

### Overfishing

As *The Perfect Storm* shows, fishing is a big (and risky) industry. A complex set of political decisions determine where and when fishing boats are allowed to work. The basic principles are simple. If too many fish are caught, then there are not enough adults to produce babies, and the fish populations will go extinct. Implementation of policy is a different problem.

Since 1982, the United Nations Law of the Sea Convention has required participating countries to prevent overfishing in their own Exclusive Economic Zones and to regulate their own flagged ships on the high seas. However, different countries enforced this differently, and some fishing boats actively sought to carry flags from countries that did not strongly regulate their actions on the high seas.

Starting in 1993, the FAO Compliance Agreement says that countries cannot allow their flagged vessels to fish on the high seas unless they are able to control their fishing operations. The 1995 Fish Stocks Agreement tries to set up a structure to make all fishing boats comply with regional fisheries organizations—such as the US/Canadian effort to regulate fishing on the Grand Banks.

The fish stocks agreement has not yet been ratified, and not all regional organizations have articulated policies. In those that do have policies, fisheries biologists and commercial fishing boats may not be in agreement about the merits of the existing rules.

Fish farming offers an alternate means to bring fish to market, but has its own problems

In our study of overfishing, each group will investigate one of the world's fisheries. In your groups, identify a new spokesperson, recorder, discussion leader, and fact checker.

1. As a group choose a fishery to study. Suggested fisheries are North Sea cod (for English fish and chips), Alaskan salmon, white abalone, Galapagos Sea Cucumber, New England lobster, Caribbean coral reef fish, sardines, Atlantic swordfish, bluefin tuna, farmed shrimp, farmed salmon. Sign up for your fishery choice on the blackboard.

2. Identify a list of stakeholders who will be concerned with fishery policy. *The Perfect Storm* should suggest some possibilities.

3. What do you expect will be relevant issues to consider to understand how to manage the fishery that you've chosen?

Assign each member of your group one or two topics to research for next time. These might include finding out about the fish that are caught and their life cycle, methods used to catch the fish, and the current regulations. You'll also want to think about general fisheries policy. (One natural way to divide up the research work load would be to have your each represent a stakeholder: biologists, fishing boats, government regulators, international policy makers, representatives of markets that compete against your fishery.)

Write a paragraph summarizing your research to hand in next time.

Next time be prepared to work out with your group a fisheries management plan that will be acceptable to all of the stakeholders. You will need to present some background about your fishery to the class as well as the plan that you propose.

*California's Fisheries are Collapsing*  
(SAN FRANCISCO CHRONICLE; JANUARY 1997)

Once, fishing in the Pacific Ocean off the California coast was a simple story: salmon, sardines and tuna. Now, it is virtually anything that swims.

Overfishing off California's coast is harming dozens of species. It is undoing ecosystems and turning a rich ocean environment into a watery wasteland. Drift nets stretch for miles, trawlers scour the ocean bottom, and new mass-fishing methods sprout from hook-studded PVC pipes to wiremesh fish traps banned in Florida and other places.

In six decades, California's commercial catch has plunged 76 percent from 1.8 billion pounds in 1935 to 425.9 million pounds in 1995. Commercial harvest figures help tell the tale. Red abalone, down 67 percent (1975-95); Pacific angel shark, down 85 percent (1986-91). Bocaccio groundfish, down 80 percent (1980-95). Red sea urchin (North Coast), down 80 percent (1988-94). White abalone close to extinction.

"California is a dying sea," said William Hanmer, director of the Marine Science Center at UCLA. "The Bering Sea is a dying sea. The Grand Banks is a dying sea. Everything's been overfished. It's just been hammered to death."

Today, new tiers of marine life are being plucked from the ocean, things relatively little-known and unloved: sea urchins, moray eels, scorpion fish, sea cucumbers, even snails. "Turban snails! That's the end of the line," said Paul Dayton, a professor of marine ecology at the Scripps Institution of Oceanography. "The next thing you know, they'll be taking foraminifera—worms!" "It's a vacuum cleaner approach," said Mia Tegner, a marine scientist at Scripps. "We fish the hooey out of sea urchins. When they die back, we start poaching abalone and live-trapping fish."

