

STOCK DELINEATION STUDY OF BLACK ROCKFISH,
Sebastes melanops, OFF THE OREGON COAST

Contract No. 84-ABH-00067
Saltonstall-Kennedy Act Funds

Annual Progress Report
October 1, 1984 through September 30, 1985

Jerry Butler

Oregon Department of Fish and Wildlife
Newport, Oregon

April 15, 1986

STOCK DELINEATION STUDY OF BLACK ROCKFISH,
Sebastes melanops, OFF THE OREGON COAST
Contract No. 84-ABH-00067
Annual Progress Report
October 1, 1984 through September 30, 1985

INTRODUCTION

The black rockfish, Sebastes melanops, is the most often caught recreational groundfish off the Oregon coast. This species' widespread occurrence, susceptibility to angling gear, and general acceptance by the angling public, all contribute to its importance now and its continued value in the future.

Concern for the black rockfish resource lead the Oregon Department of Fish and Wildlife (ODFW) to plan a tagging study designed to better understand the movements of these fish along our coast. This study was submitted to the National Marine Fisheries Service for possible funding under the Saltonstall-Kennedy Act. Funding was approved and the project field work was completed during FY 85. This report summarizes that work and the results achieved through December, 1985.

METHODS

All owners of charterboats licensed to operate in Oregon were invited to bid their services for use in our program. The bid form used is shown in Appendix I. Bids were offered for 28 boats: 13 for Garibaldi and 15 for Newport. A ranking of vessels and a selection process led to the acceptance of five boats for the Garibaldi work and four boats for Newport.

Normal angling equipment (rod and reel) was used to capture the fish. We chose to work in areas popular with both recreational anglers and commercial hook-and-line (jig) fishermen. However we did restrict our efforts to areas

no deeper than 60 feet; this helped ensure that the captured fish would be in as good physical condition as possible. Only very healthy fish were tagged; all injured fish taken during our work were donated to local food share programs for distribution to needy people. The two general areas of tagging, out of Garibaldi and Newport, are shown in Figure 1.

Captured fish were brought aboard the boat, examined for condition suitability, measured and sexed, tagged, and returned to the water. They were then observed to determine whether they were able to quickly dive and swim away normally. If the capture rate exceeded the ability to tag and release, a holding tank was utilized. Each boat was equipped with a 100 gallon tank filled with clean seawater. If fish were coming aboard rapidly, they were placed in this tank until they could be tagged and released. Every effort was made throughout the study to ensure good physical condition of the fish released. This was done in an effort to reduce tagging-induced mortality, and should contribute to long term survival of the tagged fish.

Floy FD68B anchor tags were used. These were serially numbered D00001 through D08000 and carried the printed legend "RETURN ORE FISH WILD, NEWPORT".

Since public cooperation in returning tags is critical, several steps were taken to publicize the project. State and local newspapers carried articles. Television crews were involved in both the Garibaldi and Newport sites; the resulting news broadcasts were carried by both Portland and Newport stations. Signs were placed in both ports where they would be seen by anglers.

