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surveying for abalone

FISH AND GAME DIVERS SURVEY THE OCEAN FLOOR FOR THE DIMINISHING SPECIES

Story by Travis Buck
Photos by Derek Stein

Plunging their heads beneath the cold surface of the sea, the Department of Fish and Game biologists' breathing quickened. They scanned the panorama of kelp and boulders below, barely visible through the azure haze of the depths. Rays of sunlight trickled and shimmered downward through the blue abyss, radiating outward and creating a kaleidoscope of shadows all around them. Through gestures they confirmed that each diver was ready to begin their underwater abalone survey. Releasing the air from their buoyancy vests, they thrust their upper bodies forward and down, kicking powerfully to propel themselves to the sea floor below. A moment later, the only evidence of the team's presence at the surface was a faint trail of bubbles.

The abalone, a marine snail, is considered a gastronomic delicacy. A handful of different abalone species have been harvested in Southern California by commercial divers and sport fishermen throughout the last century. In 1997 however, all abalone fisheries were closed south of San Francisco Bay and off the Farallon Islands due to falling numbers of the mollusk. DFG developed the Abalone Recovery and Management Plan as a blueprint for restoring the depleted southern populations and actively managing the relatively healthy northern California stocks. Marine biologists have been tasked with finding and determining the status of the remaining abalone populations in Southern California.

"The dive surveys are a step towards implementing the recovery and management plan," says Ian Taniguchi, a DFG senior abalone specialist. "This plan went into effect in 2005 and was developed in response to legislation in the 1990s that shut down all abalone fisheries in Southern California. That legislation mandated we develop a recovery plan for abalone."

While historically abalone populations thrived off the coast of California, numbers dropped in many areas during the latter half of the 20th century—within a mere 50 year time span. Precise causes of the demise are uncertain, but possibilities include over-harvesting that was based on incomplete fishery data, poaching, sea otter predation, disease and loss of habitat.

There are seven species of abalone native to California's coastal waters, none of which may now be legally harvested south of Marin County. Red abalone, found from Oregon to Baja California, is the world's largest abalone and the only one still legally taken in California through a well-regulated recreational fishery north of San Francisco Bay. The red abalone is easily identified by the smooth black tentacles and

Previous Page: Using the anchor line as a guide, scuba divers with the Department of Fish and Game are silhouetted as they ascend to their research vessel *Garibaldi.* The divers were conducting surveys of abalone off the coast of southern California, collecting information on size and abundance to determine the health of populations and if certain species are increasing; At left: Amidst algae-covered boulders, divers experience an array of species—from multi-colored marine slugs to the spiny purple sea urchins that dominate the undersea landscape. The bright orange fish is a garibaldi, California's state marine fish.

area around the edges of the foot that extends from under of the brick-red shell.

DFG has taken a proactive approach to cataloguing locations where abalone may still be found. Biologists collect information on abalone size and abundance to better understand the health of populations and to determine whether certain species are staging a comeback off Southern California.

On this particular day, divers were surveying the east side of Santa Cruz Island in an area once known for pink abalone. The pink abalone is easily identified by its thick, wavy shell and can reach to 10 inches in length. The species was once abundant in Southern California and Baja California's giant kelp beds in sea depths of between 20 to 120 feet.

It had been more than a decade since the state had instituted measures and developed scientific techniques—such as these dive surveys—that could aid in the abalones' recovery and continued existence as one of California's most prized marine mollusks.

After reaching the bottom and completing a gear and safety check, the dive team set off on a controlled scouting trip for abalone, scanning large boulders and reefs, checking cracks and crevices, and carefully overturning cobbles. Gear such as calipers used to measure abalone dangled from their sides, along with clipboards of waterproof paper and pencils used to record characteristics of the underwater habitat and sea life. Some divers also carried underwater cameras and lights to help locate abalone in dark rocky crevices and document species of interest.

At first divers glided along the bottom and barely noticed the waves surging toward shore 40 feet overhead. But the seafloor gradually rose to less than half that depth and they found themselves

Above left, a pink abalone with a fragile sea star attached to its shell. The sea star forages for food such as sponges found growing on the abalone's shell; Above right, Usually found in shallow waters, green abalone have olive-green tentacles, an anatomical feature that all species of abalone possess.

pulled and pushed by the wave action. They held on to rock formations when waves passed above them to avoid being tossed about or slammed into a reef.

Throughout the dive, biologists encountered a number of marine invertebrates, creatures that lack a spinal column. Spiny purple sea urchins dominated the undersea landscape. Fat-armed bat stars and brilliantly colored marine slugs, or nudibranchs, foraged on algae-covered boulders. More than one octopus was spotted hiding in a rocky crevice. Despite the diverse sea life, not a single abalone was found by the dive team after 45 minutes of searching.

