China rockfish
Sebastes nebulosus

species. Mortality from swim bladder inflation limits the use of size limits. Recreational harvest has varied a lot from year to year, but generally increased in Southeast and Southcentral Alaska in the late 1970s and 1990s (see graph). Commercial fisheries are managed under harvest caps that include incidental catch (or "bycatch") in other fisheries, trip limits, and bycatch restrictions. Rockfish are caught unintentionally and discarded in several fisheries for other species, so harvest statistics probably underestimate the total removals by fishing. Ultimately, controls may have to be placed on fisheries that target other species but have a high bycatch 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.

Copper rockfish
Sebastes caurinus

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.

Tiger rockfish
Sebastes nigrocinctus

• 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 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. You should **not** use syringes or hollow needles to deflate the swim bladders—studies show that survival from this method is low. 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 well off the bottom to avoid non-pelagic species.

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.

Silvergray rockfish
Sebastes brevispinis

Alaska sport fishing regulation booklets have an identification chart to distinguish the most common pelagic and non-pelagic species. 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 identification book, *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), **www.alaskaseagrant.org.**

The American Fisheries Society has published a policy statement outlining issues and recommendations for management of Pacific rockfish. See **www.fisheries.org/html/Public_Affairs/Policy_Statements/ps_31d.shtml.**

This brochure was written by Scott Meyer, Fishery Biologist, Division of Sport Fish, Alaska Department of Fish and Game, Homer, Alaska.

For more information contact the Alaska Department of Fish and Game, Division of Sport Fish:
Anchorage (907) 267-2218
Homer (907) 235-8191
www.sf.adfg.state.ak.us

This brochure was funded in part through a grant from the National Fish and Wildlife Foundation.

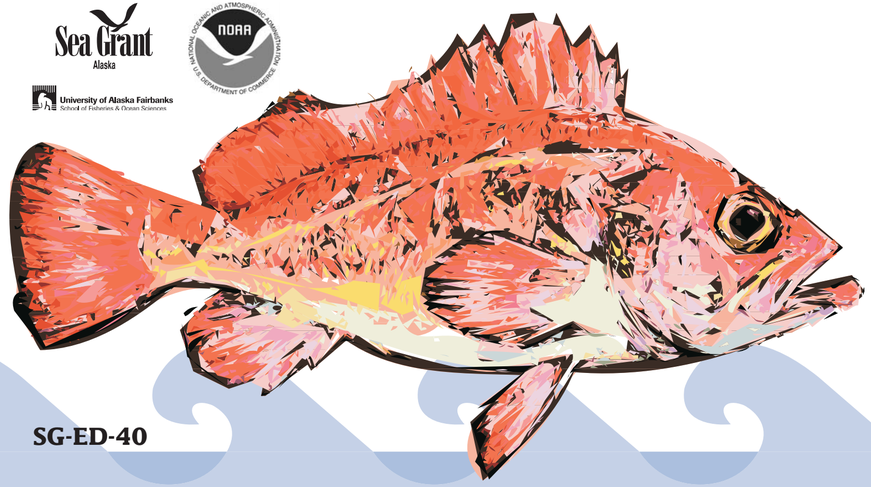
Published by:

Alaska Sea Grant College Program
University of Alaska Fairbanks
P.O. Box 755040
Fairbanks, Alaska 99775-5040

phone (888) 789-0090
fax (907) 474-6285
www.alaskaseagrant.org

Angler's Guide to the ROCKFISHES of Alaska:

BIOLOGY and FISHERY MANAGEMENT



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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 over thirty 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, large fin spines, and smaller spines on the head and gill covers. 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) are also sometimes mistaken for 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.

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

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 the black, dusky, dark, and yellowtail rockfish are common in Alaska.

(2) **Non-pelagic** species usually stay close to the bottom, often 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 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 animals. 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.

Dusky rockfish
Sebastes ciliatus

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, allowing their populations to persist through long periods where conditions are unfavorable for survival of offspring.

