
March 17, 2008

Chinook Salmon Vanish Without a Trace

By **FELICITY BARRINGER**

SACRAMENTO — Where did they go?

The Chinook salmon that swim upstream to spawn in the fall, the most robust run in the Sacramento River, have disappeared. The almost complete collapse of the richest and most dependable source of Chinook salmon south of Alaska left gloomy fisheries experts struggling for reliable explanations — and coming up dry.

Whatever the cause, there was widespread agreement among those attending a five-day meeting of the Pacific Fisheries Management Council here last week that the regional \$150 million fishery, which usually opens for the four-month season on May 1, is almost certain to remain closed this year from northern [Oregon](#) to the Mexican border. A final decision on salmon fishing in the area is expected next month.

As a result, Chinook, or king salmon, the most prized species of Pacific wild salmon, will be hard to come by until the Alaskan season opens in July. Even then, wild Chinook are likely to be very expensive in markets and restaurants nationwide.

“It’s unprecedented that this fishery is in this kind of shape,” said Donald McIsaac, executive director of the council, which is organized under the auspices of the Commerce Department.

Fishermen think the Sacramento River was mismanaged in 2005, when this year’s fish first migrated downriver. Perhaps, they say, federal and state water managers drained too much water or drained at the wrong time to serve the state’s powerful agricultural interests and cities in arid Southern California. The fishermen think the fish were left susceptible to disease, or to predators, or to being sucked into diversion pumps and left to die in irrigation canals.

But federal and state fishery managers and biologists point to the highly unusual ocean conditions in 2005, which may have left the fingerling salmon with little or none of the rich nourishment provided by the normal upwelling currents near the shore.

The life cycle of these fall run Chinook salmon takes them from their birth and early weeks in cold river waters through a downstream migration that deposits them in the San Francisco Bay when they are a few inches long, and then as their bodies adapt to saltwater through a migration out into the ocean, where they live until they return to spawn, usually three years later.

One species of Sacramento salmon, the winter run Chinook, is protected under the Endangered Species Act. But their meager numbers have held steady and appear to be unaffected by whatever ails the fall Chinook.

So what happened? As Dave Bitts, a fisherman based in Eureka in Northern California, sees it, the variables are simple. “To survive, there are two things a salmon needs,” he said. “To eat. And not to be eaten.”

Fragmentary evidence about salmon mortality in the Sacramento River in recent years, as well as more robust but still inconclusive data about ocean conditions in 2005, indicates that the fall Chinook smolts, or baby fish, of 2005 may have lost out on both counts. But biologists, fishermen and fishery managers all emphasize that no one yet knows anything for sure.

Bill Petersen, an oceanographer with the National Oceanic and Atmospheric Administration's research center in Newport, Ore., said other stocks of anadromous Pacific fish — those that migrate from freshwater to saltwater and back — had been anemic this year, leading him to suspect ocean changes.

After studying changes in the once-predictable pattern of the Northern Pacific climate, Mr. Petersen found that in 2005 the currents that rise from the deeper ocean, bringing with them nutrients like phytoplankton and krill, were out of sync. "Upwelling usually starts in April and goes until September," he said. "In 2005, it didn't start until July."

Mr. Petersen's hypothesis about the salmon is that "the fish that went to sea in 2005 died a few weeks after getting to the ocean" because there was nothing to eat. A couple of years earlier, when the oceans were in a cold-weather cycle, the opposite happened — the upwelling was very rich. The smolts of that year were later part of the largest run of fall Chinook ever recorded.

But, Mr. Petersen added, many factors may have contributed to the loss of this season's fish.

Bruce MacFarlane, another NOAA researcher who is based in Santa Cruz, has started a three-year experiment tagging young salmon — though not from the fall Chinook run — to determine how many of those released from the large Coleman hatchery, 335 miles from the Sacramento River's mouth, make it to the Golden Gate Bridge. According to the first year's data, only 4 of 200 reached the bridge.

Mr. MacFarlane said it was possible that a diversion dam on the upper part of the river, around Redding and Red Bluff, created calm and deep waters that are "a haven for predators," particularly the pike minnow.

Farther downstream, he said, young salmon may fall prey to striped bass. There are also tens of thousands of pipes, large and small, attached to pumping stations that divert water.

Jeff McCracken, a spokesman for the federal Bureau of Reclamation, which is among the major managers of water in the Sacramento River delta, said that in the last 18 years, significant precautions have been taken to keep fish from being taken out of the river through the pipes.

"We've got 90 percent of those diversions now screened," Mr. McCracken said. He added that two upstream dams had been removed and that the removal of others was planned. At the diversion dam in Red Bluff, he said, "we've opened the gates eight months a year to allow unimpeded fish passage."

Bureau of Reclamation records show that annual diversions of water in 2005 were about 8 percent above the 12-year average, while diversions in June, the month the young Chinook smolts would have headed downriver, were roughly on par with what they had been in the mid-1990s.

Peter Dygert, a NOAA representative on the fisheries council, said, "My opinion is that we won't have a definitive answer that clearly indicates this or that is the cause of the decline."

Carolyn Marshall contributed reporting.

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