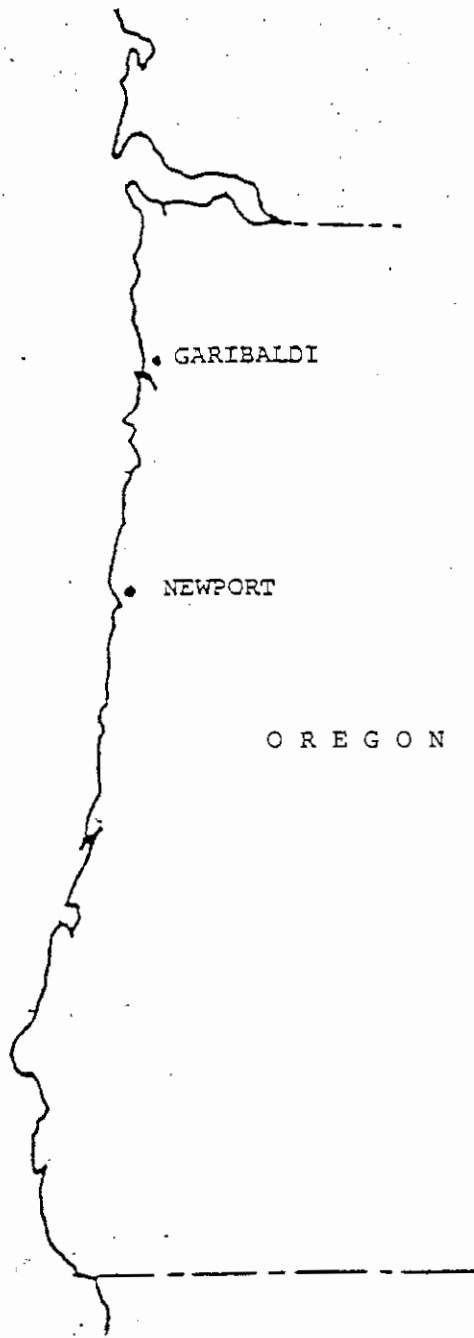


Figure 1. Location of the tagging ports, Garibaldi and Newport.

RESULTS

The tagging was completed in three days (15 boat days) out of Garibaldi, on April 29, 30, and May 1. The work out of Newport required more boat days (19) due to lower overall catch rates. The Newport tagging was done on May 6-9, and May 28-30. Approximately 350 person-days (150 at Garibaldi and 200 at Newport) were spent by people participating in the tagging operations during these 34 boat days at sea.

The numbers of tagged fish released were 3,850 at Garibaldi and 3,908 at Newport. This total of 7,758 deviated from the target goal of 8,000 by the number of tags that were broken during the tagging operation; this is a normal occurrence.

Garibaldi fish were released at four specific sites (Figure 2). The majority (84%) were released at the most popular fishing (both recreational and jig) site, Three Arch Rocks. Pyramid Rock was the location where 14% of the fish were caught and released. Two percent were released at Cape Lookout and <1% at the Tillamook Bay north jetty.

In contrast to the "discrete site" releases at Garibaldi, the fish tagged out of Newport were much more scattered (Figure 3). Most of the fish (90%) were released in an eight mile long strip from the Yaquina Bay south jetty to just beyond Seal Rocks. Eight percent were released along a 1.5 mile strip of coast just north of Yaquina Bay. The remaining two percent were released off the town of Waldport, 12 miles south of Newport.

The scattering of fish released out of Newport was due to the lower overall catch rate there, compared to Garibaldi. The lower catch rate caused more

