There were 95 additional species identified in the catches, the weight of each was less than one mt. We also collected Atka mackerel egg masses as part of an ongoing study on Atka mackerel reproductive ecology.

Wild tag recoveries

A total of 29 wild tags were recovered on the F/V Seafisher research charter, all of which were tagged and released during the 2006 tag release charter. All 29 tags were recovered near Kiska Island. Tag recoveries are summarized by area and strata in Table 5. 'Wild tagged' fish are fish that have been tagged and released during a tag release cruise as opposed to tagged fish that were seeded into the catch already on board during the tag recovery cruise to obtain the tag reporting rate (see below).

Tag reporting rate

Reporting rate is defined as the proportion of tagged fish caught by the vessel that are actually found and reported. To determine tag reporting rate, scientists tagged 10 Atka mackerel per haul and distributed them randomly throughout the catch. 'Seeded tagged fish were appeared identical to wild tagged fish and could only be distinguished by their tag number. This was done for all hauls during the cruise. These "seeded" tagged fish were recovered in the factory by the vessel and scientific crew. The tag reporting rate is summarized in Table 6. Tag reporting rates were approximately 95% for single tagged fish and 98% for double tagged fish.

Biological samples

Table 4 summarizes the biological samples taken from Atka mackerel during the tag recovery cruise. Gonads, stomachs and otoliths were randomly collected from 10 fish (5 females and 5 males) from almost every tow. During this cruise we recorded males in spawning color separately to identify spawning habitat.

Special Projects

1. Ultrasonic tagging pilot study

The first part of the ultrasonic tagging pilot study was to test ultrasonic tag detection by portable hydrophones using the FV *Seafisher* as a platform. Ultrasonic tags can give detailed real time information of fish movement and behavior on small time and space scales. The goal of this pilot study was to determine if a commercial size factory trawler could be used as a platform to deploy hydrophones that detect ultrasonic tags in the water. One anchored buoy with 4 ultrasonic tags attached was placed in Atka mackerel preferred habitat at about 100 m depth. We deployed portable hydrophones off the vessel on several occasions to detect and locate the position of the ultrasonic tags. Signals from the test tags on the buoys were recorded on all of these occasions. However, it became evident that signal reception was not ideal and that the hydrophone configuration was not adequate for testing range and need to be improved in order to track moving targets.

The buoy deployment worked well initially. However during the last week of the cruise the buoy was located free floating in the water and brought on board despite of inclement weather conditions. It was apparent that the line had been torn shortly above the test tags. Several attempts were made to retrieve the anchor, tags, and hydroacoustic release by trawling over the location where the tag was originally released. However, the tags were not recovered.

Since there was a trawl float attached to the line above the test tags (to keep the tags vertical in the water column) an attempt was made to retrieve the tags and the hydroacoustic release assuming the trawl float would provide enough buoyancy to bring them to the surface. The hydroacoustic release was then deployed to release the tags from the anchor. After several hours of searching the recovery attempt was terminated since the trawl float was not located. However, the trawl float was spotted hours later by Julie Nielsen and the tags and the hydroacoustic release were safely brought on board by the dedicated ships crew. All items were undamaged. It was assumed that the line had wrapped around an obstacle most likely during the heavy tidal changes and the line had been severed by rubbing against it.

Testing of tag attachment and fish survival

The second part of the ultrasonic tagging pilot study was to test tag attachment and fish survival on live fish. A 250 gal life tank was placed on deck with a continuous seawater supply of approx. 20 gal/min. The seawater was drawn from the seachest located at about 5m below the surface.

During haul 4 and 5 at Seguam pass, approx. 40 live fish were taken from the upper part of the codend and placed into the tank. After 1 day of settling the fish were examined and it was clear that most of them sustained bruising and abrasion of the cornea while in the net. Fish in the best condition available were selected for tag attachment and insertion. 6 fish received an external

ultrasonic tag (2 different sizes) and 4 fish received an internal tag by inserting the tag into the body cavity.
Of the 7 fish with external tags 4 died, of the 4 fish with internal tags 3 died. It was not clear however, whether this high fish mortality was due to trauma from the net or trauma from attaching or inserting the tags since mortality of the control fish was also high (out of 27 control fish 12 died).

