

ANNUAL REPORT TO THE
NATIONAL UNDERSEA RESEARCH PROGRAM (NURP)
FOR 1990



By

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ANNUAL REPORT TO NURP FOR 1990

DEFINITION OF THE RELATIONSHIP BETWEEN DEMERSAL SHELF ROCKFISH ABUNDANCE AND HABITAT COMPLEXITY BASED ON *IN-SITU* OBSERVATIONS FROM A SUBMERSIBLE IN THE EASTERN GULF OF ALASKA.

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Objectives: Demersal shelf rockfish (DSR) is one of the few groups of commercially important fishes in the Gulf of Alaska for which no estimate of biomass is available. The Alaska Department of Fish and Game (ADF&G) is currently involved in a five year research program to develop a stock assessment method for this group of species. The most promising approach for a stock assessment method is a habitat-based biomass estimate. This involves estimation of rockfish density per unit of habitat, coupled with an areal estimate of suitable rockfish habitat, to yield estimates of rockfish density and biomass. Specific submersible objectives are: 1) To estimate density of adult demersal shelf rockfish using line transects conducted from a manned submersible, 2) To determine if there is a diel difference in observed abundance of DSR, 3) to further evaluate the usefulness of a submersible for delineating habitat of DSR, and 4) to define the relationship between habitat complexity and DSR abundance.

Approach/Methods: In 1990 we used a modified hand-held sonar to facilitate line transects methods for counting DSR. Three transects were run per dive and distance to fish, species identification, and habitat were recorded. Both video and audio counts were recorded from the submersible. A "pisces box" auto recorded time, temperature, depth of submersible and depth of submersible off bottom at one second intervals. Dive sites were located using NOS bottom maps and the support vessel's navigational equipment. Transects were run following a straight line compass or gyro setting.

Current Status: The 1990 survey was the first year of a proposed two year study. We have reapplied for the second year's funding for 1991. Our 1990 results indicate that the submersible is an appropriate tool for enumerating DSR by habitat type. Our ability to apply line transect methods to estimating density of rockfishes has been enhanced by the successful use of a hand-held sonar gun for measuring distance to individual fish. We are currently conducting analyses to estimate the density of rockfishes along our transects, using the program "TRANSECT" to obtain density estimates. The automatic recording of depth data, using the "Pisces" box, newly-installed in the Delta, has greatly improved our ability to estimate topographic relief along the transects. When we have obtained the estimates of rockfish density along the transects, the relationship between density and topographic relief will be modelled. A variety of measures of topographic relief are currently being investigated for association with rockfish density. Some of these measure include variance in depth, number of runs of increasing or decreasing depth and mean change in depth. We plan to complete our primary analysis by the end of February, 1991.

Benefits: Our initial problems with line transect methods encountered in 1989 have been resolved. The use of a modified hand-held sonar allow us to use line transect methods, the preferred approach. Strip transects rely on the calculation of field of view which is difficult to quantify in the

rugged, rocky terrain inhabited by rockfishes. We have begun to describe the relationship between yelloweye abundance (the dominant DSR species in the commercial landings) and habitat complexity and are continuing the analysis of our 1990 data. Initial results suggest an increase in abundance of DSR with habitat complexity. Once this relationship is described, the development of a stock assessment method may be accomplished by combining the use of available bathymetry data and the defined relationship between DSR and habitat complexity.

In preparation for publication:

O'Connell, V.M. and D.W. Carlile. Observations of the relationship between yelloweye rockfish (*Sebastes ruberrimus*) abundance and habitat complexity in the Eastern Gulf of Alaska. (will be submitted to Fishery Bulletin).

Carlile, D.W. and V. M. O'Connell. The relationship between demersal shelf rockfish abundance and habitat complexity in the Eastern Gulf of Alaska. (Submitted for presentation at the 1991 AFS national meeting).

Dive system used Delta Cost/day \$7,000.00

Additional OUR science support, i.e., personnel, supplies, equipment, etc.
Total \$ _____.

Co-funding, i.e., NSF, SG, ONR, etc.: Total \$ _____

Match, i.e., investigator/institution costs: Total \$ 32,079

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