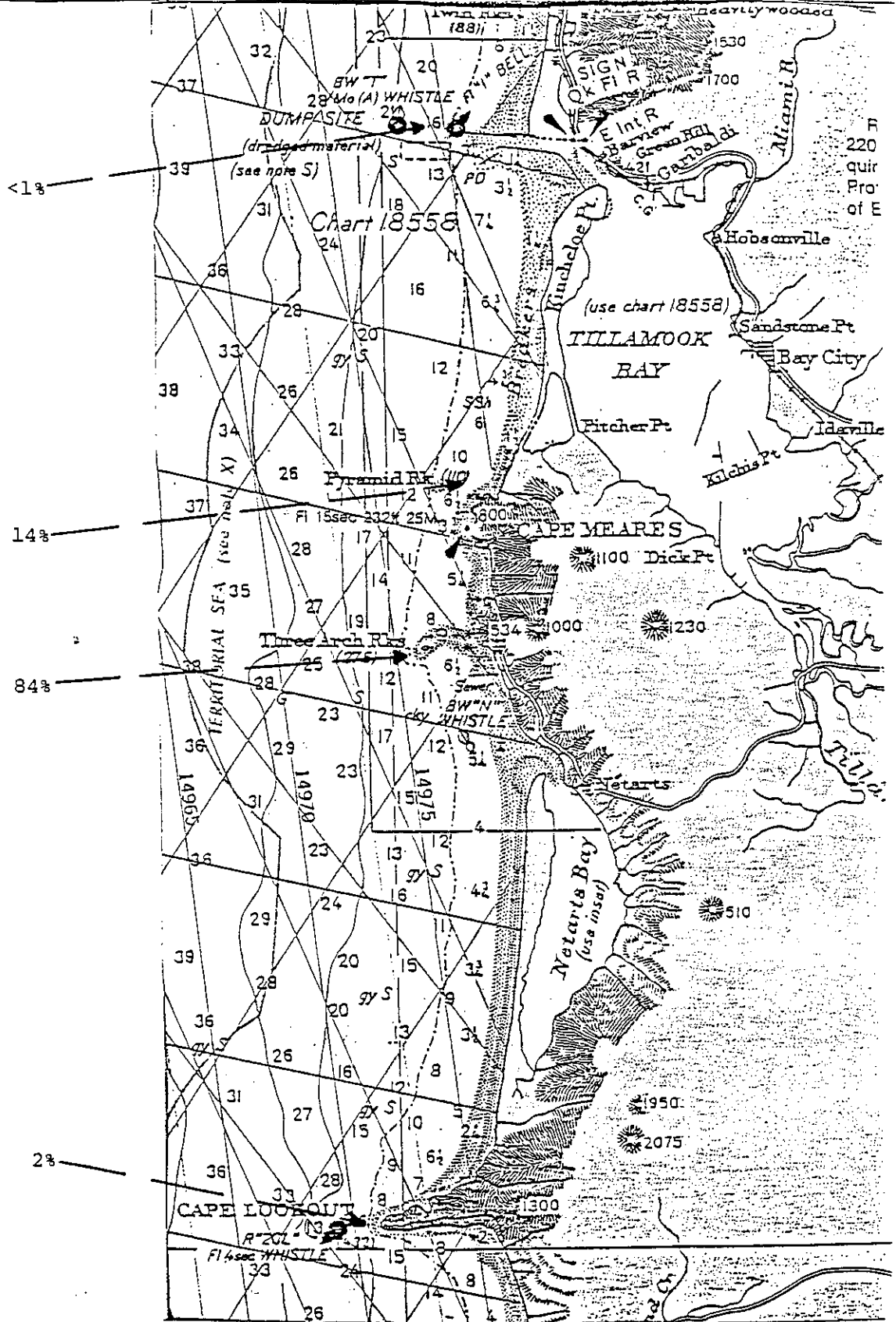


Figure 2. Tagging area out of Garibaldi. The 3,850 tagged fish were released proportionally in the subareas shown.