In summary, the pilot study for ultrasonic tags was a good attempt at testing equipment and tagging procedure. It was clear that in order to use this technology on a vessel of this size, improvements need to be made to increase the sturdiness and ease of setup for the hydrophones. The buoy needs to be supplied with a floating line on the bottom and more flotation so the line does not get wrapped around obstacles on the seafloor.

The tag attachment and insertion went well, however fish mortality was alarmingly high. Caution needs to be taken to make smaller hauls when fish are used for tagging since large nets seem to cause bruising and trauma to the fish. Methods should be improved for tag attachment and/or insertion in a more controlled setting where a larger set of tanks can be used for a control study of fish without tags. It was not clear whether mortality was caused by tagging or the trauma of getting caught in a large net.

2. Collection of egg masses
Atka mackerel egg mass samples were collected throughout the cruise as part of a study on Atka mackerel reproductive ecology (Bob Lauth P.I). Egg masses are caught occasionally in the nets. Small subsamples are preserved in 5% formalin and brought back for further analysis. 90 egg masses were collected during this cruise, 20 at Seguam pass and 70 at Kiska Island.

3. *Collection of frozen fish for Archaeological study*
Various species of frozen fish were collected for and archaeological study of the eating habits of the early inhabitants of the Aleutian Islands.

4. *Collection of cannibals for genetic study*
Atka mackerel are cannibalistic in that they will feed on their egg masses. This feature is used in a genetic study to determine parentage and mating habits of Atka mackerel. Male and female atka mackerel cannibals were collected and frozen for this study.

5. *Seabird project*
Stationary seabird surveys were conducted opportunistically during each feasible haul event aboard the seafisher. Seabrids were counted and identified from the wheelhouse during the daylight hours.

For further information, contact Dr. Patricia Livingston, Director, Resource Ecology and Fisheries Management Division, Alaska Fisheries Science Center, National Marine Fisheries Service, 7600 Sand Point Way NE, Building 4, Seattle, WA 98115-6349, Telephone: (206)526-4172

