

## In California, the Mystery of the Missing Fish

### Salmon stocks plummet, leaving an industry in crisis and a rash of unanswered questions

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SAN FRANCISCO—Anglers off the California coast began noticing it a few winters ago. The number of chinook salmon, a hardy breed that supports much of the fishing economy from here to Oregon, was mysteriously declining. After a decade of steady catches, fishing boats found themselves with empty hooks. "Everybody was just scratching their heads going, 'What happened to the fish?'" says Zeke Grader, executive director of the Pacific Coast Federation of Fishermen's Associations.



Catching a haul of chinook, or king, salmon off Point Reyes, Calif.

Now, what was bad has gotten worse. Last month, the Pacific Fishery Management Council announced that the fall salmon run in the Sacramento River, where most of the chinook off California go to spawn, had experienced an "unprecedented collapse." Only about 90,000 adult salmon were counted this fall; five years ago, almost 800,000 salmon returned to the river. Ominously, the number of immature males that are used to predict the rate of return next year also plummeted, from 40,000 in a typical year to 2,000.

The fishing industry is bracing for more hard times. "The Sacramento River fish are our bread and butter," says Dave Bitts, a fisherman in Eureka, Calif. Agency officials will meet in March to assess options for the fishing season, which begins in May. Strict regulations on the salmon catch are likely. Says Bitts: "That will have the effect of closing the fishery in California completely."

**Hostile habitat.** Which leaves fishermen and scientists asking: Where did all the fish go? Experts cite two likely causes: several years of abnormal ocean conditions, some of which may be related to global warming, and an increase in water pumped from the salmon's habitat to Southern California. In a remarkable journey, Sacramento salmon swim to the ocean through a delta filled with predators, dams, and pumping stations and then, after several years, return to the river to spawn. Both environments are becoming increasingly hostile. In the past five years,

the amount of water pumped from the Sacramento Delta has increased by 20 percent. It's no coincidence that salmon numbers have fallen in the same period, says Tina Swanson, senior scientist at the Bay Institute, an environmental group. "There is clearly something really, really wrong with the watershed."

Salmon's salvation has been the open ocean, where they feast on crustaceans and smaller fish. But the ocean hasn't been welcoming lately, either, and marine life—including birds—has suffered up and down the Pacific coast. "Ocean conditions have been really squirrely," says Bruce MacFarlane, a fishery biologist at the National Oceanic and Atmospheric Administration. A seasonal upwelling, which brings cold, nutrient-rich water and food from the bottom of the ocean to the surface, has become less predictable. Water temperatures have climbed. And in some areas, the current has shifted from the north—where it brings food from Canada and Alaska—to the south.

Scientists aren't sure what's causing the changes, but some of them, they say, may be due to global warming. Indeed, many wonder if the salmon collapse could be a preview of a warmer and harder-to-forecast future. "The climate is changing, and the past isn't going to be a great guide," says Nate Mantua, a research professor at the University of Washington's school for aquatic and fishery science. "You can't be sure what will happen next."

What to do? "The ocean's going to do what the ocean's going to do," says William Sydeman, a marine ecologist at the Farallon Institute for Advanced Ecosystem Research. And while reforming water policy might be an obvious starting point, there are daunting obstacles. One reason for increased water exports, after all, was to meet growing demand. In the short term, "the only knob we have to turn," says Swanson, "is cutting back and saying you can't fish." And hoping the fish will show up again next year.

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