

Shortraker Rockfish, *Sebastes borealis*, Observed from a Manned Submersible

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Background

The shortraker rockfish, *Sebastes borealis*, is an offshore, demersal species distributed from the southeastern Kamchatka Peninsula, U.S.S.R., to Ft. Bragg, Calif. (Kramer and O'Connell, 1986). It attains lengths >100 cm (>39 inches) and weights to 20 kg (44 pounds). In the Gulf of Alaska, shortraker rockfish are sampled annually during longline surveys and are most abundant between depths of 300 and 400 m (984 and 1,312 feet).¹

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ABSTRACT—*These are the first documented observations of shortraker rockfish, Sebastes borealis, in their natural habitat. The in situ observations were made from a manned submersible in 1991 in the eastern Gulf of Alaska. Eleven dives were completed from 207 to 357 m (679–1,171 feet); shortraker rockfish were observed during four dives. Their apparent indifference to the submersible allowed observations of their spatial distribution and habitat. The shortraker rockfish observed (20 total) were not schooled and were at least 50 m (164 feet) apart. Nineteen were on the bottom, and one was 0.5 m (20 inches) above the bottom. They were using 3–12° sloping terrain composed of either silt or pebbles interspersed with boulders (diameter 0.5–4.0 m (1.6–13 feet)); six were next to boulders.*

Commercial harvesting of shortraker rockfish in the Gulf of Alaska began in the early 1960's when foreign trawl fleets were targeting more abundant *Sebastes* spp. In recent years, high catch rates of shortraker rockfish indicate that the domestic trawl fleet targets this species; shortraker rockfish comprised 14.9% of the species composition of slope rockfish harvested in 1990, although trawl survey data indicates they comprised only 2.5% of the biomass (Heifetz and Clausen, 1991).

In 1991, catch limits were established for shortraker rockfish to prevent overharvesting of this species in the Gulf of Alaska. Catch limits are based on biomass estimates derived from bottom trawl catch rates. These biomass estimates are questionable, however, because the catch efficiency of bottom trawls on shortrakers is unknown. Fishermen report that shortrakers school off-bottom and above rugged habitat in steep-slope areas where bottom trawls cannot sample effectively.

The two-man submersible *Delta* was chartered by the National Oceanic and Atmospheric Administration, National Undersea Research Center, for rockfish behavior studies in the eastern Gulf of Alaska in June 1991. One objective was to determine whether shortraker rockfish could be observed from the submersible and, if so, to obtain information on their spatial distribution and habitat.

Methods

Submersible dives were made at eleven sites on the outer continental

shelf in the eastern Gulf of Alaska between lat. 55°N and 60°N (Fig. 1). Dives were made during daylight hours at depths from 207 to 357 m (679–1,171 feet). At each dive site, the submersible followed four parallel transects for 15 minutes each; each 15-minute transect was separated by 5 minutes of travel perpendicular to the transects. The average speed was 3 km/h (1.6 knots), resulting in approximately 3 km (1.6 nautical miles) surveyed at each site. Halogen lights on the submersible provided illumination; visibility was 4–7 m (13–23 feet), depending on the amount of zooplankton and suspended silt.

The pilot maintained the submersible within 0.5 m (1.6 feet) of the bottom while a scientist observed through a starboard porthole. Observations included rockfish species identification, number, size, grouping behavior, position relative to the sea bottom, habitat affiliations, and response to the submersible. Observations were audio and video recorded for subsequent analysis. Species identification and fish sizes were verified from bottom trawl samples collected at seven sites.²

Results

Response to Submersible

Twenty large shortraker rockfish, estimated at 7–20 kg (15–45 pounds)

²R. E. Haight. Cruise results, NOAA RV *John N Cobb*. Cruise no. JC 91-07, Distribution of Pacific ocean perch, eastern Gulf of Alaska. On file at Auke Bay Laboratory, AFSC, NMFS, NOAA, Juneau, Alaska.