Seguam Atka mackerel Biological Sampling 2007

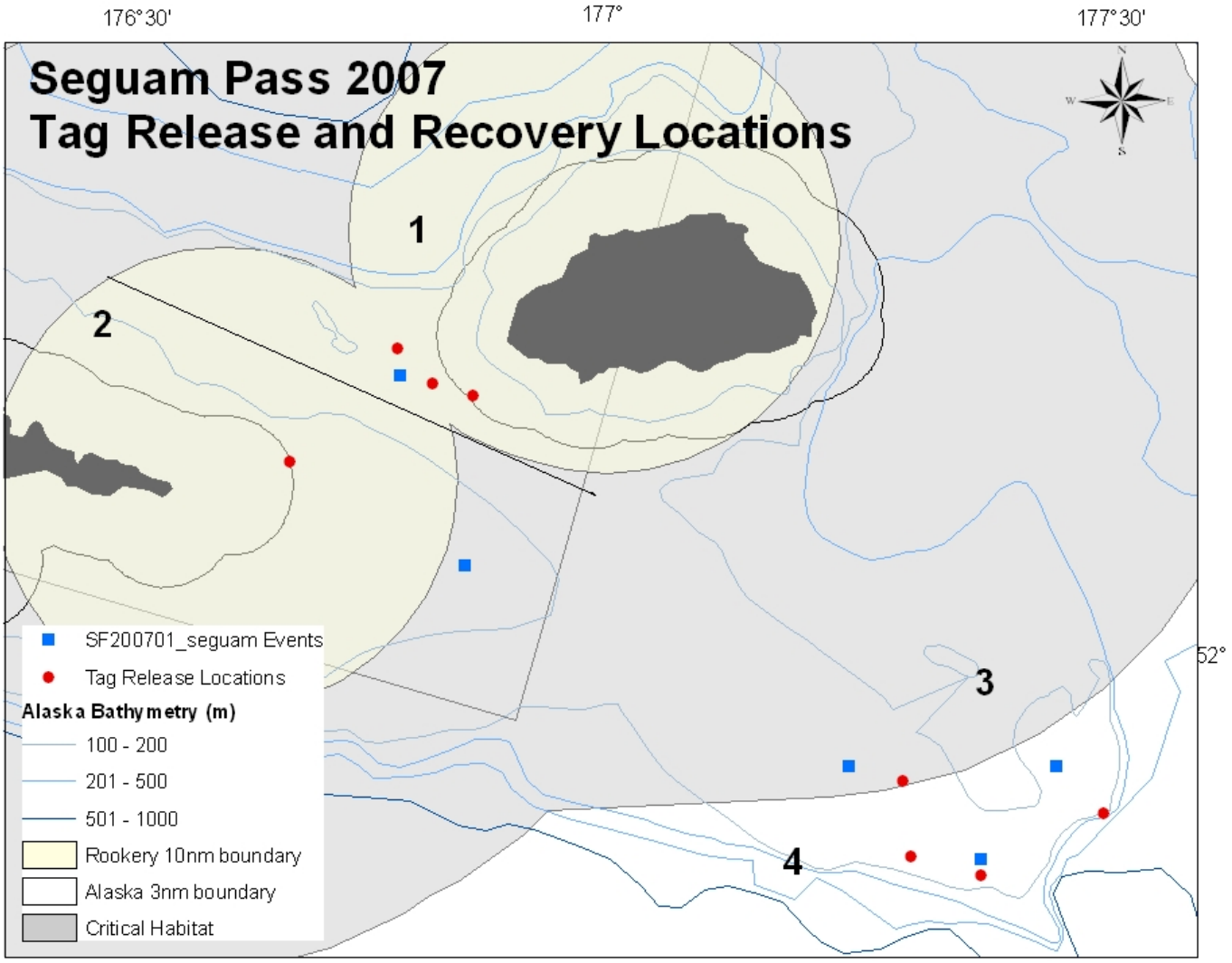


Figure 1. Tag release and recovery haul locations near Seguam Pass. Strata's 1, 2 and 3 are inside the trawl exclusion zone and stratum 4 is outside the trawl exclusion zone. No tags were recovered at Seguam pass, 2007.

