FINAL REPORT: DEMERSAL SHELF ROCKFISH STOCK ASSESSMENT IN THE EASTERN GULF OF ALASKA

By

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Regional Information Report[1] No. 1J00-33

Alaska Department of Fish and Game
Division of Commercial Fisheries
NOAA Award NA77FM0209

September 15, 2000

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1. Final Report: Demersal Shelf Rockfish Stock Assessment in the Eastern Gulf of Alaska.

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2. Abstract

A. This report summaries the fieldwork, accomplishments, and findings of the NOAA grant NA77FM0209 "Demersal Shelf Rockfish Stock Assessment in the Eastern Gulf of Alaska," July 1997-June 2000. The project involved research on habitat-based stock assessment of demersal shelf rockfish (DSR) with an emphasis on yelloweye rockfish, *Sebastes ruberrimus*. Density estimates were updated for yelloweye rockfish in two management areas of the eastern gulf and total amount of rock habitat was estimated. Final results indicate 5,757 sq. km of rocky habitat occur inside the 100 fathom contour of the southeast outside district with an estimated 30,400 mt of exploitable biomass of yelloweye rockfish. This estimate yields a total allowable catch of 340 mt for the DSR complex.

3. Executive Summary

A. Submersible surveys to collect density estimates of yelloweye rockfish and verify habitat classification were conducted in 1997 in Central Southeast Outside (CSEO) and East Yakutat (EYKT) sections, and in 1999 in the Southern Southeast Outside (SSEO) and EYKT sections. In addition to new estimates of fish density, the amount of rock habitat used in extrapolation of the biomass estimate was reevaluated using new information from sidescan sonar mosaics, submersible verification, and commercial logbook data. Longline surveys of the Fairweather Grounds was conducted every year and young of the year rockfish were sampled from the Mt Edgecumbe pinnacle area. Survey results were used to successfully recommend that the Edgecumbe pinnacles area be classified as the first no-take marine groundfish reserve in Alaska. In addition, results of these studies were presented at a variety of public and scientific meetings including the North Pacific Fisheries Management Council, the Alaska Board of Fisheries, the Technical Subcommittee of the Canada/US Groundfish Committee, the 10th and the 11th Western Groundfish Conferences, the Annual American Fisheries Society meeting, annual Science Conference of the ICES and the Marine Benthic Habitat Meeting, SOPAC.

4. Purpose

A. The Alaska Department of Fish and Game has immediate responsibility for management of demersal shelf rockfish under North Pacific Fisheries Management Council guidelines. The objective of this project is to continue a habitat-based method of estimating rockfish abundance as a means to improve rockfish management and to reduce the risk of over harvest in Southeast Alaska. This objective was met through the use of submersible-based surveys and improved technology. Stock assessment methods for this assemblage are made based on an estimation of rockfish density per unit of habitat and an area estimate of rockfish habitat.

Objectives for the project include:

1. Density estimation of yelloweye rockfish.
2. Habitat characterization and quantification for use in stock assessment.
3. Description of biological characteristics of the stock.
4. Annual stock assessment and fishery evaluation reports to the North Pacific Fisheries Management Council for use in management of the resource.

5. Dissemination of results through public and scientific meetings.

5. Approach

1997/1998: During the contract period a submersible was used to conduct 71 transects for collecting line transect density data and/or habitat characterization for the CSEO management section and the Fairweather Ground. Additionally, further work was done on quantification of rockfish habitat in the survey areas. These data were used to update the exploitable biomass estimates for DSR, used directly in the 1997 Stock Assessment and Fishery Evaluation Report to the North Pacific Fishery Management Council. A survey to collect juvenile rockfish for genetic sampling and identification was undertaken in May 1998 with limited success. Results of the habitat-based stock assessment were presented at several national and international venues and information from this work was used to support the closure of the Mount Edgecumbe pinnacles area as a "No-take Groundfish Reserve."

1998/1999: Sidescan, seismic profiling, and bathymetric data were collected from a 309 sq. nm area of the western bank of the Fairweather Ground, an important rockfish fishing ground in the East Yakutat section. We had 9 survey days and 2 running days with 24-hour operations. We used the AMS-150 sidescan sonar system to collect sub-bottom profiles, sonographs, and swath bathymetry. These data were processed and will be used to improve our DSR stock assessment in the East Yakutat Subdistrict for the year 2000 assessment. We also chartered the commercial vessel *Ida June* to set longline gear and collect yelloweye rockfish specimens from our permanent survey sets in the East Yakutat section. We have a time series of data from this vessel that has allowed us to track catch per unit effort (CPUE) using the same equipment, exact location, and method of operation to minimize variance. All lingcod caught were also sampled for sex, length, maturity, and otoliths. We set 7 of our permanent survey stations and 3 more sets that were picked using the sidescan sonar mosaic from Fairweather.