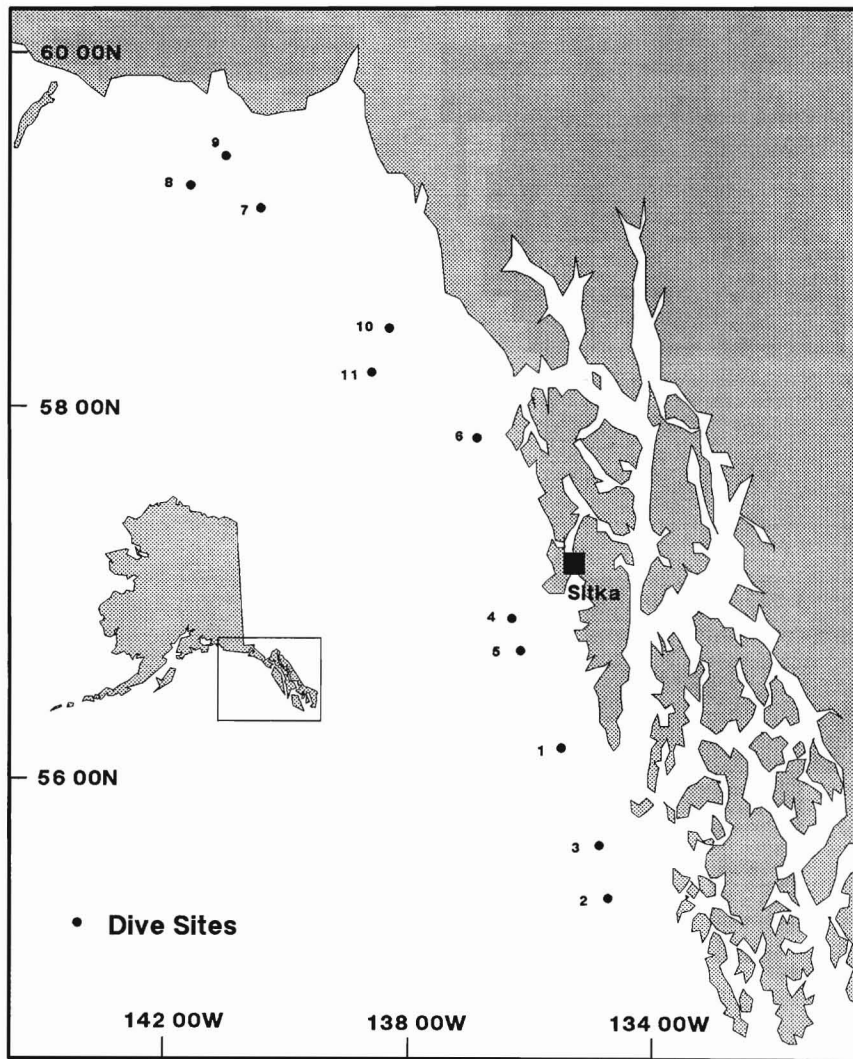


Figure 1.—Submersible survey sites for shortraker rockfish in the eastern Gulf of Alaska in June 1991.

each, were observed from the submersible. These are the first known published observations of shortraker rockfish in their natural habitat. These fish remained motionless when the submersible passed by them. After observations on rockfish distribution and habitat were completed, the submersible approached six shortraker rockfish for close-up video; only one reacted—by moving 1 m (3.3 feet) from the submersible. The submersible drifted against two shortraker rockfish; they remained in contact with the submers-

ible as they were pushed along the bottom.

Habitat

Shortrakers were observed at 4 of the 11 dive sites (Table 1). These observations were supported by trawl catches; seven sites were sampled with bottom trawls², and shortraker rockfish were captured only at the sites where they were observed from the submersible (Table 1). Substrate differences were observed between sites with and without shortraker rockfish. Boulders 0.5–4.0 m (1.6–13 feet) in diameter were common at all four shortraker sites, whereas boulders were scarce at six sites where shortraker rockfish were not observed (Table 1). The bottom topography sloped 3–12° at the three sites containing 19 shortraker rockfish, whereas the slope was nearly flat (<2°) at 6 sites where no shortraker rockfish were observed (Table 1).

The specific habitats used by shortraker rockfish were similar. Nineteen shortraker rockfish were in contact with fine-grained substrates of silt or pebbles, and one was approximately 0.5 m (20 inches) above cobble <0.2 m (8 inches) in diameter (Fig. 2A). Six shortraker rockfish on the bottom were each next to a boulder 0.5–1.5 m (1.6–5 feet) in diameter (Fig. 2B).

Table 1.—Occurrence of shortraker rockfish and sea-floor habitat at 11 dive sites in the eastern Gulf of Alaska in June 1991.