Kiska Atka mackerel Tag Recovery 2007

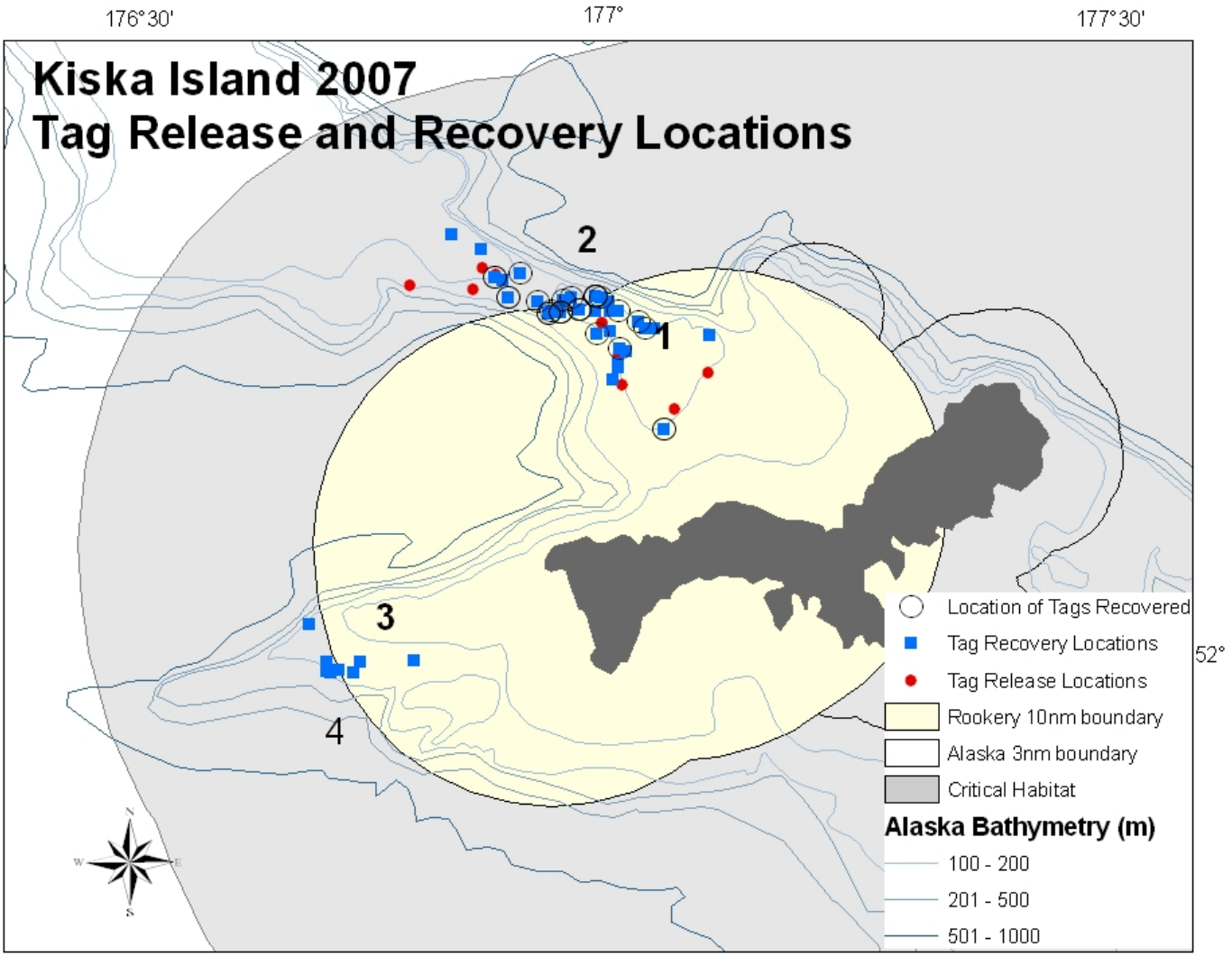


Figure 2. Tag release and recovery haul locations near Kiska Island. Strata 1 and 3 are inside the trawl exclusion zone and strata 2 and 4 are outside the trawl exclusion zone. Hauls in which tags were recovered are circled in black.

