



Yelloweye rockfish
Sebastes ruberrimus

ROCKFISH are among the more interesting and colorful fishes in the North Pacific Ocean. They also are particularly vulnerable to overfishing. Maintaining healthy populations requires knowledge of their biology as well as innovative approaches to fishery management.

There are thirty-two species of rockfish (genus *Sebastes*) in the Gulf of Alaska, but fewer than ten are commonly caught in the recreational fishery. Rockfish have large scales, and they have spines on the head, gill covers, and fins. Depending on species, adult rockfish may reach 8 to 40 inches in length. Coloration ranges from bright red, orange, or yellow to blander black and gray. Pelagic rockfish look like bass and are commonly misnamed “black bass” or “sea bass.” Yelloweye rockfish are often misnamed “red snapper.” In fact, there are no true basses (family Serranidae) or snappers (family Lutjanidae) in Alaska. These fishes prefer warmer waters and lower latitudes. Lingcod, greenlings, and sculpins (such as Irish lords) also are mistakenly labeled rockfish.

Rockfish are members of the family Scorpaenidae, or “scorpion fishes,” named for their venomous fin spines. Although some scorpion fishes have extremely toxic venom, rockfish venom is mildly toxic and typically causes only pain or swelling. Rockfish venom sacs are located at the base of the dorsal and anal fin spines and, in a few species, other fins as well. Rockfish do not attack with their venom, but use it only for defense against predators.

Typical and maximum ages, in years, of common rockfishes in the sport harvest.

	Typical ages in the harvest	Approximate maximum age
<u>Non-pelagic</u>		
Yelloweye	15-70	120
Tiger	20-70	115
Quillback	15-55	90
Silvergray	10-40	80
Copper	10-30	50
<u>Pelagic</u>		
Dusky	5-35	65
Black	5-30	50

Alaska sport fishing regulations divide rockfish into two groups based on their preferred habitats:

(1) Pelagic species congregate in large schools throughout the water column, above or around rocky shelves or pinnacles. There are five species in this group, but only three, the black, dusky, and yellowtail rockfish, are common in Alaska.

(2) Non-pelagic species usually stay close to the bottom in rocky areas. They are typically solitary or in small schools, and are often mixed with other species. Some species are “cryptic”—hiding in cracks or under rocks. The most common species include yelloweye, quillback, copper, silvergray, tiger, and China rockfish. Rougheye and shortraker rockfish typically inhabit very deep bays and deep waters along the edge of the continental shelf.

Life in the Slow Lane

Rockfish are among the longest-living vertebrates on earth. Non-pelagic species generally live longer than pelagic species (see table). Yelloweye rockfish, for example, reach ages over 100 years. Rougheye and shortraker rockfish occasionally exceed 150 years of age. Many of the rockfish you catch today were frolicking in kelp beds during the 1930s, and some were around when Alaska was purchased from Russia in 1867.

Most rockfishes do not start reproducing until they are at least 5-7 years old, and some may not reproduce until they’re 15-20 years old. Unlike egg-laying fishes, rockfishes mate and fertilize the eggs internally. The developing embryos receive



Dusky rockfish
Sebastes ciliatus

nourishment from the female. After several months, the females give birth to thousands or millions of tiny larvae. Most of the larvae are swept away by currents and eaten by other fishes. The survivors settle onto the ocean floor and hide in kelp, eelgrass, or around rocks. As the juvenile fish grow and mature they move to adult habitats in deeper water.

The survival of larval rockfish is believed to be closely linked to oceanographic factors such as temperature, currents, and food availability. Rockfish have evolved to live long and produce millions of offspring each year, which offsets frequently unfavorable conditions.

Tagging studies have shown that although pelagic species can move hundreds of miles, most were recaptured within 20 miles of the tagging site. Non-pelagic species, on the other hand, have small home ranges, rarely venturing more than a few hundred yards from their favorite reef. For this reason, heavy fishing can reduce rockfish populations in localized areas.

No Free Lunch

Rockfish are an integral part of the food chain in the North Pacific. They eat a variety of foods, including plankton, adult and larval crabs, shrimp, and small fishes such as sand lance, herring, and juvenile rockfish. In turn, rockfish are eaten by larger rockfish, lingcod, Pacific cod, sablefish, halibut, chinook (king) salmon, sculpins, sharks, seabirds, marine mammals, and humans.