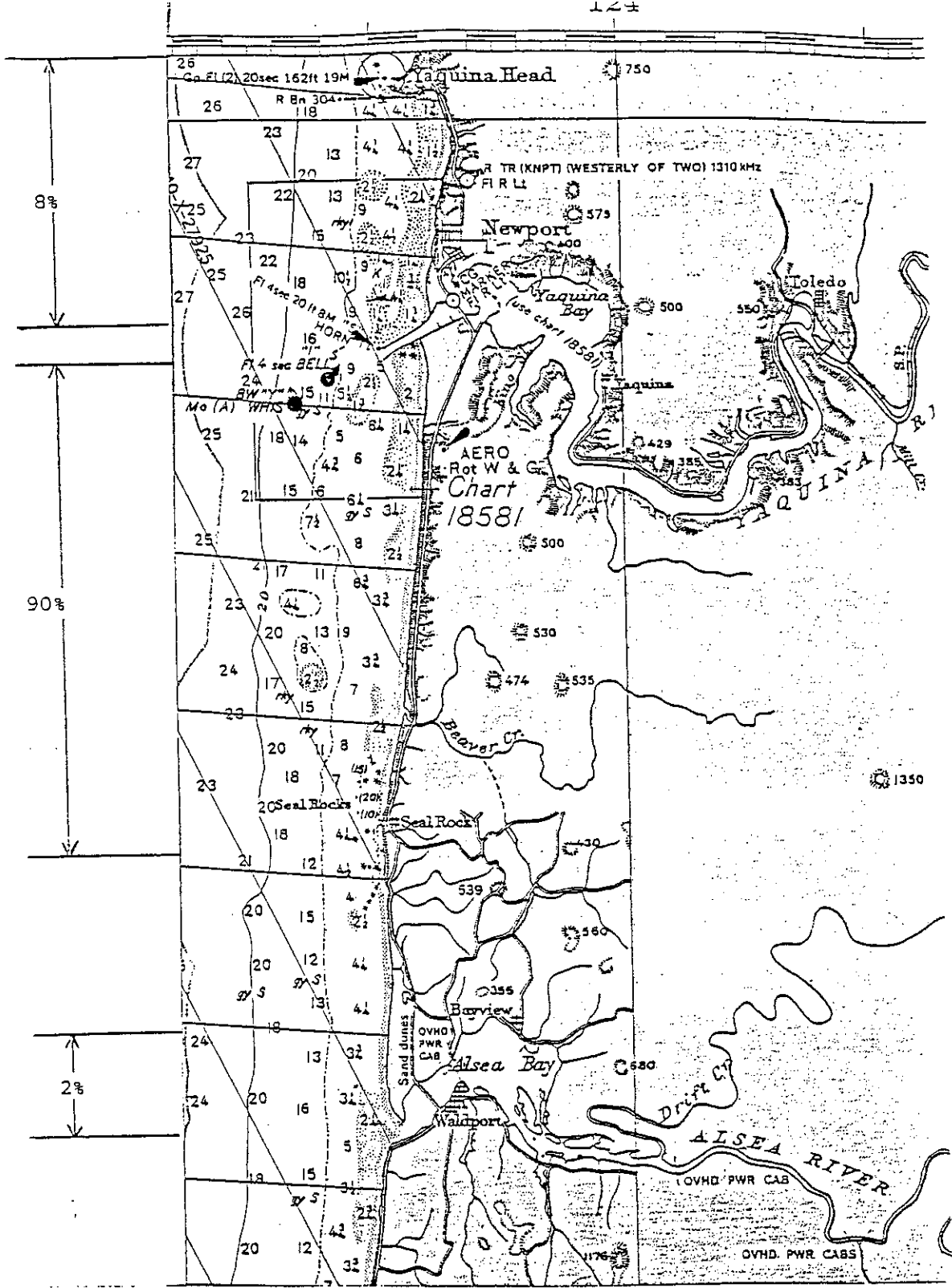


Figure 3. Tagging area out of Newport. The 3,905 tagged fish were released proportionally in the subareas shown.

boat movement in searching for better concentrations of fish. As a result, the majority of fish were released over much larger areas than had occurred at Garibaldi.

There have been 114 tagged fish recovered from the Garibaldi tagging as of December 31, 1985. Three of these fish showed northerly movement from the area of tagging to the area of recovery. Two fish moved from Cape Lookout 8 miles north to Three Arch Rocks. The other fish moved from Three Arch Rocks 2 miles north to Pyramid Rock. Seven fish showed southerly movement; all of these moved 2 miles from Pyramid Rock to Three Arch Rocks.

Forty tagged fish have been recovered from the Newport area releases. Two of these showed northerly movement. Both were released and recovered south of Newport; one moved 2 miles and one moved 4 miles. Two fish moved south between tagging and recapture. One of these moved 2 miles and one 5 miles.

None of the remaining tag recoveries from either port showed any detectable movement.

