

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver *Chris*  
Executive Director

DATE: May 4, 2004

SUBJECT: Steller sea lion/Pacific cod fishery interaction study

ESTIMATED TIME 1 HOUR
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**ACTION REQUIRED**

Receive a report from the Alaska Fisheries Science Center on the status of the Pacific cod fishery depletion study.

**BACKGROUND**

The Fisheries Interaction Team (FIT) of the Alaska Fisheries Science Center is conducting a study of Pacific cod localized depletion in the Bering Sea near Unimak Pass. This study is part of an overall effort to address concerns over localized depletion of Steller sea lion prey as a result of spatially and/or temporally intensive commercial fishing. NMFS' FIT has developed an experimental approach that uses pot catch of cod as a measure of local abundance, both in an intensively fished area and in an adjacent "control" (unfished) area. The goal is to compare the rate of seasonal change in abundance between sites in the treatment (fished) and control sites and test for presence or absence of a fishing effect. The study was initiated in 2003.

The FIT successfully completed the winter 2004 field season, and will present to the Council a progress report on the study design, methods, and preliminary results.

Attached (Item D-4(d)(1)) is a brief overview of the study approach and a map of the study area. Members of the FIT will present this status report and will be available to answer questions.

## Overview of the AFSC Cod Pot Study

The Fisheries Interaction Team (FIT) of the Alaska Fisheries Science Center (AFSC) has been charged with investigating the effectiveness of fishery management measures implemented to protect endangered Steller sea lions. Currently the information available to evaluate alternative methods for protecting Steller sea lions and their habitat is very limited. The FIT is conducting field experiments to evaluate effects of commercial harvest on groundfish prey availability for Steller sea lions. This summary/presentation describes the Pacific cod study.

The goal of the experiment is to evaluate the effects of commercial trawl fishing on the local abundance of Pacific cod, which aggregate over spawning grounds in the Aleutian Islands and southeastern Bering Sea during winter months. Cod have been found to be a frequent prey item in winter scat samples from Steller sea lions in the eastern Aleutians. The same dense aggregations of cod which attract commercial fishing may provide an important seasonal food resource for sea lions. Localized depletion of Pacific cod has been implicated as a possible mechanism for adverse effects of the commercial fishery on availability of prey for Steller sea lions. This experiment is designed to look at effects of the intensive winter trawl fishery on local abundance of Pacific cod in the vicinity of Unimak Pass in the eastern Bering Sea. A successful experiment will provide data for a quantitative statistical test for the presence of a localized depletion effect from this fishery, which will help to define appropriate management action. The localized depletion study also provides a platform for sample collection and observation of spawning cod that is not available from regular summer surveys. A cod tagging program is also being conducted to collect information on movement of cod around the spawning ground; estimates of short-term and seasonal movement from tagging studies will be important both in interpreting results of the local abundance study and in better understanding spawning dynamics of this important stock.

The study uses standardized pot-fishing gear to collect an index of local cod abundance. Pot gear is well-proven for Pacific cod, and can be fished at fine spatial resolution. Most importantly, pot catch data have statistical properties that make the data much more amenable to statistical testing than trawl samples. The large number of pots that can be worked within a sea day allows a larger sample size than would be feasible with a trawl study, which increases statistical precision.

The study is designed as a comparison between sites within the area subject to intensive seasonal trawling (the "treatment"), and "control" sites within a nearby zone where trawling is prohibited. Each site is surveyed before and immediately after the main trawling season. While there are many factors that may contribute to a change in local abundance between the two surveys, these factors are expected to have similar effects on trawled and control areas. Thus, the experiment is designed to look at the rate of change in local abundance between the "before" and "after" surveys, and test whether this rate of change is the same in trawled and untrawled areas.

Current regulations prohibit directed trawling for walleye pollock or Pacific cod within 10 nautical miles (nm) of specified Steller sea lion rookery and haulout sites, including haulouts at Akun Head on Akun Island and at Cape Sarichef on Unimak Island. These trawl exclusion zones bracket the northeastern and northwestern sides, respectively, of Unimak Pass. The Cape Sarichef zone, in particular, intersects the area that has historically been the main site of the winter cod trawl fishery. The study areas selected for the local abundance experiment include the outer portion of the Cape Sarichef no-trawl zone and the open trawling grounds just outside this boundary (see attached Figure).

The AFSC requested a special regulatory amendment in fall 2002 to create a short-term closure in the vicinity of the cod pot study. The regulatory amendment prohibits all trawl, pot, and longline fishing in the experimental area from March 15 through March 31 of each year (2003 through 2006). This closure was requested due to the incompatible nature of trawling and fixed-gear fisheries. In order to conduct the "after" survey in the trawled zone, field crews need to set and haul experimental pots at the trawled sites without having research gear picked up or disturbed by trawls. This request and the project study design were presented to the Council in October 2002. The SSC reviewed and approved the study design, and the Council approved the regulatory amendment. Representatives from industry were consulted during the final determination of the experimental layout and extent of the closure area.

The local abundance experiment was conducted in winter 2003, but severe weather and equipment problems prevented collection of an adequate sample size during the Dec/Jan "before" survey. Results of the 2003 experiment were provided to the Council in a written progress report at the spring 2003 meetings in Kodiak, AK. The 2003 data did not show a significant difference between trawled and untrawled areas, but because of the low sample size these results were not considered conclusive. Field operations in 2003 included release of a large number of tagged cod at several sites around Unimak Pass; return of these tags has been ongoing and analysis of tag return data is underway.

The experiment was repeated in winter 2004 with good success. Research cruises in January and March 2004 each completed sampling the full array of experimental stations. Data from 2004 cruises have been assembled and are currently undergoing analysis. The presentation at the 2004 Council meeting is for presentation of these results. Both principal investigators for the project, M. Elizabeth Connors and Peter Munro of the AFSC, will be present to answer questions about the study design, methods, and results. Results of tagging and biological studies to date will also be briefly reviewed.

**Figure 3. Cod Pot Local Abundance Study Area off Cape Sarichef.**  
**Triangles indicate 2003 study sites, shaded depths 70-90 m.**