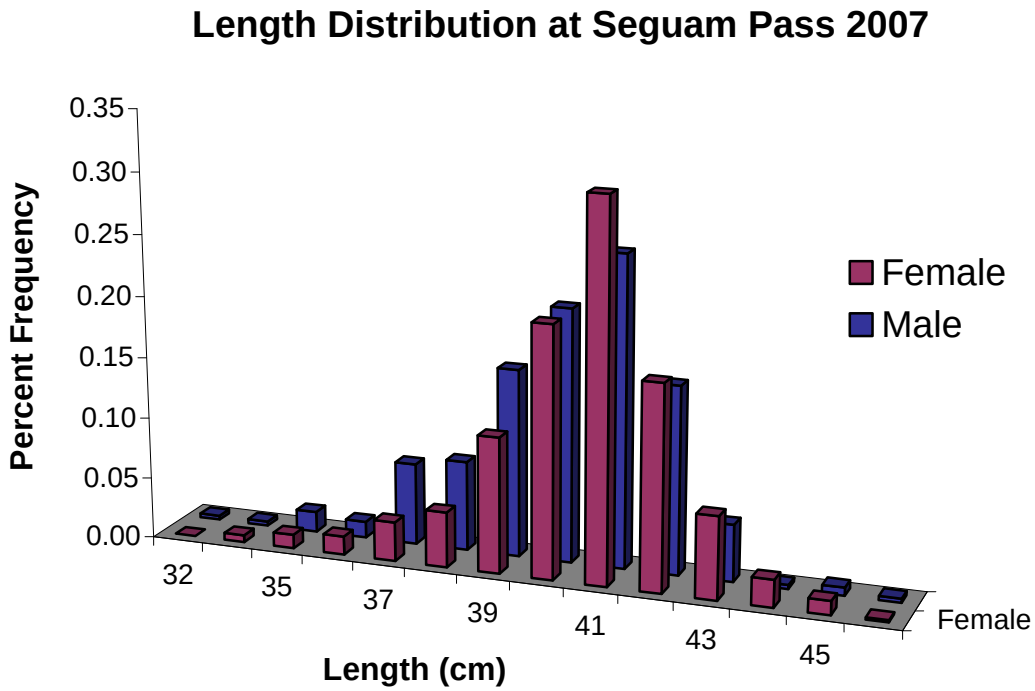
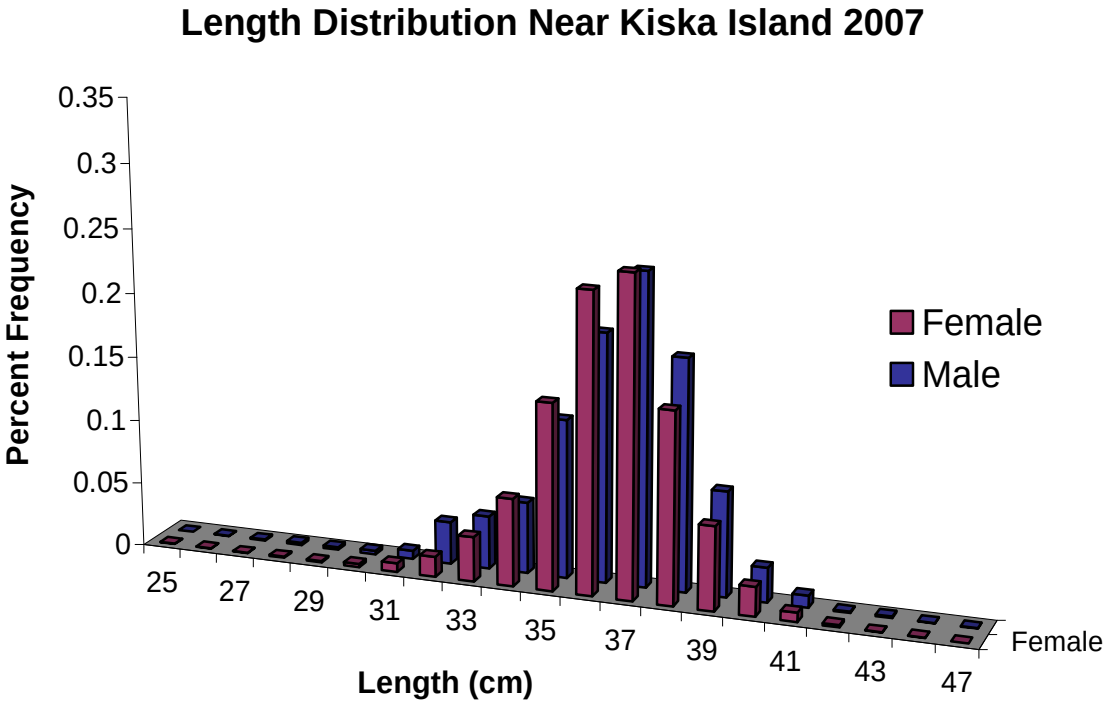


Figure 3: Seguam Pass. Percent length frequency distributions by sex for Atka mackerel during the recovery cruise in 2007. Note the male and female categories add up to 100 %.