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 pressure 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 more vulnerable to overfishing than most other fishes. 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, becoming fairly large 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. The photographs of yelloweye, China, and silvergray rockfish all show bulging eyes as a result of 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.

Quillback rockfish
Sebastes maliger

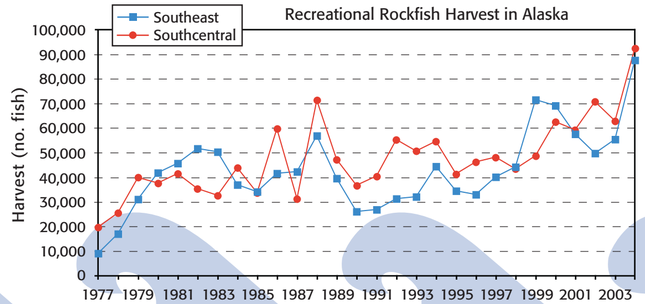
Management Hurdles

Rockfish are excellent table fare and have long been harvested in commercial, recreational, and 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 a rockfish population as a low-interest savings account. To live off the interest (sustain a moderate harvest), you have to maintain a large balance. If you make too many withdrawals, your account will take years to regain its original value. Likewise for rockfish, recovery from overfishing can take decades.

The abundance of most rockfish species in Alaska is unknown. Assessment of nearshore rockfish stocks is difficult and expensive. Many sampling gears cannot be used in the rocky habitats favored by nearshore rockfishes. Submarines have been used to assess populations in some areas of Southeast Alaska, but the method is expensive and not widely available. Assessment methods are complex and still under development. As a result, managers generally have inadequate information and limited tools for managing fisheries, and must therefore manage conservatively.

Recreational and subsistence fisheries in Alaska are managed under some of the most restrictive bag limits on the Pacific Coast, usually with special provisions for the less productive non-pelagic



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... Barotrauma Studies. A number of projects are underway to evaluate how **barotrauma** in captured rockfish influences survival upon release. **...**
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ODFW News

... "Unlike rockfish, cabezon do not have air bladders and therefore do not suffer from **barotrauma**—expansion or rupture of the air bladder when the fish are **...**
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[PDF] Appendix F Examples of Potential Conservation Actions

... Potential Partner(s) Benchmarks/ Monitoring Fish ID for anglers • Marine Regulation book with pictures • Results of **barotrauma** research • Work with **...**
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[PDF] Oregon Nearshore Marine Resource Management Strategy

... o Listening to users o **Barotrauma** research o Other research • Port Orford Ocean Resources Team (community-based fisheries management) • Recreational users **...**
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... Type: The Oregon Coalition for Educating Anglers (OCEAN) would like to educate marine anglers on releasing rockfish in a safe manner that avoids **barotrauma**. **...**
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... cm, FL) and released. Rockfish with significant **barotrauma**, as determined by having a gas-filled everted esophagus, were released **...**
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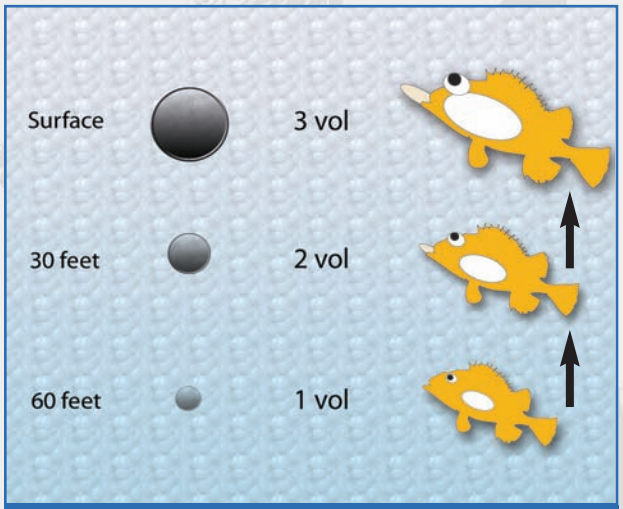
WHY ARE ROCKFISH PRONE TO PRESSURE-RELATED INJURIES?