For some species, such as squid there are no rules. You can take as many as you can get. For others, legal "limits" are so huge fishermen seldom reach them. And many rules are set not by scientists but by politicians in Sacramento. "The traditional way it works is someone figures out a market for a species. A few people start fishing, make a lot of money. Then, everybody goes 'Holy cow!' and the gold rush is on," said Milton Love, author of "Probably More Than You Want to Know about the Fishes of the Pacific Coast." "And then the fishery collapses," he said "And a government agency says, 'We didn't know anything about this species. We have to study it.' But it's too late."

Years ago, the Pacific could stand such abuse. Now, California, with more than 30 million people and booming domestic and foreign seafood markets, is exhausting its ocean bank account. Some species aren't being caught—they're being mined, yanked from the sea "at a higher rate than the ocean produces them," according to one state report.

And it's not just commercial fishing. There are millions of recreational fishermen, too, and spear-gunners and rock-pickers prying abalone and shellfish off rocks. And then there is the Alice-in-Wonderland stuff: Scuba divers stalking fish with butterfly nets.

Marine science can't keep up. And today, poor science may be especially costly. No longer do fishing boats simply take too many fish. Now, they play a more dangerous game. Some target smaller fish that haven't had a chance to breed. Some are more narrowly focused. They take females only, not wise for species preservation.

It's not just scientists who are worried. It's the fishing industry, too. "One ton of fish is a nice little trip today; we used to think a ton, God, that was starvation," said Jim McKenzie, 66, a San Pedro commercial fisherman. "The inshore fishery is slowly but surely dying. We're just picking and scratching." "I've seen it go from big jumbo fish to where we're catching babies," said Ed Adams, 42, a Eureka fisherman. "They should close it (to

commercial fishing) for five years. Let the juveniles grow up and spawn.”

Not everything is hurting, though. Last year’s catch of squid—a wide-ranging species, was a record. Sardines, another migratory species, are finally bouncing back after near disastrous overfishing a half century ago. “The first reaction people have is that everything’s bad out there,” said L.B. Boydstun, acting chief of the marine resources division for the California Department of Fish and Game. “But there have been some good things happening.”

Recovery, though, is relative. Sardines may be back, but they are a dim shadow of their former glory. The sardine catch at its peak in 1936 was 663,859 metric tons. In 1995, it was 40,676 metric tons, a drop of 94 percent.

For many coast-hugging species, California is a danger zone. Scientists Mary Yoklavich and Milt Love recently saw first-hand evidence through a submarine window off the Central and Southern California coasts. “There are places with incredible habitat, and you wonder, ‘Where are all the fish?’ ” Love said. “You go a long time and you won’t see a single fish. They’ve all been caught.” “Our idea was that the deep-water Systems in the remote submarine canyons were untouched,” said Yoklavich, a National Marine Fisheries Service biologist. “But in the heads of many canyons there was a lot of fishing gear, mostly gill nets. Some trawl nets, too. And lots of ordinary hook-and-line. Some rock outcroppings had no evidence of gear. Not many, though.”

Such spots are home to one of California’s most loved and diverse fish families: rockfish, a catchall term for 57 varieties of the long-lived, slow-growing fish with strange and wonderful names: squarespot rockfish, widow rockfish, flag rockfish, chilipepper and so on. Rockfish, often sold as rock cod or red snapper, have long been survivors—in part because marquee species such as salmon and sardines got the most fishing attention. Today, though, rockfish are in vogue. Commercial trawlers using cone-shaped nets far offshore scoop them up by the tons. Closer in, recreational anglers on \$50-a-day “party boats” hoist in large quantities, too—dropping weighted lines sometimes more than 1,000 feet deep into rockfish hang-outs.