Black rockfish
Sebastes melanops

Vulnerable to Overfishing

Rockfish are vulnerable to overfishing. They prefer rocky habitat, which fishers can easily locate using navigational charts or sonar. Once found, rockfish are relatively easy to catch. Most species grow quickly in their first few years of life, reaching harvestable size before they are mature. Catching fish before they can reproduce impairs the population’s ability to replace itself.

A major factor contributing to the vulnerability of rockfish is that their swim bladder (a balloon-like organ used to adjust buoyancy) is not vented. When rockfish are brought to the surface from deep water, the air in the swim bladder expands, compressing internal organs and often forcing the stomach inside out into the mouth. Fish released in this condition cannot re-submerge and will likely die. There may be other less noticeable injuries to eyes, blood vessels, and internal organs that can cause death long after the fish is released, even if it appears to swim away normally. In the photographs, the yelloweye, black, China, and silvergray rockfish all show eye damage from pressure changes.

When you consider their ease of capture, limited movements, late maturity, low annual productivity, and low survival rate when released, it is easy to see why rockfish populations are vulnerable to overfishing.

Management Hurdles

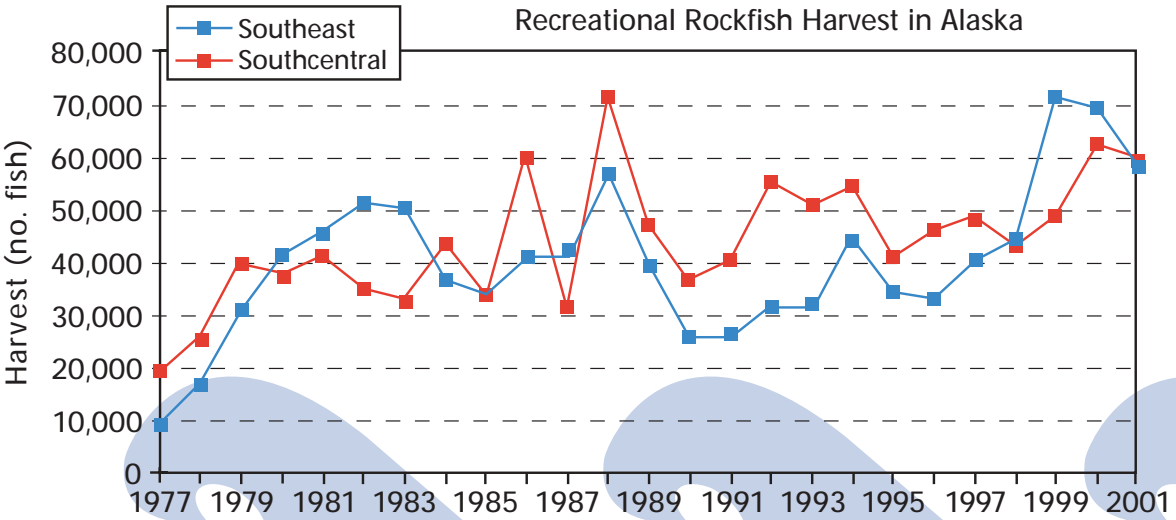
Rockfish are excellent table fare and have long been harvested in commercial, recreational, and



Quillback rockfish
Sebastes maliger

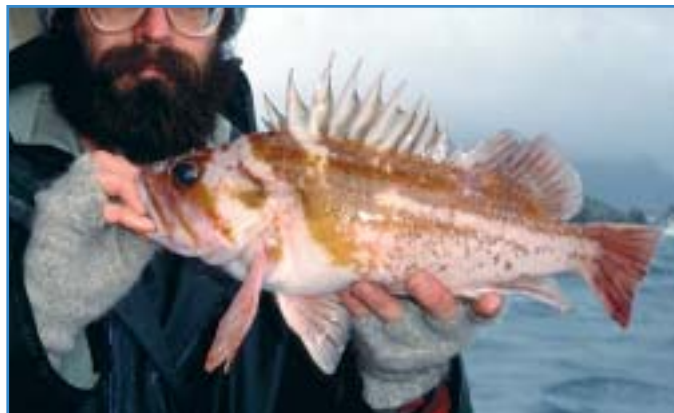
subsistence fisheries from California to Alaska. But some rockfish populations have been severely reduced through overfishing, even when managers were aware of the potential for overfishing and took steps to limit harvest. From British Columbia to southern California, populations of several species are now at a small fraction of their unfished level, and the status of other species has not yet been determined. Several fisheries have been severely restricted in order to rebuild rockfish populations.

