Local Abundance and Movement of Atka Mackerel and Other Steller Sea Lion Prey in the Aleutian Islands

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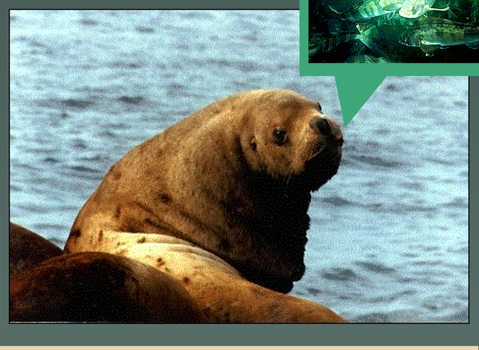


Background

Atka mackerel are the most abundant groundfish in the Aleutian Islands (2011 adult biomass 437, 000 metric tons). They are distributed in dense aggregations in areas of strong currents from Kamchatka to the Gulf of Alaska along the Aleutian Island chain.

Atka mackerel are semi-pelagic and mostly occur at a depth of 100-200m.

During the spawning season from July through October, males establish nesting sites where they actively guard the nests.

Atka mackerel and Steller sea lions

Atka mackerel are one of the main prey items of the endangered Steller sea lion in the Aleutian Islands.

In 1997, the western Stock of Steller sea lions was declared endangered. In 2000, 10-20nm trawl exclusion zones were established around rookeries and haulouts. In addition, the fishery was allocated in space and time to avoid local overfishing.

In 2010, as Steller sea lions populations were still declining in the Western and Central Aleutian Islands, the entire Western Aleutian Island subarea was closed to Atka mackerel and Pacific cod fishing and the Central Aleutian Island subarea was closed to fishing inside critical habitat (Fig. 1).

These mitigation measures were put in place to avoid competition between the fishery and Steller sea lions for prey.

However, the National Marine Fisheries Service acknowledged that there was much uncertainty as to the impact of fishing on the Steller sea lion prey field.

Objective

Examine the impacts of fishing on the Steller Sea lion prey fields

1. Estimate Atka mackerel movement and abundance in the central Aleutian Island subarea in three local aggregations of Atka mackerel

   Atka mackerel tag release study

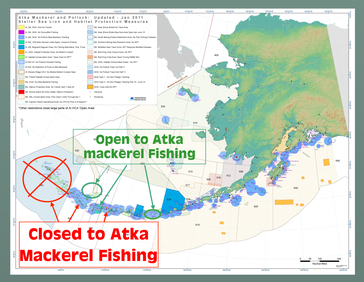
2. Estimate relative abundance of other Steller Sea lion prey in those three local areas

   Catch per Unit Effort data from Atka mackerel tag recovery effort

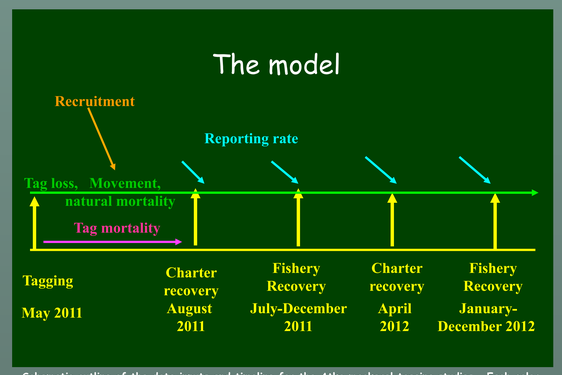
3. Describe oceanographic features of Atka mackerel habitat

   CTD casts and underwater camera tows

Figure 1: Fishery restrictions since 2011

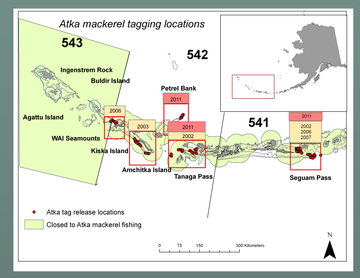


This map shows recent fishery restrictions implemented in January 2011 in response to the Biological Opnion's findings adressing the federal fisheries in the Aleutian Island subareas.



Schematic outline of the data inputs and timeline for the Atka mackerel tagging studies. Each color represents a separate data set, event, or experiment which in the model will be represented by a separate likelihood. Currently all the 2011 Tagging and recovery events have been conducted.