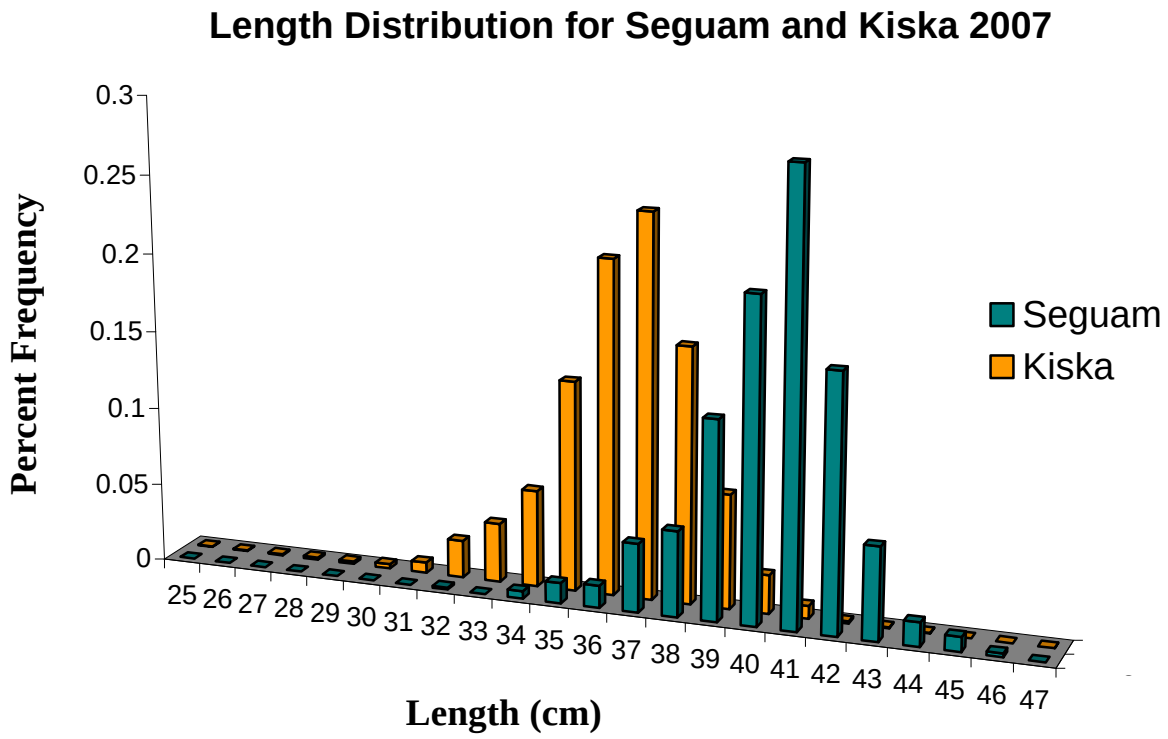


Figure 6: Percent length frequency distributions (combined sexes) by area for Atka mackerel during the recovery cruise in 2007. The sample number (N) at Seguam = 842 amd Kiska = 6720. Note that both categproes add up to 100 %

Table 1. *Number of tows per strata*

Strata	1	2	3	4
Seguam Pass	1	1	1	2
Kiska Island	20	14	4	3

Table 2. *Atka mackerel catch per strata in metric tons*

Strata	1	2	3	4
Seguam Pass	4.08	9.30	38.84	77.84
Kiska Island	479.82	310.47	58.27	14.35

Table 3. *Atka mackerel and bycatch summary per area in metric tons*

Catch in MT	Atka mackerel	Bycatch
Seguam Pass	131.05	11.16
Kiska Island	862.9	325.31
Total	993.95	336.47

Table 4. *Total number of biological samples collected*

Samples Collected	Seguam Pass	Kiska Island
Gonads	50	380
Stomachs	50	380
Otoliths	50	380
Lengths	842	6720

Table 5. *Wild Tag recoveries by strata for each area*

Strata	**1**	**2**	**3**	**4**
Seguam Pass	0	0	0	0
Kiska Island	13	16	0	0

Table 6. *Tag reporting rate for Seguam Pass and Kiska Island*

Tags	**Percent recovered**
Single Pink Tag	95%
Double Pink Tag	98%

Table 7. *Total catch by species at Seguam Pass and Kiska Island in MT (Species that have catch of <1mt are in alphabetical order of names)*

SpeciesName	Kiska	Seguam
Atka mackerel	862.90	131.0508
northern rockfish	194.23	4.2473
Pacific cod	66.13	3.298
Pacific ocean perch	52.57	2.8131
walleye pollock	2.55	< 1 MT
Alaska skate	2.21	< 1 MT
sponge unident.	1.35	< 1 MT
harlequin rockfish	1.20	< 1 MT
Alaska falsejingle	<1 MT	< 1 MT
Alaskan ronquil	<1 MT	< 1 MT
Aleutian skate	<1 MT	< 1 MT
arrowtooth flounder	<1 MT	< 1 MT
Atka mackerel eggs	<1 MT	< 1 MT
basketstarfish unident.	<1 MT	< 1 MT
blackspotted rockfish	<1 MT	< 1 MT
box crab unident.	<1 MT	< 1 MT
brittlestarfish unident.	<1 MT	< 1 MT
bryozoan unident.	<1 MT	< 1 MT
bubble gum coral	<1 MT	< 1 MT
Calcareous finger sponge	<1 MT	< 1 MT
Ceramaster sp.	<1 MT	< 1 MT
Ceratiidae unident.	< 1 MT	< 1 MT
cheiraster dawsoni	<1 MT	< 1 MT
chum salmon	<1 MT	< 1 MT
coral unident.	<1 MT	< 1 MT
crab unident.	<1 MT	< 1 MT
Crossaster sp.	<1 MT	< 1 MT
Cucumaria sp.	<1 MT	< 1 MT
darkfin sculpin	<1 MT	< 1 MT
Diplopteraster multipes	<1 MT	< 1 MT
Dipsacaster borealis	<1 MT	< 1 MT
dusky rockfish unident.	<1 MT	< 1 MT
garbage	<1 MT	< 1 MT
Gephyreaster swifti	<1 MT	< 1 MT
giant barnacle	<1 MT	< 1 MT
giant grenadier	<1 MT	< 1 MT
golden king crab	<1 MT	< 1 MT
green sea urchin	<1 MT	< 1 MT
Greenland turbot	<1 MT	< 1 MT