Every rockfish has a gas-filled organ called a swim bladder that allows the fish to gently control its buoyancy. By deflating its bladder, a fish can descend more easily. By inflating it, its ascent is assisted. When a fish is caught and reeled in, this mechanism for moving vertically in the water column is thrown out of whack.

Depending on the depth at which the fish was caught, a fish's air bladder may swell so much its stomach is forced out its mouth. The eyes may bulge and other organs can be injured as well. Fish suffering from pressure-related injuries are said to be experiencing barotrauma (pressure shock). Without intervention, a fish with barotrauma may die from the progression of its wounds or succumb to temperature shock or predators.

"Floaters" – overly inflated fish that cannot re-descend on their own – are especially easy targets for sea gulls and sea lions.



The volume of a fish's swim bladder can triple when reeled in from depths as shallow as 60 feet.

Alternate communication formats of this document are available upon request. If reasonable accomodation is needed, call DFG at (916) 322-8911. The California Relay Service for the deaf or hearing-impaired can be utilized from TDD phones at (800) 735-2929.

ROCKFISH-BAROTRAUMA MYTHS

Myth:	Reeling a fish in slowly prevents barotrauma.
Fact:	Rockfish cannot acclimate to the pressure drop even when reeled in slowly.
Myth:	The organ protruding from a "popped" fish's mouth is the swim bladder.
Fact:	It is the stomach! Never vent the stomach or try to force it back inside the mouth.
Myth:	You can tell by looking whether a fish will survive or die.
Fact:	When properly recompressed, even fish with severe barotrauma can survive.

ROCKFISH-BAROTRAUMA SCIENCE

According to published results of a Sea Grant study led by researchers at Cal State Long Beach:

The degree of barotrauma in a fish is not a reliable predictor of its survival. The most significant predictor of post-release survivorship is the time a fish spends at the surface.

In experiments with several species of common Southern California rockfish, 83 percent of fish caught at depths between 217 feet and 350 feet, survived when returned to depth within 2 minutes. The odds of a fish dying following recompression nearly doubled with every 10-minute increase in time at the surface.

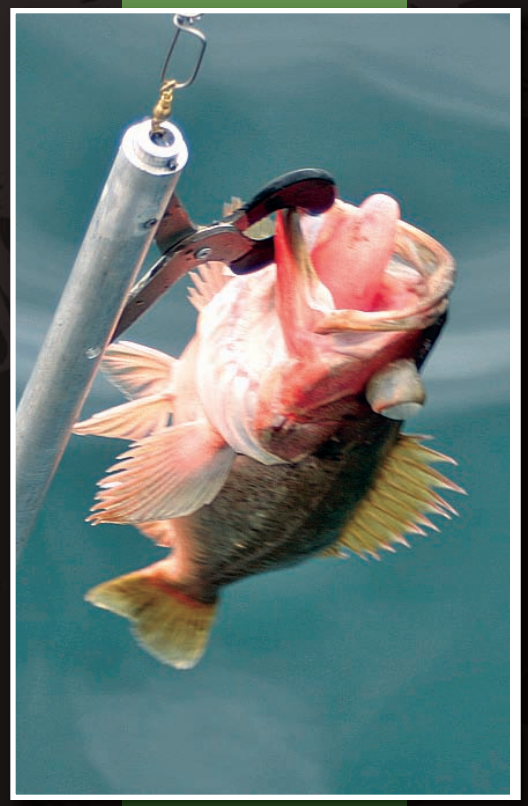
Tagging and recapture studies showed some released fish were still alive 1.5 years later.

For current recreational groundfish fishing regulations, call (831) 649-2801 for recorded information or visit the California Department of Fish and Game website at www.dfg.ca.gov/marine/regulations.asp.

Sea Grant

This brochure was a collaborative effort of California Sea Grant, Oregon Sea Grant and University of Southern California Sea Grant.
Printing was funded by the California Department of Fish and Game.