The principal user group to recover tags in both ports was charterboat anglers, followed by private boat anglers (Table 1). Recreational anglers in total recovered 90% of the tags out of Garibaldi, and 98% of the tags from Newport. Both ports had 2 percent of their tags recovered by unknown means. The principal difference in recovery means between the two ports was in the number of tags returned by commercial jig fishermen; this was 8 percent at Garibaldi compared to 0 at Newport.

Table 1. Proportion of tagged fish recoveries by user group out of Garibaldi and Newport during the period May 1 through December 31, 1985.

| User Group | Percent Recoveries | |
|------------------------------|--------------------|---------|
| | Garibaldi | Newport |
| Charterboat angler | 54 | 63 |
| Private boat angler | 28 | 25 |
| Unknown angler ^{1/} | 8 | 10 |
| Commercial jig | 8 | 0 |
| Unknown user group | 2 | 2 |
| TOTAL | 100 | 100 |

^{1/} These were tag recoveries known to be from the sport fishery, but that could not be assigned to either charterboat or private boat anglers.

Table 2. Proportion of tagged fish recoveries by month of recovery out of Garibaldi and Newport during May 1 through December 31, 1985.

| Month | Percent Recoveries | |
|-----------|--------------------|---------|
| | Garibaldi | Newport |
| May | 12 | 5 |
| June | 20 | 30 |
| July | 18 | 18 |
| August | 18 | 38 |
| September | 25 | 7 |
| October | 6 | 2 |
| Unknown | 1 | 0 |
| TOTAL | 100 | 100 |

The highest monthly tag return out of Garibaldi was in September with 25% of the total. August was the month with the highest return rate (38%) at Newport (Table 2).

DISCUSSION

A large difference exists in tag returns between the two ports (114 from Garibaldi and 40 from Newport). This cannot be explained by differences either in angling effort or total black rockfish catch between the two ports, as Newport leads Garibaldi in both of these statistics (Table 3). For example, in July and August (the only period for which we yet have monthly catch estimates) the estimated catch of black rockfish out of Garibaldi and Newport was 20,637 and 22,761 fish, respectively. Total estimated ocean boat angling effort for the same period was 31,757 angler trips out of Garibaldi and 49,534 angler trips out of Newport. Non-salmon (i.e. bottomfish directed) angler trips were 3,738 out of Garibaldi and 5,074 out of Newport, about the same ratio as trips directed at salmon. Therefore it seems unlikely that the tag return differences can be attributed to differences in either effort or total catch statistics, as the proportion of recoveries is substantially reversed from ratios of effort and catch at the two ports, while tags out were essentially the same.

However, there are at least two possible reasons for this tag return difference. The first is that the total black rockfish population or density fished by the Garibaldi fleet may simply be smaller than the population or density out of Newport. With approximately the same number of tagged fish released in each location, a Garibaldi population that equalled only 35% of the Newport population in size could result in approximately the observed tag return pattern. However, catch rates during the tagging program do not

Table 3. Total Black Rockfish Catch, Angler Effort, Tagged Fish Released and Recovered, and Respective Proportions, by Port for May 1 through December 31, 1985.

| Port | Total Black Rockfish Catch ^{1/} | Total Angling Effort ^{2/} | No. of Tagged Fish: | |
|-----------|--|------------------------------------|---------------------|-------------|
| | | | Released | Recovered |
| Garibaldi | 20,637 (47.5%) | 31,757 (39.1%) | 3,850 (49.6%) | 114 (74.0%) |
| Newport | 22,761 (52.5%) | 49,534 (60.9%) | 3,908 (50.4%) | 40 (26.0%) |
| Total | 43,398 (100.0) | 81,291 (100.0) | 7,758 (100.0) | 154 (100.0) |

^{1/} Number of fish, July and August, 1985

^{2/} Number of angler trips, July and August, 1985

support this hypothesis. Observed catch rates were substantially higher in Garibaldi; this does not suggest a smaller total population. Total catch rates (all boats) in Garibaldi were 25% higher than those in Newport during tagging operations. If we examine just the most successful boat in each port, then Garibaldi's "high boat" exceeded Newport's by 31%.