One area hit hard by sportfishing is the Channel Islands northwest of Los Angeles. Years ago, anglers routinely caught lots of big, beefy rockfish, 2 to 3 feet long, weighing 10 to 15 pounds. But not any more. “There’s no question populations have declined,” said Love. “We went to a spot recently and saw very few fish. There were lots of little fish but few larger than 12 inches.”

Today, though, small rockfish are what many commercial fishermen want. It’s the latest craze—the “live fish” business. Using hook-studded pipes, wire traps and lines with multiple hooks, fishermen work near-shore regions that are also rockfish nurseries. “It’s a scary proposition,” said Yoldavich. “The fishing is very efficient. You can easily get rid of a lot of fish.”

A 1994 Fish and Game report looked at the booming rockfish market, and found trouble. “The size decreases are a sign of overharvest ... that fish (are being) taken at a higher rate than the ocean produces them,” it said. The young fish are caught and tossed into holding tanks. On shore, they bring \$2 to \$7 a pound, against 50 to 80 cents a pound dead from buyers who sell them to markets and restaurants, mostly in Asian American communities. And there is, in effect, no limit. That’s because the quota—40,000 pounds a month—is for much larger commercial boats that catch industrial quantities far offshore. The small boats in the live fish fleet can’t come close.

There is no fresher seafood anywhere than selecting a live fish from a restaurant tank. The ideal fish is 1 to 3 pounds—the size of a dinner entree. Brightly colored fish—especially red and yellow hues—are highly desired. “These critters are getting hit hard,” said Boydstun,

the Fish and Game marine resources chief. “They’re high-price, high-demand fish. And they are young fish. So there’s likely to be some regulation changes in this area.”

Changes traditionally come slowly—in part because they must be approved by a government body that knows little about marine biology: the California Legislature. “There are very few people in the Legislature who understand the ins and outs of Fish and Game,” said Sen. Mike Thompson, D-St. Helena. “You’d be hard pressed to find five hunting licenses in the Legislature. And five fishing licenses would be an equal stretch.”

“The Legislature probably shouldn’t be making rules and regulations that dictate how commercial fishing should be taking place,” said Thompson, who has drafted numerous pieces of marine legislation. “But the fact of the matter is, it’s the only game in town.” “What happens is, you find something slightly alarming, and a legislator will say, ‘Well, when we get more data, we’ll deal with that one,’ ” said Nicole Crane, a professor of marine biology at Monterey Peninsula College. “More data and more data often equals more time. At which point, fisheries crash.”

The federal government, unconstrained by Sacramento politics, moves more rapidly. This fall, the Pacific Fisheries Management Council drastically reduced commercial limits for bocaccio, a rock-fish harvested in federal waters outside the 3-mile state boundary.

“Biologists make recommendations, which are promptly ignored,” said scientist Milt Love. “You do that year alter year, and your morale goes into the toilet.” The ocean seems to be making adjustments already. “Last year, I was doing \$400 a day,” said Steve Arndt, a live-fish fisherman in Morro Bay. “Now, I can’t get over \$200. I have to work at it. My hands are sore. I’m tired, and I’ve got no fish.”

The ocean itself may be partly responsible. A recent study has found even zooplankton, tiny microscopic animals that form the foundation of the marine food chain, are fading from the Pacific off Southern California. The study, published last year in *Science*, found zooplankton volumes had declined 80 percent from 1951 to 1993. No one knows why. It may be a natural cycle. But rising water temperatures also hint at big trouble: global warming.

“The argument is overfishing vs. climate (warmer water temperature),” said John McGowan, a Scripps scientist and co-author of the study. “It’s still not resolved. Up until this (study), it was thought to be overfishing. I still think that’s a very important source.” So do others.

“What about our grandfathers? They never had this problem,” said one fisherman in Bodega Bay. “There were tons and tons and tons of fish then. Now, there are spots that are completely wiped out.”