Sea Grant



BRING THAT ROCKFISH DOWN

FISH CAN SURVIVE BAROTRAUMA

Amazingly, rockfish that look dead at the surface can "pop" back to life if quickly returned to a native depth range. Because of this, rockfish that you must, or want to, toss back should be quickly recompressed.

Even fish with bulging eyes and protruding stomach can survive if returned to depth quickly. Note: the organ protruding from the fish's mouth is the stomach, not the swim bladder.

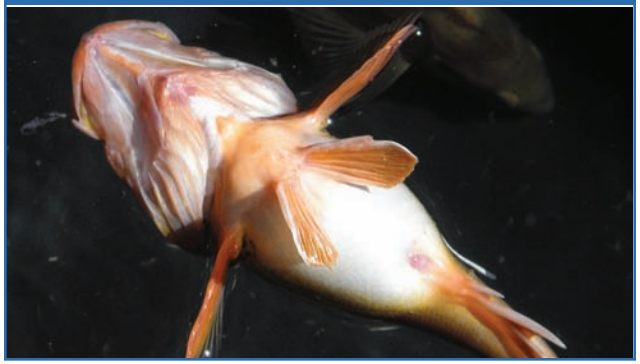
TOP FIVE REASONS TO SEND'EM DOWN

Why should you care about helping a released fish return to depth?

1. Floating fish are a waste of the resource.
2. Some populations of prohibited species, such as canary and yelloweye rockfish, may take decades to rebuild.
3. High-grading is illegal and selects for smaller fish in the gene pool.
4. Venting fish may cause more harm than good.
5. Re-descending fish can increase their chances of survival.

Catch-and-release practices work best when you can help with fish survival. Helping fish get back down is good for the resource and the sport.

PRACTICE THE FOLLOWING TECHNIQUES AND SAVE ROCKFISH LIKE THIS!



There are many ways of returning a fish to a depth at which it can recompress. Your choice may depend on the size of the fish you usually catch, your experience as an angler, sea conditions and cost.

Upside-down crate, weighted and attached to rope

Upside-down milk crate, weighted and attached to a rope: Crate is dropped over the fish and then, with the buoyant fish inside, lowered to a minimum depth of 60 feet and kept down until it can swim out on its own. Caveats: In rough seas, fish can escape prematurely and the crate may bang against a fish's extended eyes. Try lowering the fish down gently or paint crate's inside with a rubberized coating to smooth sharp edges.

Inverted barbless hook with weight

Inverted *barbless* hook with weight: Hook fish through lower lip from inside to outside, to keep hook from puncturing an extruded stomach and to prevent line cuts to eyes. You can also hook a fish through the membrane on its upper lip from outside to inside, which some say makes for easier release. In both cases, the weight must lead the fish into the water and be heavy enough to sink it to the desired depth. Fish is released with a sharp jerk on the line. Caveats: Hook can puncture an extruded stomach. Once a fish reaches a depth at which it regains muscle coordination, it may wrestle free prematurely. Method works best with smaller fish.

Commercial fish descender

Commercial fish descenders: There are a variety of practical, easy-to-use fish descenders on the market. The best one for you may depend on the sizes and species you catch. For more information, visit www.sheltonproducts.com and http://git-r-down.com.

VENTING: A sharp needle or steel cannula is used to puncture a fish's inflated swim bladder. The California Department of Fish and Game does not currently encourage venting as it can cause serious injury to fish and angler. You may accidentally puncture the wrong organ and/or introduce infection. Even when done properly, venting damages a fish's swim bladder.

PACIFIC ISLANDS FISHERIES GROUP

Pacific Islands Fisheries Group
150 Hamakua Dr. PBN# 430
Kailua, HI 96734
Phone: 808 265-4962
Email: pacificfisheries@gmail.com

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Current Events

Pacific Islands Fisheries Group bottom fish tagging project leads to new release techniques that increase fish survival.