Because the annual production of new fish is so low, sustaining a harvest year after year requires maintaining a high abundance of spawners. Envision





China rockfish
Sebastes nebulosus



Copper rockfish
Sebastes caurinus



Tiger rockfish
Sebastes nigrocinctus



Silvergray rockfish
Sebastes brevispinis

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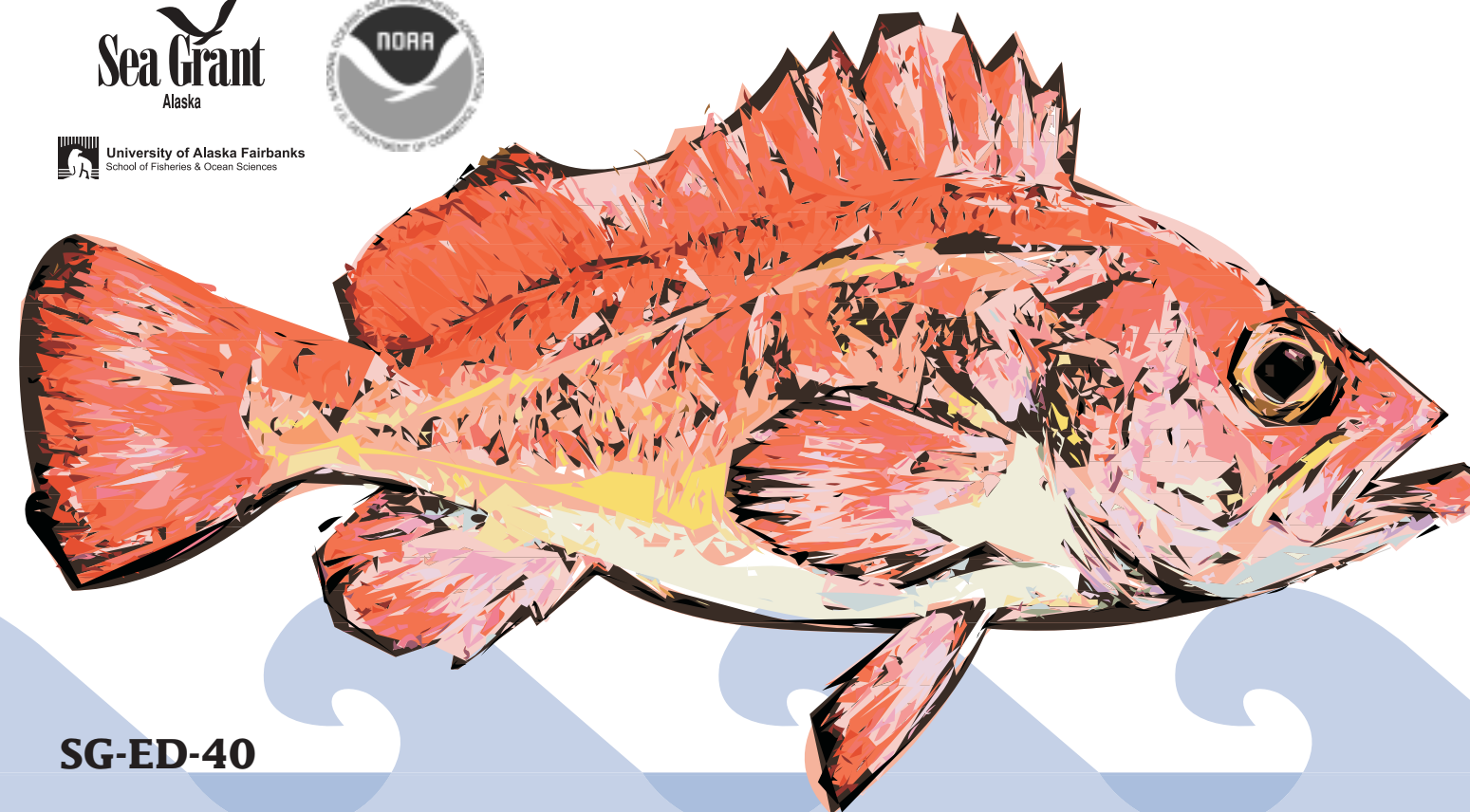
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Angler's Guide to the ROCKFISHES of Alaska: BIOLOGY and FISHERY MANAGEMENT



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restrictions. Rockfish are caught unintentionally and discarded in several fisheries for other species, so harvest statistics probably underestimate the total removals by fishing. Ultimately, control of rockfish removals may require restricting fisheries that target other species. Tools such as marine reserves are being considered to protect habitat and help ensure sustained harvest of rockfish. The success of rockfish conservation and management requires the cooperation of all resource users.

