

A small fish caught in a big fuss

February 8 2011, By Bettina Boxall

When Peter Moyle began studying an obscure little Northern California fish in the early 1970s, he had no inkling of the role it would come to play in the state.

No one had paid much attention to the delta smelt. "They were just there," recalled Moyle, then an assistant professor at the University of California, Davis, in need of a research topic. "We knew nothing about it."

Nearly four decades later, the delta smelt is arguably the most powerful player in California water. Its movements rule the pumping operations of the state's biggest water projects in the Sacramento-San Joaquin Delta. Efforts to stave off its demise have at times reduced water deliveries to 25 million people and 2 million acres of farmland, magnifying the impact of the recent drought and forcing farmers to fallow fields. Politicians harangue it and maneuver to gut the regulations that protect it.

Why all the fuss over a puny creature - streaked in steely blue, redolent of cucumbers and no bigger than a woman's little finger - that Central Valley congressmen and Fox News broadcasters belittle as a worthless bait fish and "a 2-inch minnow." Why not just crank up the pumps and forget the thing?

Moyle, whose work helped earn the delta smelt a spot on the federal [endangered species list](#) in 1993, is philosophical at first: The American people have decided that we should not wipe species after species off the

face of the Earth.

Then he gets more pragmatic. "If the delta smelt goes away, it's not going to solve the problem" of California's dependence on the ailing delta for a good measure of its water, Moyle said. He reels off a list of prized fish that use the delta and are also in trouble, such as Chinook salmon and green sturgeon. Help the smelt, he says, and we help them.

Bill Bennett is a former graduate student of Moyle's who picked up his mentor's research baton and passion for delta smelt. He champions *Hypomesus transpacificus* as a unique native whose fate is entwined with that of the West Coast's largest estuary.

Drive the delta smelt and other natives into oblivion, he warns, and we will wind up with "the McDonalds and Wal-Mart version of California," overrun with generic species from elsewhere. "I think people appreciate the real California rather than something they can get everywhere."

Bennett, an associate researcher at UC Davis' John Muir Institute of the Environment, is bracing himself against the wind as he speeds down the Sacramento River with a government research team on a chilly gray day to scout locations for a new smelt study. The crew was back on the river taking field samples in the rain at 3 a.m. Christmas Day.

Delta smelt exist "only here," he says with an emphatic jab of his finger. "And they do something remarkable every year." They hatch, mature, migrate up the delta to spawn in fresh water, and then die - all in a 12-month period.

Even under ideal conditions, a delta smelt's existence is not easy. They have low fertility rates. For much of their life cycle, they favor a narrow zone of water with just the right salinity levels that shifts location in the delta according to freshwater flows.

Successful spawning requires a precise range of water temperature. One of their enduring mysteries is exactly where in the delta they spawn: Only one delta smelt egg has been discovered in the wild.

Moyle, 68, met his first smelt when he was a young academic trying to build his classroom fish collection. He went out with state fish and game biologists who were conducting surveys of striped bass. Along with that popular - and nonnative - game fish, their nets kept hauling up delta smelt, then still abundant. "You'd go out there and do a 20-minute trawl or a 10-minute trawl for striped bass and you'd come back with a tub of fish that was mostly delta smelt," he said.

When Moyle asked about its life cycle, the fish and game crew shrugged. They offered to provide research samples. Soon afterward, a state truck pulled up behind Moyle's campus lab, loaded with several hundred one-quart bottles filled with thousands of preserved smelt. He studied their physical characteristics and the smelt's behavior in the delta.

"I became the authority on smelt," said Moyle, a fisheries biology professor and author of a well-known reference book on California fishes. "It wasn't hard to do."

The first edition of his book, published in 1976, contained a few paragraphs on delta smelt. The entry in the 2002 revision goes on for 5 pages.

For the record, delta smelt are not minnows. They belong to the smelt family (Osmeridae), and are distant relatives of salmon. Like the San Francisco Estuary system it evolved in, the delta smelt is a young species, probably no older than 8,000 to 10,000 years.

It was originally considered an isolated population of pond smelt, which are found on both sides of the Pacific. A Russian scientist was one of the

first to describe delta smelt as a separate species, but since that was during the Cold War, his work didn't get much traction.

"We just assumed the Russians did bad science," Moyle said wryly. Genetic testing proved the Soviets right.

The smelt's ability to adapt to the complex conditions of the delta are a blessing and a curse, allowing it to develop as a distinct species but also limiting it to an area that has for decades functioned as a giant faucet for much of California.

Nearly translucent, they like open, muddy water - flushed into the delta by the Sacramento and San Joaquin rivers. They like a pinch of salt, courtesy of sea water from San Francisco Bay. They aren't the best swimmers, employing an irregular "stroke and glide" technique that lets them ride tidal currents to get around the delta. Evolution had consigned them a humble niche: eating tiny zooplankton, and being eaten by the delta's teeming birdlife and other fish.

"It's extraordinarily well-adapted for the system the way it was," Moyle said.

That is the core of the smelt's problems, for today's delta bears little resemblance to the fish's original home. Drained, farmed, colonized by invasive species and used as a conduit to ship water from Northern California to the San Joaquin Valley and Southern [California](#), the delta is an ecological invalid.

Scientists can't say how close the delta smelt is to extinction, but the population has collapsed in the last decade to the lowest levels ever recorded. It's possible that sometime soon the only place to find delta smelt will be in tanks at the UC Davis Fish Conservation and Culture Lab.

Joan Lindberg and her colleagues established a capture refuge population at the lab near Byron a few years after the delta smelt was listed as threatened. (The U.S. Fish & Wildlife Service determined last year that a reclassification to "endangered" was warranted but did not take the action because of a backlog.)

"I heard about smelt being listed and thought we could probably culture them," said Lindberg, the lab's director. But figuring out how was tough. "We couldn't get them past the larval stage for several years."

Now the lab breeds 250 pairs every year, carefully selecting them to maintain as much genetic diversity as possible. They are used in research and some are sent to a backup population maintained at a facility near Shasta Dam. They are not released into the delta to avoid mixing a hatchery population with the wild one.

After nearly 20 years of working with the tiny fish, Lindberg is still fascinated. "I like that they're always surprising," she said, gazing into an outdoor tank filled with delta water, flush with 30,000 darting adults.

Moyle goes back and forth about whether the smelt can be saved. But when he stares into the muck on Liberty Island, he allows himself a bit of optimism. "Chicken soup for smelt," he calls it.

Liberty sits on the delta's western edge, at the bottom of a flood zone that carries overflow from the Sacramento River. The farm island flooded 27 times in the 20th century, until landowners gave up in 1997 and didn't bother to repair the levees. The nonprofit Trust for Public Land bought most of the island with government grants and is about to turn it over to the state Department of [Fish](#) and Game.

Liberty has set about healing itself: Tule marsh and wetlands are reclaiming old onion and asparagus fields. Open tidal water covers

thousands of acres. And the smelt know it. For reasons scientists are madly trying to decipher, a small year-round smelt population seems to have established itself at Liberty.

"My dream is to get delta smelt abundant enough to harvest," Moyle says. "There'd be a market in Japan."

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