Methods for Releasing Deepwater Bottomfish

The Pacific Islands Fisheries Group has been administering a tagging project throughout the Hawaii Archipelago that targets the seven deepwater bottomfish (the Deep 7)—onaga, ehu, opakapaka, kalekale, hapuupuu, gindai and lehi. As part of the project, Hawaii bottomfish fishermen have been field-testing developed techniques to release deepwater bottomfish in a manner to promote their health and survivability.

When bottomfish are brought up rapidly from deepwater to the surface, they can experience "barotrauma," which is physical damage to body tissue that is caused by rapid changes in the surrounding (or ambient) pressure. Barotrauma occurs because gases are compressible but the tissues are not. When bottomfish are brought rapidly from deep waters where the pressure is high to the surface where the pressure is significantly lower, the gas inside the air spaces in the body can cause damage to the surrounding tissues if that gas becomes trapped.

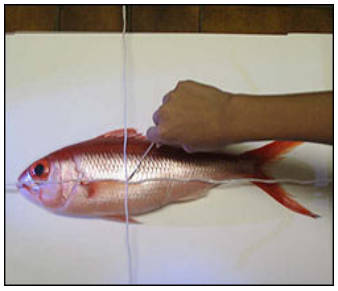
Bottomfish that appear lively and are in good shape are not experiencing barotrauma and can be returned to the ocean immediately without any treatment.

Bottomfish that come up showing signs of barotrauma—bloating, bulging eyes, stomach protruding through mouth and/or popped scales—should be treated before released or should be released in a manner that quickly returns them to higher pressure depths. These methods are explained below.

METHODS FOR HANDLING BOTTOMFISH SHOWING SIGNS OF BAROTRAUMA

1) Venting — Venting a fish's swim bladder is one way of treating barotrauma. Venting consists of puncturing or piercing the swim bladder to allow gases to escape. Once vented, the fish can be released. The faster the fish is treated the better its chance for a full recovery.

Tools: 1/8-inch hollow tube about 6 inches long with one side sharpened or a syringe needle



Ehu's stomach pushed back into stomach cavity after venting

Steps for Venting the Swim Bladder:

Insert the hollow needle (or syringe) at a 45-degree angle towards the bottom of the stomach in line with the pectoral fin and below the 4th dorsal spine. Push the needle gently through the skin to puncture the swim bladder.

If the procedure is done correctly, air should be heard escaping through the hollow needle and the stomach will deflate. (The swim bladder has been known to heal in a matter of days in some species and weeks in others.)

If the fish is vented and the stomach protrudes out of the fish's mouth, use a smooth or rubberized dowel to push the stomach back into the stomach cavity. This will prevent the stomach from obstructing water flow through the fish's gills as it descends to the bottom and is recommended when using "drop shoot."

2) "Drop Shot Weight Release" - Fish can be returned to the bottom by using a release weight. Test have shown that fish do not require venting if using a release weight as gases in the swim bladder recompress as the fish returns to the bottom. However, if the stomach protrudes out of the fish's mouth, use a smooth or rubberized dowel to push the stomach back into the stomach cavity after venting. This will prevent the stomach from obstructing water flow through the fish's gills as it descends to the bottom.

A) Pass the hook on the release weight from behind, along the gill plate and gills out through the fish's mouth.

B) Next, drop the fish head first into the water. If the fish is larger, reduce the margin of error for timingthe release of the fish with the weight by using the optional "dropshoot." (below) The drop shoot provides safe handling of larger fish during release and also eliminates the need for two persons.

C) Once the released fish reaches a minimum depth of 25 fathoms, pull sharply on the line to release the fish.

Tools: (above) Barbless hook mounted on a 5-lb dead wieght and attached to a release line.

(below) Optional "drop chute" made of 8-inch by 3-foot PVC pipe cut length wise in half with a nylong rope handle

Optional "Drop chute" release for larger fish

The Pacific Islands Fisheries Group is a 501c3 non-profit organization. For more information about PIFG, the tagging project or on the release techniques for bottomfish species, visit www.fishtoday.org or call 808 265-4962.

