

## Leopard sharks flourishing in south San Francisco Bay as wetlands are restored

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When most people think of sharks along the southern edges of San Francisco Bay, they think of ice skates, pucks and helmets.

Now, a different type of shark is flourishing south of the San Mateo Bridge, one whose presence is powerful testament to the improving health of the bay: leopard sharks.

UC Davis researchers are finding large numbers of leopard sharks -- some as big as 6 feet long -- benefiting from five years of work to restore thousands of acres of industrial salt ponds ringing the bay's shoreline from Hayward to San Jose to Redwood City. Ducks, herons and fish are thriving in the former ponds, which are being restored to tidal marshes. But the fact that sharks are also booming is a particularly encouraging sign, scientists say.

The sharks, known for their distinctive silvery skin with dark spots, have been swimming through breached earthen levees into former Cargill salt evaporation ponds, where they are gobbling up herring, crabs, worms and other species that have exploded in number as the ponds have been opened to bay waters.

There's so much food that sometimes leopard sharks sit at the salt pond openings as tides rush out, gorging themselves like Homer Simpson under a soft-serve ice cream machine.

"It's pretty much a buffet tray for them," said Jim Hobbs, a fisheries biologist with UC Davis who is helping lead the research in areas off Union City, Menlo Park and Alviso.

There are no hard population counts. But on some days scientists are catching and releasing as many as 30 sharks in one hour in the shallow waters at the southern edges of the bay, Hobbs said.

Unlike their great-white cousins, leopard sharks don't eat people.

"They have very tiny teeth. It's like sandpaper," Hobbs said. "At most, they might give you a scrape."

Similarly, the scientists aren't killing leopard sharks. The worst they do is make them vomit.

Scientists could catch the sharks and cut them open to study what the sharks eat when they swim into the former salt ponds. But to avoid that fate, instead they catch them in nets and with barbless hooks. They take pump sprayers, similar to what backyard gardeners use to spray weed killer on dandelions, and place the nozzles in the sharks' mouths to spray water into their stomachs.

That makes them throw up.

The researchers and their students catch the contents in a bucket -- think lots of chewed up little fish and worms -- and return the sharks to the water.

"It doesn't hurt them," Hobbs said. "We throw them back within two or three minutes, they swim away, and

they start eating again."

The UC Davis researchers preserve the regurgitated shark food in ethanol to carefully catalog the sharks' diets.

The federal and state government spent \$100 million to buy 15,100 acres of salt ponds from Cargill in 2003, beginning the largest wetlands restoration project ever attempted on the West Coast. For decades, Cargill evaporated bay water in the ponds to produce salt for food, road de-icing and medicine. The ponds were so salty that almost nothing lived in them.

But once the U.S. Fish and Wildlife Service, state Coastal Conservancy and other agencies began opening them to bay tides, millions of fish, crabs, clams and other species poured in. So far, more than 3,000 acres of former salt ponds have been opened to bay waters.

Most of the water in the southern edges of San Francisco Bay is less than 10 feet deep, so during low tides vast areas of mud flats are exposed. Traditionally, leopard sharks that wanted to eat from those shallow waters had to swim to the middle of the bay every low tide to avoid being beached. Now, Hobbs said, they can stay in some former salt ponds for days, fattening up.

Because there are no good historical counts, estimates of leopard shark population growth in the bay aren't available. But in any natural area, when large predators come back, that's good news, experts say.

"We're starting to see a lot more leopard sharks and also bat rays in the ponds now," said Eric Mruz, manager of the Don Edwards San Francisco Bay National Wildlife Refuge in Fremont.

"This tells us the water quality is getting better," he said. "And it shows that these former salt ponds are providing tremendous amounts of fish, worms, crabs and other species. It tells us the South Bay is getting healthier."

Most people don't realize that sharks live in San Francisco Bay, said Christina Slager, director of animal care at the Aquarium of the Bay in San Francisco. But there are four species -- leopard, spiny dogfish, brown smooth hound and sevengill -- that are commonly found in the bay. None eats people.

No two leopard sharks have the same spots. They aren't endangered, Slager said, but face threats, from fishing to mercury pollution. They never get the attention great whites get.

"If Steven Spielberg would do a movie about leopard sharks that would be wonderful," Slager said. "They are delightful. They have beautiful patterns. And they are a pleasure to work with."

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