We believe that "tagging density" is most likely responsible for the observed difference in returns. As discussed above, the Garibaldi tags were released in a much more concentrated area than those released out of Newport. The angling effort out of both ports follows patterns very similar to the tagging vessels. Garibaldi anglers tend to concentrate mainly around Three Arch Rocks and to a lesser extent at Pyramid Rock. Newport anglers are typically scattered over a much larger area.

Recovery data through December 31, 1985 do not indicate much movement occurred. Ninety-one percent of the known area recoveries from Garibaldi and 88% of those from Newport have been recaptured at or very near the area of release. Definite movement was shown by 9 and 12 percent of the recoveries out of Garibaldi and Newport, respectively.

It is too early to attempt to delineate stocks based on these results. While the first year's returns suggest that little movement either in total or in distance occurs, returns in subsequent years may not follow the same pattern. For example, it may be that most movement occurs with the stimulus of winter storms. For this reason future tag recoveries will be very valuable; we will continue every effort to secure complete recovery information with each tag.

The question of population size is one that concerns fisheries managers very much. Knowing population size allows us to evaluate the probable effects

of removals from that population. Sometimes tagging programs such as this one can yield information useful in estimating population size if certain criteria are met. Among these is a good estimate of the total catch being removed from the population in question. We do not yet have such a catch estimate for our two areas. Presently available catch estimates began July 1, 1985; the tagged fish were exploited for up to two months before that date. We are now exploring alternative methods for estimating the catch that occurred during periods other than July-August.

However, this study does lend itself to the estimation of another very useful statistic, the rate of exploitation of the population. Given the rate of exploitation, and knowledge of the fish's natural mortality rate, we can assess whether a given harvest is likely to have an adverse affect upon a population. This can be done by examining the ratio between the number of tagged fish recovered and the number of tagged fish initially released (Ricker, 1975). This is expressed as:

$$\text{Exploitation rate} = \frac{\text{number of tag recoveries}}{\text{number of tagged fish released}} / \text{Time period}$$

If we apply this equation to the Garibaldi experiment, we obtain:

$$\text{Exploitation rate} = \frac{114}{3,850} / \frac{8}{12} \text{ year} = 0.044/\text{year}$$

Similarly we obtain for Newport data:

$$\text{Exploitation rate} = \frac{40}{3,908} / \frac{7}{12} \text{ year} = 0.017/\text{year}$$

Therefore, the estimated annual exploitation rates are about 0.04 and 0.02 for the respective tagging areas. For a species like black rockfish with a natural mortality rate of approximately 0.18 (PFMC, 1982), the estimated exploitation rate seems well within an acceptable level, i.e., well below the natural mortality rate, M.

FUTURE WORK

Principal work in the future will be to continue an aggressive program of tag recovery effort. These future recoveries will be very important in establishing long-term movement patterns, stock delineation, and other parameters as well.

We will also continue to refine catch estimates of black rockfish at all times of the year. This will be part of our ongoing efforts to document the population size of the species in the tagging areas, and to better estimate the exploitation rate occurring.

ACKNOWLEDGMENTS

The support of the National Marine Fisheries Service is gratefully acknowledged. Without such support in the form of Contract No. 84-ABH-00067, this study could not have been accomplished.

Efforts of the charterboat skippers involved were very important. Their skill in fishing operations contributed to the smoothness of the program.

The very many volunteers (both agency people and general public) who staffed the charterboats were invaluable in providing the fish used in the study.

The efforts of charterboat skippers and the angling public in returning tags is especially appreciated.

REFERENCES

- Ricker, W.E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Bulletin Fisheries Research Board of Canada. 119:382 p.
- PFMC. 1982. Pacific Coast Groundfish Management Plan. Pacific Fishery Management Council. Portland, Oregon.