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Marine Resources Program - *Current Research Projects*

The following is a partial list of MRP research objectives and projects in progress in 2005:

Objective: Evaluate discard as a management tool for Pacific rockfishes.

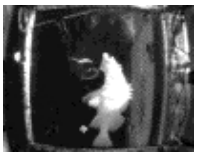
Barotrauma Studies

A number of projects are underway to evaluate how barotrauma in captured rockfish influences survival upon release. These studies include laboratory survival studies using pressurized aquaria, field studies using underwater video to observe fish behavior upon release, mark-recpature studies to evaluate the effectiveness of venting excess swimbladder gas and acoustic telemetry studies of released rockfish to try to measure longer term survival.

Click on picture for fullsize

Pressure Tanks

This hyperbaric aquarium system was constructed at the Hatfield Marine Science Center in Newport and used to estimate survival rates of black rockfish recompressed after capture (released at depth) and to learn about their swimbladder acclimation rates when changing depths.

 *Click on picture for video*	**Yelloweye Release** When rockfish are captured in deep water (>100ft), symptoms appear immediately lethal. However, if recompressed, immediate symptoms appear to resolve and many fish swim away. Long term survival for these fish is not known. Click on the picture for a video (3.4 mb) showing a recreationally caught yelloweye rockfish being placed in a cage and lowered to approximately 70 feet before being released. Note the gut protruding from the mouth, the bloated body, and general disorientation the fish displays at the surface. Upon descent, the gut retracts, and the fish shows good orientation before swimming strngly downward. *Windows Media Player required to view.*
 *Click on picture for fullsize*	**Venting** Some fishers are venting fish prior to surface release. The effectiveness of this technique is not known, so we are conducting a mark-recapture study with black rockfish to measure any significant effect on survival.

To estimate longer-term survival, we are also working on a project to acoustically tag yelloweye rockfish following hook and line capture, release them using recompression techniques, and then track them with acoustic receivers and an ROV to evaluate condition after several weeks.

Objective: Develop new tools for managing nearshore rockfish.

Black Rockfish PIT Tagging

This is long-term project to evaluate if PIT tags (Passive Integrated Transponder) can be used effectively to estimate exploitation rates of black rockfish. We charter CPFV vessels, tag several thousand fish each spring and search for recovered fish at the docks. Data are used in a population estimation model to determine exploitation rate and population size each year.

Bob's Cage  *Click on picture for fullsize*	**Cages** A cage is used to take the fish down to a depth of 50 feet before release. The rope is pulled causing resistance on a paddle which opens the hinged end of the trap. Above are two examples of different types of release cages. The cage on the left opens from the bottom via the large paddle. The cage on the right opens like a suitcase via the metal plate on the left side. For information on constructing a

Parker's Cage  *Click on picture for fullsize*	release cage, please contact the Newport Marine Resources Program.

Black Rockfish Movements

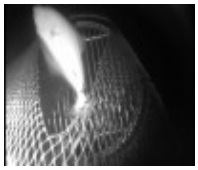
This is a "support study" for the PIT tagging project that uses acoustic telemetry techniques to measure the home range and movements of black rockfish to determine if the assumptions of a PIT tagging program are met (e.g. minimal emigration from the study area). Results of this study will also be useful in describing essential fish habitat, seasonal use of space, and efficacy of marine protected areas for species such as black rockfish off the Oregon coast.

 *Click on picture for fullsize*	**Acoustic Receiver and tag** Picture shows an acoustic tag in the person's hand and the associated receiver.

Objective: Reduce fishery bycatch.

Testing a 3/4 inch BRD in the Shrimp Fishery

This project tests the use of reduced bar spacing in a BRD (Bycatch Reduction Device) in the pink shrimp trawl fishery to reduce the bycatch of small flatfish and juvenile rockfish.

 *Click on the picture for a video (1.2 mb)*	**Halibut Escape** A video showing a view of a finfish excluder in a shrimp trawl, with a Pacific halibut exiting the net. *Windows Media Player required to view.*

Testing a DIDSON Imaging Sonar in Trawl Nets

This project evaluates the utility of an imaging sonar to observe fish behavior in and around trawl nets in the absence of artificial light. We can use this tool to evaluate how fish respond in an approaching trawl in areas with little or no visible light, and design bycatch reduction methods for those species that show different behaviors.