Figure 2: Atka mackerel tag release locations from 2000-2011



Project history outlining previous tagging study locations and years (orange) including the current study (pink).

Catch

Tag

Release

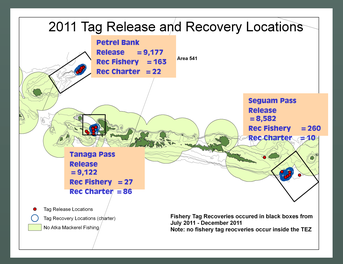
Recover

Photo: Jared Guthridge

Recapture

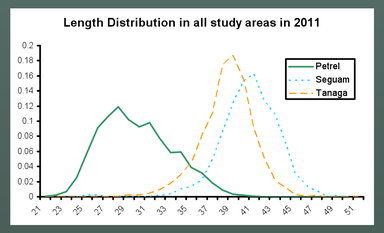
Results to Date

Figure 3: Atka mackerel tag release and recovery locations by study area.



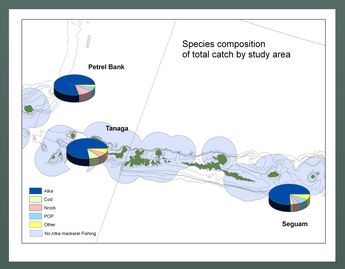
We released approximately 27,000 tagged Atka mackerel during the tag release cruise in June 2011 on the chartered vessel *Pacific Explorer*. During August and September 2011 the chartered FT *Seafisher* recovered 118 tagged fish and the commercial fishery recovered 450 tagged fish. Another tag recovery cruise is planned in April 2012.

Figure 4: Atka mackerel length frequency distribution by study area.



Atka mackerel exhibited different length distributions in the three study areas with Petrel bank fish showing much smaller lengths than Tanaga and Seguam Pass. Although growth differences have been recorded for this species between the central and Eastern Aleutian Island subareas (McDermott, etal. 2011), this large size difference might indicate that fish at Petrel bank are younger than the fish at Tanaga and Seguam pass. We are currently ageing the specimens collected and will soon have age data analyzed to validate this assumption.

Figure 5: Species composition of major Steller sea lion prey species per study area (data collected during the tag recovery cruise) .



Species composition of the main Steller sea lion prey was estimated from total catch during the recovery cruise. Species were dominated by Atka mackerel at all three study sites. Petrel bank showed Northern rockfish and Pacific Ocean Perch (POP) as its other important species. In Tanaga, Pacific Cod and northern rockfish were also abundant whereas at Seguam Pass POP was the second most commons species.

Methods

Atka mackerel were tagged and released on the charter vessel Pacific Explorer in May-June 2011 (Fig. 2).
Fish are tagged with Floy T-bar tags, measured and released into the water. We chose three separate study sites:
Seguam Pass: Commercial fishery present, sea lion population stable
Tanaga Island: Limited commercial fishery present (small quota), sea lion population declining
Petrel Bank: Commercial fishery present (large portion of the quota), outside critical habitat for Steller sea lions.

In August-September 2011 we recovered tagged fish aboard the chartered FTSeafisher (Fig. 3). Catches are sorted and sampled for species composition similar to observer sampling on commercial vessels. In addition length frequencies and biological samples were collected for every haul.

We anticipate to recover tagged fish in April 2012 on the chartered vessel Seafisher.

Model:
We will use an integrated maximum likelihood model based on tagging and auxiliary data (ADMD).

Oceanographic habitat:

During the tag release cruise, we sampled the water column after each trawl tow with a CTD. In addition, we collected depth and temperature data during each tow.

Underwater camera tows:
During the release and recovery cruises, we conducted 31 underwater camera transects in the locations of the trawl hauls whenever weather permitted this operation. Results from this work will give insight into bottom habitat type and fish density. In addition this will be a step towards developing tools for assessing fish abundance in untrawlable areas.

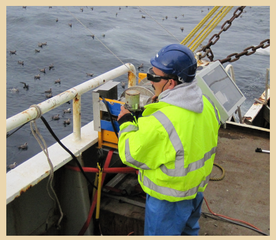


Figure 6: Phil Dang conducting underwater camera tows off the chartered vessel *Seafisher*

Figure 7: Launching of underwater video camera

References

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