At the research vessel *Garibaldi*, each diver lumbered onto the staging platform with their gear and then moved out of the way for the next. Weight from the dive gear seemed oppressive after the freedom of the near-neutral underwater buoyancy. The lack of abalone weighed on them as well.

"I can't believe it, not a single pink abalone," Derek Stein says as he peeled off his wetsuit hood.

"Yeah, not a single green abalone either," another diver, Kai Lampson remarks, seawater pouring out of his gear.

Most of the divers had expected to find pink abalone and green abalone at this site. Green abalone have olive-green tentacles, a shell that is generally brown with many low, flat-topped ribs and a mottled cream-and-brown colored foot. This species was once abundant over the same area as pink abalone and generally occurred in shallower water, although some could be found in depths of 30 feet or more. They may still be spotted occasionally in rocky crevices covered by dense surfgrass and algae, where they feed on drifting algae.

Inside the *Garibaldi's* warm cabin, the team reviewed its data sheets and filled in final bits of information. Once the captain fired up the engines and headed to the next survey site, any further talk had to be above the throaty roar of the engine.

Gradually, talk shifted to stories about the old days and the once abundant abalone of Southern California.

"Commercial fishermen used to

Exercise Care When Picking Snails

Abalone "picking" refers to the act of prying the snails off of the rocks or substrate they call home, and is performed using a short, flat, iron bar known as an abalone iron. The muscular foot of an abalone has strong suction power that allows it to clamp tightly to rocky surfaces. All species of abalone are hemophiliacs, meaning they have no blood clotting agents and will often bleed to death from cuts. Blood from injured abalone will also attract predators and if the abalone is unable to securely attach to a rock surface, their chances of survival are greatly reduced. For these reasons, abalone pickers are encouraged to carefully pry off only legal-sized abalone, since the bar can often puncture the abalone's foot. A brochure developed by DFG describes the correct way to remove an abalone and features recent research concerning how divers and rock-pickers can conserve the marine mollusk. The brochure is available on DFG's Web site at *www.dfg.c.a.gov/pdfs/abalone_brochure.pdf*, and at northern California DFG offices.

Other Colors, Other Abalone Species

Besides red, pink and green abalone, California's ocean waters are home to four other species: white, black, flat and pinto.

White abalone have deep oval shells, live to 40 years and are found over the same range as pink and green abalones. While nearly all California abalone favor rocky reef and kelp bed habitat, only the white prefers exposed rocky areas in deeper water. The species is federally listed as endangered under the Endangered Species Act.

Black abalone ranges from Mendocino County to southern Baja California. True to its name, this abalone has a black shell and was once so abundant they were found stacked on top of one another in undisturbed, shallow intertidal areas. Unfortunately it has proven to be highly susceptible to withering syndrome disease, first reported in 1985. This species is also listed as endangered and is under federal protection.

The flat abalone's historic range covers the entire coast of California north to British Columbia, Canada. With its flat and narrow shell, this species is able to hide in the crevices of rocky reefs in waters between 20 to 70 feet deep.

The pinto abalone is the smallest abalone species found in California and is historically less common than the other species. The pinto abalone is most often found at about 4 inches in length and its historic range is Monterey north to Alaska. According to senior abalone specialist Ian Taniguchi there is also a sub-species of the pinto abalone referred to as the threaded abalone, which ranges from San Luis Obispo County south to Baja California. Similar to pink and green abalone, the pinto is on the National Marine Fisheries Service "species of concern" list.

For more information about the Abalone Recovery and Management Plan, visit DFG's Web site at *www.dfg.ca.gov/marine/armp/index.asp* or call senior abalone specialist Ian Taniguchi at (562) 342-7182.

Red abalone, left, attached to the underside of a colorful rocky reef. The reef's colors come from different species of coralline algae and sponges. The pink, flower-like creatures below the red abalone are commonly known as strawberry aneomones. Above photo, marine biologists literally search the ocean's depths to determine the status of the remaining resources off the coast of Southern California.

head to port with thousands of pounds of abalone in their holds," one biologist recalls. "And recreational divers and shore-pickers would go home with gunny sacks full of them."

They wondered aloud what it must have been like to dive in Southern California among hundreds of abalone before the declines.

As the *Garibaldi* neared the next dive site the talk turned more hopeful. It had been more than a decade since the state had instituted measures and developed scientific techniques—such as these dive surveys—that could aid in the abalones' recovery and continued existence as one of California's most prized marine mollusks.

Once the engines throttled down, the divers gathered their gear and prepared for the next dive. The sun was falling low in the west and they knew this would be the last survey for the day. Minutes later they stepped off the boat one after another and descended to the bottom. Ten minutes later, one of the divers signaled to the others. He had located a cluster of green abalone.

Travis Buck is a marine biologist and dives with the Invertebrate Management Project. He encourages the public to help in the conservation and recovery of abalone by reporting poaching at 1 (888) DFG-CalTIP.