	Didson Sensor

 *Click on picture for fullsize*	The Didson sensor is shown below the person on the right in a protective housing that is attached to the trawl net.

Objective: Improve data for stock assessments.

Improved Maturity Data

This project conducts expanded maturity sampling for female fish of selected species that currently lack adequate data for Oregon populations. The project also utilizes histological evaluation of ovarian sections to expand the useful sampling window for maturity data. We are currently working on several species of nearshore and slope rockfish, along with cabezon and kelp greenling.

OTHER RECENT PROJECTS

Development of a Selective Flatfish Trawl

This multi-year project developed, in collaboration with the fishing industry, a selective flatfish trawl that decreased the bycatch of many rockfish species. The trawl incorporates a low-rise design and a cut-back "hood" or "square" that facilitates the escapement of fishes that rise when encountering a trawl, such as canary rockfish and Pacific halibut. For more information on the selective flatfish trawl, click on the "Publications" tab at the top of this page.

 *Click on picture for fullsize*	**Selective Flatfish Trawl** A picture of the selective flatfish trawl at the HMSC Seafest, June 2004. Note the size in relation to the people and automobiles.

Evaluation of ROVs as Passive Survey Tools

ROVs are being utilized more and more for surveying fish populations in untrawlable areas and have several benefits over traditional trawl surveys. However, because they are slow and depend on visual identification of each species, work needs to be done to determine if different species are repelled or attracted by the presence of the ROV, its lights, sounds, smells etc… We conducted a project to film fish behavior behind an ROV during survey transects to test the hypothesis that fish behave the same as the ROV approaches and as it goes past (ie, it is a passive observer).

3406 Cherry Avenue N.E. :: Salem, OR 97303 :: Main Phone (503) 947-6000 or (800) 720-ODFW [63

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This page was last updated: 10/01/2009 4:07 PM

Rockfish

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How can I help reduce rockfish mortalities?

Rockfish are a slow growing, long-lived fish (50 to over 100 years depending on the species). Rockfish populations can be easily overfished and once overfished it can take 50-80 years for the stock to recover. It is important for you to take steps to minimize your impact on rockfish. Here are a few steps you can take to lower rockfish mortalities while fishing.

1. When fishing in an area that allows retention of rockfish, don't release smaller rockfish so you can keep slightly larger ones. Released rockfish have a low survival rate even if they appear to be in good health when released.
2. If you have caught your limit of rockfish or are catching rockfish while fishing for a another species, like lingcod, move to a location that doesn't have much rockfish. Rockfish are usually found close to the bottom in rocky areas. To reduce your impact on rockfish try fishing well off of the bottom and avoid rocky areas.
3. Target lingcod before targeting rockfish. Lingcod generally reside in the same areas as rockfish so by fishing for your lingcod first you have the opportunity to keep the rockfish you catch at this time. After you catch your lingcod, you can catch your remaining rockfish at your favorite pinnacle.
4. Try using large baits and lures when fishing for lingcod or halibut, this may reduce the number of rockfish you accidentally hook.
5. If you need to release a rockfish use a technique that enhances its chances of survival. Studies have shown that rapid return of rockfish to the water is important to their survival. At times release rockfish may have trouble resubmerging themselves following release. If this is the case, here is You can learn how best to resubmerge e rockfish at: Release Methods for Rockfish. We do not recommend venting (puncturing the side of a rockfish) as a means of resubmergence.

While these actions may not seem like much, the results can be significant. We sincerely appreciate the effort, on the part of anglers and the recreational fishing community, in trying to protect our valuable rockfish populations.

For More Information

- Rockfish Conservation
- Protecting Washington's Yelloweye Rockfish
- Groundfish: Stock Assessments and Rebuilding Analyses [PFMC]