1999/2000: We chartered the submersible Delta and used the *R/V Medeia* as a support ship to conduct line transects in the SSEO and EYKT portions of the Eastern Gulf of Alaska. We conducted 45 line transect dives in SSEO and 22 in the EYKT area. Additionally we completed 10 dives to verify geology and the Fairweather sidescan mosaic and 4 dives on rockfish longline gear. The fishing vessel *Ida June* was chartered to set longline gear and collect yelloweye rockfish specimens from permanent survey sets. We have a time series of data from this vessel that has allowed us to track CPUE using the same equipment, exact location, and method of operation to minimize variance. Yelloweye rockfish were subsampled for age, length, sex, and maturity. All lingcod caught were also sampled for sex, length, maturity, and otoliths. We set 7 of our permanent survey stations and 3 more sets that were selected using the sidescan sonar mosaic from the Fairweather Grounds. Data from the survey is currently being entered into the database. A manuscript for review by Marine Geology Journal, detailing our Edgecumbe habitat study, has been finalized.

6. Project Management

Victoria M. O'Connell, ADF&G: Project Leader, participated in all fieldwork, analysis and publications.

David W. Carlile, ADF&G, co-investigator, responsible for biometric support, and participated in publications.

Dr. Waldo Wakefield, Rutgers University: co-investigator, fieldwork, and publications.

Dr. Gary Greene, Moss Landing Marine Laboratory, marine geologist, participated in 1 week of fieldwork, geological habitat analysis and publications.

Cleo Brylinsky, ADF&G, groundfish biologist, participated in fieldwork, GIS application, and analysis of habitat maps.

Dr. Doug Woodby, ADF&G, contract administrator.

7. Findings

A. Accomplishments and Findings:

Detailed findings are documented in the semi-annual and annual reports covering this three-year contract period. Overall findings of the three-year period were a revision of the yelloweye (YE) density estimates and estimates of rock habitat used in the stock assessment model. The 2000 Stock Assessment and Fishery Evaluation report to the North Pacific fishery details the results as follows:

Area	Survey data	Density YE/km^2	CV(D)	Avg wt (kg.)	Habitat Km^2	Point Estimate	Biomass L90% CL (mt)
EYKT	1999	2323	0.3084	4.07	703	6,645	4,045
CSEO	1997	2534	0.2009	3.144	1,184	9,432	6,701
NSEO	1994	834	0.2778	2.98	357	892	568
SSEO	1999	1879	0.1711	3.04	851	4,858	3,673
SEO Total					3,095	21,827	15,067

By applying a fishing mortality rate equal to estimated natural mortality rate (in this case 0.02) and adjusting for the 10% of other DSR species caught, the recommended 2000 total allowable catch for the Southeast Outside section of the Eastern Gulf of Alaska is 340 mt.

B. Problems:

1997/1998: We had great difficulty in trapping juvenile rockfish in deepwater offshore areas. We tried using several types of trap and netting devices and used night and daytime soaks, light devices etc. After a week of sampling we were still only able to collect 15 samples. We did not collect yelloweye gonads for fecundity work as we had difficulty with the laboratory samples collected during the spring of 1997. The Gilson's fluid we used does not seem to break down the ovarian tissue adequately without damage to the ova. We decided to delay collection of more samples until these problems are resolved.

1998/1999: Williamson's and Associates did not provide full swath bathymetry as requested. Except in a few areas of the mosaic, single beam bathymetry was substituted. For this reason I would not recommend using this contractor again.

8. Evaluation

Major goals and objectives of this contract were attained. We have been able to increase our understanding of habitat use by yelloweye rockfish and have been able to map and quantify large sections of the commercially important DSR fishing grounds in SE Alaska. Our submersible survey techniques for DSR have improved greatly over time and our stock assessment method has aided fishery management for this group considerably.

9. Dissemination of Project Results

Project results are disseminated through annual reports to the North Pacific Fishery Management Council, Alaska Board of Fisheries, the Technical Subcommittee of the Canada/US Groundfish Subcommittee and various public and scientific forums.

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