Site	Depth		No. of fish		Slope	Sea-floor habitat	
	Meters	Feet	Observed ¹	Sampled ²		Substrate	Boulders
1	323–316	1,060–1,037	0		0–2°	Pebble and cobble	Common
2	282–276	925–906	0	0	0–2°	Silt	Absent
3	357–351	1,171–1,152	1	2	0–1°	Silt	Common
4	316–280	1,037–919	8	13	3–4°	Silt and cobble	Common
5	316–215	1,037–705	6		3–4°	Pebble and cobble	Common
6	294–207	965–679	5		5–12°	Silt and cobble	Common
7	295–286	968–938	0	0	0–2°	Silt	Rare
8	294–291	965–955	0		0–2°	Silt and cobble	Rare
9	318–285	1,043–935	0	0	4–16°	Sand and cobble	Rare
10	251–250	823–820	0	0	0–1°	Silt	Absent
11	262–261	860–856	0	0	0–1°	Silt	Absent

¹Observed in situ from the submersible.

²Caught by bottom trawl. Data are from R. E. Haight (text footnote 2).

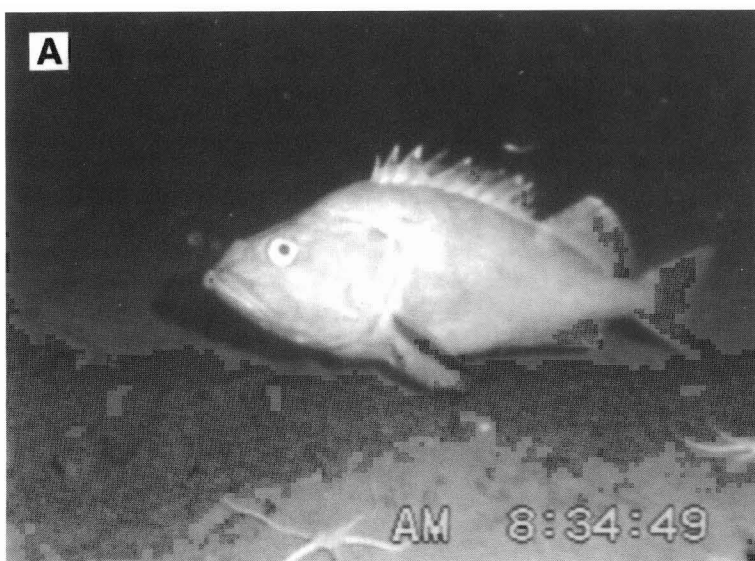


Figure 2.—A shortraker rockfish on silt (A) and on pebble next to a 1 m diameter boulder (B).

Spatial Distribution

The maximum number of shortraker rockfish observed at any dive site was eight (Table 1). No schooling was observed, and individual fish were separated by at least 50 m (164 feet). Currents ranged from 0.1–0.4 km/h (0.05–0.2 knots), and ten shortraker rockfish were oriented broadside to the

current and tilted 5–20° with the current (Fig. 3).

Discussion

Shortraker rockfish were an ideal species to observe in situ because they were motionless, solitary, and not obstructed by habitat. Their passive behavior is similar to the behavior of other large

Sebastes spp. observed from the submersible, such as yelloweye rockfish, *Sebastes ruberrimus*, and rougheye rockfish, *Sebastes aleutianus*. These large rockfishes have few predators, and their passive behavior may indicate a lack of concern for predators.

The behavior and habitat preference of shortraker rockfish may be related to the size of the fish. Commercial fishermen report shortraker rockfish schools above rugged, steep-slope habitat; most of these fish are reported to weigh <5 kg (11 pounds). In this study, large shortraker rockfish (>7 kg (>15 pounds)) were observed as solitary individuals on or near the bottom and among moderately sloped, smooth habitat. Small shortrakers were not present, as verified by the trawl catches.

Based on the 1987 resource survey by the NMFS Alaska Fisheries Science Center in the Gulf of Alaska, most (85%) of the shortraker biomass occurs at depths of 301–500 m (988–1,640 feet) (Clausen and Heifetz, 1989). This study sampled only the shallower portion of their depth range. It is not known, therefore, whether distribution of large shortrakers on shallow, trawlable bottom is typical of this species throughout its depth range.

Another unknown is whether the distribution of large shortrakers seen in this study is typical of their distribution throughout the year. Possibly they school during other seasons in response to spawning, feeding, light, or other conditions. Further research is planned with a submersible to study these questions and to determine whether shortraker rockfish use untrawlable substrate.

Acknowledgments

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Figure 3.—A shorttraker rockfish tilted with the current.

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