Marine Reserves— An Effective Tool?

Marine reserves are areas that are closed to all fishing. Fishery regulators and stakeholders are implementing or considering reserves for managing rockfish and other fisheries throughout the eastern Pacific. Marine reserves may be effective when employed along with conventional management measures, especially when rockfish bycatch is high in fisheries targeting other species.

The short-term benefits of reserves include rebuilding overfished populations, protecting habitat, enhancing genetic and species diversity, and eliminating bycatch. Protection of spawners guarantees some level of reproduction, and larvae and juvenile fish may disperse from closed areas to areas where fishing is open. In the longer term, reserves can provide insurance against errors or imprecision in stock assessment and management, and allow scientists to separate the effects of fishing from the effects of environmental changes.

Implementation of reserves is typically met with fierce opposition because of the loss of fishing area.

Depending on the goals and species involved, 5 to 20 percent of rockfish habitat may have to be closed to fishing. The impacts to fishing fleets can be minimized if reserves are designed carefully and with public involvement.

Successful reserves trade short-term costs for long-term benefits. Reserves have benefited a wide variety of fish and shellfish throughout the world. Rockfish reproduce slowly and it may take many years to realize benefits, but a few reserves have existed long enough to demonstrate effectiveness in rebuilding or maintaining rockfish populations. Alaskans still have the opportunity to implement reserves and other inventive management strategies to prevent overfishing and maintain the abundance and diversity of rockfishes now enjoyed.

Changing the Way You Fish

Many anglers are not interested in keeping rockfish, or want to avoid wasting fish. Here are some suggestions for minimizing your incidental catch of rockfish and increasing the chance of survival for released fish:

- When fishing in areas where rockfish are likely to be caught, use a **single circle hook**. Single hooks will help limit your catch of non-pelagic rockfish, and circle hooks are less likely to be deeply swallowed.
- Avoid fishing in high relief, rocky areas, and avoid fishing steep slopes or the sides of rock piles (halibut are generally found in nearby low-relief areas).
- If you get many small nibbles or catch a non-pelagic rockfish, move to a different type of habitat.

• Salmon anglers often catch black and dusky rockfish while bait fishing or trolling. If rockfish are taken from less than 60 feet of water and the swim bladder does not appear to be inflated, released fish have a high likelihood of survival.

• If you think you have a rockfish on the line and would rather not keep it, reel the fish in as slowly as possible. This may reduce swim bladder inflation and other decompression injuries and increase the fish's chances of survival after release.

• If the fish's swim bladder is inflated or the stomach is protruding from the mouth, **don't** poke it with a needle or knife. The hole puts the fish at high risk for infection and delayed death, and it will likely die from other decompression injuries anyway. There is a method for decompressing swim bladders with a hollow needle, but it hasn't been rigorously evaluated in rockfish and is best left to experts with the right equipment. It is better to keep the fish and try to minimize your catch.

• If you are targeting rockfish, focus your effort on pelagic species such as black and dusky rockfish. These species are often more abundant and can sustain higher harvest rates than non-pelagic species. Use a depth finder to look around rock piles for schools of black or dusky rockfish, and then fish with your bait 6-10 feet off the bottom.

Practice good conservation by avoiding excessive harvest of rockfish. Keep in mind that rockfish spines make them relatively difficult to clean. They do not hold up for long periods in the freezer, so kill only what you can use immediately.

Alaska sport fishing regulation booklets have a color identification chart to distinguish the most common

species of pelagic and non-pelagic (demersal and slope) rockfish. You cannot use any part (except the head and guts) of a sport-caught rockfish for bait in Alaska. Consult the regulations for the area you intend to fish before you start your trip.

Read More About Rockfish

Possibly the most comprehensive and entertaining book on rockfish is *The Rockfishes of the Northeast Pacific*, by Milton Love, Mary Yoklavich, and Lyman Thorsteinson, 2002, University of California Press, Berkeley.

An excellent field guide entitled *Guide to Northeast Pacific Rockfishes*, by Donald E. Kramer and Victoria M. O'Connell, is available from Alaska Sea Grant in Fairbanks (888-789-0090), **<http://www.uaf.edu/seagrant>**.

The American Fisheries Society has published a policy statement outlining issues and recommendations for management of Pacific rockfish. See **http://www.fisheries.org/Public_Affairs/Policy_Statements/pol_rockfish.htm**.