SpeciesName	Kiska	Seguam
Henricia sp.	<1 MT	< 1 MT
hermit crab unident.	<1 MT	< 1 MT
Hippasteria sp.	<1 MT	< 1 MT
Hippasteria spinosa	<1 MT	< 1 MT
hydroid unident.	<1 MT	< 1 MT
jellyfish unident.	<1 MT	< 1 MT
Kamchatka flounder	<1 MT	< 1 MT
kelp	<1 MT	< 1 MT
lanternfish unident.	<1 MT	< 1 MT
Lebbeus sp.	<1 MT	< 1 MT
leister sculpin	<1 MT	< 1 MT
longfin Irish lord	<1 MT	< 1 MT
longfin sculpin	<1 MT	< 1 MT
lumpsucker unident.	< 1 MT	< 1 MT
magistrate armhook squid	<1 MT	< 1 MT
mud skate	< 1 MT	< 1 MT
nipple sponge	<1 MT	< 1 MT
northern rock sole	<1 MT	< 1 MT
nudibranch unident.	<1 MT	< 1 MT
oregon triton	<1 MT	< 1 MT
Pacific halibut	<1 MT	< 1 MT
Polychaeta (class)	<1 MT	< 1 MT
Polychaete tubes	<1 MT	< 1 MT
polychaete worm unident.	<1 MT	< 1 MT
Primnoa sp.	<1 MT	< 1 MT
prowfish	<1 MT	< 1 MT
Psolus sp.	<1 MT	< 1 MT
Pteraster sp.	<1 MT	< 1 MT
ragfish	<1 MT	< 1 MT
red Irish lord	<1 MT	< 1 MT
redbanded rockfish	<1 MT	< 1 MT
redstripe rockfish	<1 MT	< 1 MT
rock sole sp.	<1 MT	< 1 MT
ronquil unident.	<1 MT	< 1 MT
rose sea star	<1 MT	< 1 MT
rougheye rockfish	<1 MT	< 1 MT
scaled crab	<1 MT	< 1 MT
sculpin unident.	< 1 MT	< 1 MT
sea anemone unident.	<1 MT	< 1 MT
sea cucumber unident.	<1 MT	< 1 MT
sea raspberry	< 1 MT	< 1 MT
sea urchin unident.	<1 MT	< 1 MT

SpeciesName	Kiska	Seguam
searcher	<1 MT	< 1 MT
Sebastes babcocki	<1 MT	< 1 MT
shortraker rockfish	<1 MT	< 1 MT
shortspine thornyhead	<1 MT	< 1 MT
shrimp unident.	<1 MT	< 1 MT
snail unident.	<1 MT	< 1 MT
Solaster sp.	<1 MT	< 1 MT
southern rock sole	<1 MT	< 1 MT
spud sponge	<1 MT	< 1 MT
squid unident.	<1 MT	< 1 MT
starfish unident.	<1 MT	< 1 MT
Synallactes challengeri	<1 MT	< 1 MT
tree sponge	<1 MT	< 1 MT
Tritonia sp.	<1 MT	< 1 MT
tube worm unident.	<1 MT	< 1 MT
whiteblotched skate	< 1 MT	< 1 MT
yellow green papillate sponge	<1 MT	< 1 MT
yellow Irish lord	<1 MT	< 1 MT