

PLAYING THE SHELL GAME

IF CHRIS LANGDON'S EXPERIMENTS ARE SUCCESSFUL, ABALONE MAY MAKE A COMEBACK IN OREGON'S COASTAL WATERS.

BY RON LOVELL

Abalone, those mollusks with the tender centers, may make a comeback in Oregon waters if research at the Coastal Oregon Marine Experiment Station in Newport is successful. And the payoff could be big: 75 to 80 percent of the abalone produced in the United States is sold in Asia where the Japanese, for example, pay more than \$70 a pound for it. "It is one of the most expensive protein products in the world," says Christopher Langdon.

Traditionally, abalone have been cultured by feeding them harvested natural kelp. Langdon, a fisheries professor at OSU, is heading a project, funded by the National Coastal Resources Research and Development Institute, to determine if red abalone can be grown in a polyculture system consisting

of both abalone and red seaweed, which is processed into a food condiment.

"This approach, if successful, could lead to development of an abalone industry in Oregon," says Langdon. "It would also enhance the recreational abalone industry."

Red abalone can grow up to 11 inches in shell length and is the largest of approximately 100 species of abalone found worldwide. Abalone grow slowly--about one inch a year. Their shells are often multi-colored with oblique color bands on the margins and streaks or chevron markings on the flat shell surfaces.

Abalone have not done very well in Oregon waters since the Columbus Day storm of 1962 ruined the kelp beds where they normally grow. The small amount of kelp available today is scattered. The Oregon coast south of Coos Bay is the only area where red abalone are found, their northernmost range.

The highest concentrations of abalone have long been found off California, where a fishery has thrived for more than 100 years. The main aquaculture today takes place in California. However, in the past two years a marine boring worm has infested the edge of



The Oregon Coast south of Coos Bay is the northernmost range on the West Coast of red abalone. The creatures have not done well in Oregon waters since the Columbus Day storm of 1962 ruined kelp beds. Photo: Lynn Ketchum



Chris Langdon (left) and research assistant Michael Buchal. Langdon believes the use of a polyculture system could lead to development of an Oregon abalone industry. Photo: Bob Rost

abalone shells and irritated the abalone, reducing its growth. Although the worms do not affect taste or pose a danger to humans, they have created a crisis in the multimillion dollar industry in California. Because of the commercial value of abalone and the fact that Oregon abalone are worm free, the polyculture of abalone in Oregon has a lot of promise, according to Langdon.

Langdon and research assistant Ford Evans have set up a greenhouse in a courtyard at the Hatfield Marine Science Center to provide various light and water conditions for both the abalone and the red seaweed. The researchers are experimenting with natural light and natural light augmented with artificial light for either 12 or 24 hours a day. Artificial lighting may compensate for a period in late fall when there isn't enough light to maintain full red seaweed production and provide enough food



Abalone grow slowly—about one inch a year. At a year and a half of growth, a red abalone is about two inches long.

Photo: Bob Rost

for the abalone. A major cost of land-based abalone aquaculture is pumping water from the sea. The researchers are testing varying water flow rates to determine if abalone can flourish when water flow is reduced.

The use of red seaweed has another advantage in that the plant can remove waste products such as ammonia from culture water and improve water quality. Ammonia is one of the most toxic waste products that accumulates in intensive aquaculture systems. Artificial illumination of the seaweed at night will facilitate removal of the ammonia during darkness when abalone feed most actively.

Results to date have been encouraging, according to Langdon. Artificial light has improved red seaweed production by a factor of three. The project will continue for 18 months in Newport. After that, Evans will spend six months in California trying to apply the lessons of the laboratory to abalone farms in that state. The knowledge he gains there could then be used in future abalone growing operations in Oregon, according to Langdon.

Several organizations have

expressed interest in developing an abalone aquaculture pilot project on the former Ore-Aqua site in Newport. These facilities housed a salmon aquaculture operation in the late 1970s and early 1980s.

Several research projects paved the way for the current effort. In the late 1980s, OSU fisheries scientists Bill McNeil and John Levin found that red seaweed could efficiently re-

move ammonia, nitrate and phosphate from effluents of land-based salmon cultures. A few years later, Langdon joined McNeil and Levin in a project that showed that red abalone would grow well when fed red seaweed, eliminating the need for kelp as an abalone food. This research prompted four commercial abalone farms in California to experiment with red seaweed as a food for abalone.

Abalone have been living on the West Coast for centuries. Fossil remains of one of today's species, the black abalone, have been found in the vicinity of what is now Point Loma, California. These fossils, dating from the time of the dinosaurs, differ little from their modern counterparts.

Abalone survived through the millennia with little change, according to Peter C. Howorth in *The Abalone Book*. Their flattened, shield-like shell withstood countless threats to its existence. Apart from humans, sea otters are

the abalone's most serious menace. The otters are smart enough to use stones as tools to break the shells and eat the meat inside. Abalone populations continued to increase until thousands of Chinese laborers came to California in the Gold Rush of the 1850s. They loved to eat the creatures and began harvesting them from the dense kelp beds just off the coast. When the Southern California abalone stock was depleted, intensive abalone harvesting moved north. By 1879, annual catches were in excess of 4 million pounds. In 1900, national ordinances were passed to make it illegal to gather abalone from less than 20 feet of water. This halted the Chinese and Native American commercial operations, the only ones in existence at the time.

In the 1920s and 1930s, Japanese fishermen and American fishermen of Japanese descent began diving for abalone farther off the California shore, around Monterey and Morro Bay. These successful operations ended when World War II began. Japanese fishermen could no longer come into U.S. waters, and U.S. fishermen of Japanese descent were sent to relocation camps inland.

Popularity of the mollusk among



Abalone shells are striking in appearance with multi-colored bands and chevron markings. Researchers mark abalone shells so they can track growth and development. Photo: Bob Rost



Research assistant Ford Evans inspects red seaweed growing under various lighting conditions at the Hatfield Marine Science Center, Newport, Oregon. Photo: Bob Rost

all California residents was steadily expanding during this period. Abalone was first served by a San

pearl.

For his part, Langdon is struck with the fascination people have

Francisco restaurant in 1900. This led to the creation of the commercial fishery that exists today.

In addition to eating abalone, humans have long used its shells as bowls and fashioned them into fishhooks, wood scrapers, ornamental beads and necklaces, and added them as decoration to tools and utensils. In recent years, the shells have served as a source of mother-of-

with abalone. Before what he calls “being dragged into this,” he specialized in research on oyster and clam nutrition. Now he has students volunteering to work with him on the abalone project without pay. “Abalone are like whales,” he laughs. “There is an irrational love for them. They seem to pluck at people’s heartstrings. I wish folks were more irrational about oysters and clams.”

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