Sea Grant California

Sea Grant Fisheries

FALL 2005

Newsletter of the California Sea Grant Extension Program and UC Division of Agriculture and Natural Resources

INSIDE STORIES:

Duxbury Reef Tagging Project November 2005 Update

Kristen Green and Rick Starr

In the spring 2005 Sea Grant Fisheries Newsletter, we described a collaborative fisheries study designed by Rick Starr of the UC Sea Grant Extension Program and Roger Thomas of the Golden Gate Fishermen's Association. Last June, we chartered commercial passenger fishing vessels, and with the assistance of more than 120 volunteer anglers, caught fish using rods and reels, tagged them externally with anchor tags, and released them near the site of capture. After 22 total fishing days in June, approximately 4200 fish were tagged and released in the nearshore waters north of San Francisco, between Double Point and Duxbury Reef. After a successful start in June 2005, we returned to Duxbury Reef in September in order to recapture tagged fish and put out more tags in the study area. In eight boat days we recaptured 14 tagged fish and tagged 1100 additional fish with the help of 74 volunteers! (See Table 1, below, for species composition of landings).

Species caught in June and September 2005	Number captured	% of total captured
Black Rockfish	3703	65.8
Blue Rockfish	254	4.5
Brown Rockfish	388	6.9
Cabezon	31	0.6
Canary Rockfish	208	3.7
China Rockfish	24	0.4
Chinook Salmon	4	0.1
Copper Rockfish	9	0.2
Kelp Greenling (female)	24	0.4
Kelp Greenling (male)	44	0.8
Gopher Rockfish	136	2.4
Grass Rockfish	1	<0.1
Grunt Sculpin	1	<0.1
Jack Mackerel	1	<0.1
Lingcod	420	7.5
Olive Rockfish	114	2.0
Perch	1	<0.1
Sanddab	1	<0.1
Staghorn Sculpin	2	<0.1
Vermillion Rockfish	106	1.9
White Croaker	106	1.9
Wolf Eel	1	<0.1
Yellowtail Rockfish	45	0.8
Total Caught	**5624**	100.0

Table 1: Species Composition

We have now tagged a total of 5300 fish between Double Point and Duxbury Reef, the heavily fished area off Bolinas, CA. Landings were dominated by rockfish species, but we also tagged lingcod, cabezon, and kelp greenling. Black rockfish was the most abundant species encountered, comprising approximately 66% of the catches, and 82% of tag returns. (See Table 2, below for recaptured species composition).

Species caught	Number recaptured	% of total recaptured
Black Rockfish	110	82.1
Blue Rockfish	2	1.5
Brown Rockfish	5	3.7
Cabezon	1	0.7
Canary Rockfish	1	0.7
Lingcod	11	8.2
Vermillion Rockfish	3	2.2
Yellowtail Rockfish	1	0.7
Total Recaptured	**134**	**100.0**

Table 2. Number of fish recaptured by species.

Cabezon. Photo by Rick Starr

Commercial and recreational anglers have been notifying us when they recaptured a tagged fish via the phone number on the tag. Recapture data, including date, GPS coordinates, depth, and tag number have been collected and recorded from these anglers. Thus far, 134 recaptures have been recorded. Approximately 34% of the recaptures occurred in July, and 56% occurred in August. September and November have been much slower months for tag returns, with only 10 recaptured tags called in. This may be due to rougher weather as we enter fall or the winding down of the fishing season; most nearshore recreational and sport fisheries in the area close at the end of December.

The early recapture data indicate that most of the tagged species exhibited strong site fidelity, moving less than a few miles from the initial

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tagging location. However, some individuals have displayed noticeable movement from the study site. One black rockfish was recaptured near Rocky Point off the Marin coast, approximately 6 miles from the study site. Another individual, a yellowtail rockfish, was recaptured almost 20 miles away, near the Farallon Islands!

Lingcod. Photo by Rick Starr

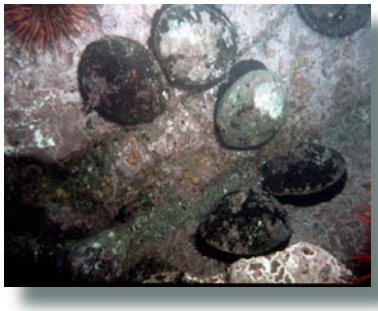
Over the course of the study we have interacted with over 200 anglers and they have supplied tremendous positive feedback to the rest of the fishing community. The volunteers have been excited to be a part of a scientific study, and eager to learn about tagging methodology and fish identification. We look forward to going back to Duxbury Reef in spring 2006 to tag more fish. Come join us!

If you are interested in more information about the study or would like to volunteer in spring 2006, please contact Kristen Green at kgreen@mlml.calstate.edu or (831) 771-4479.

Four New Research Projects

By Christina Johnson

In March 2006, California Sea Grant will begin funding four new research projects with direct applications to fisheries. Below is a summary these projects.



Black abalone. Photo by Chris Dewees

Assessing Withering Syndrome Resistance in California Black Abalone: Implications for Conservation and Restoration
Hunter S. Lenihan/UC Santa Barbara, 805-893-8629, lenihan@bren.ucsb.edu, Carolyn Friedman/UW, 206-543-9519, carolynf@u.washington.edu, Glenn VanBlaricom/UW, 206-543-6475, glennvb@u.washington.edu, Kevin Lafferty/UC Santa Barbara, 805-893-8062 lafferty@lifesci.ucsb.edu.

Efforts to restore populations of black abalone are currently being delayed by a lack of basic biological information on these once abundant intertidal species. Some biologists believe the only way to rebuild abalone stocks is via "outplanting" of cultured abalone. The remaining wild black abalones are too sparse, biologists say, to reseed depleted areas. Restocking is not currently an option because of inadequacies in techniques for rearing black abalone. Compounding the situation, the disease withering syndrome (WS), which wiped-out black abalone in Central California in the 1980s, is spreading northward into waters previously spared of the lethal bacterial disease. This project seeks to answer some of the major questions thwarting conservation efforts: Are surviving black abalones resistant to WS? If so, is this a heritable trait? What is the best method for quantifying bacterial loads in infected animals? And, what are the best methods for spawning WS-resistant black abalone?

Although the primary focus of the research is in its application to black abalone conservation, the findings will also have immediate benefits to the state's abalone aquaculture industry, which also must contend with WS.

Determination of Red and White Abalone Age and Growth Using Bomb Radiocarbon Signal and Lead Dating Gregor Cailliet/MLML 831-771-4432, cailliet@mlml.calstate.edu, Allen Andrews/MLML 831-771-4460, andrews@mlml.calstate.edu

The goal of this project is to develop a reliable technique for determining and validating age and growth rates of red and white abalone. Researchers will use radiocarbon markers produced during tests of atomic bombs in the 1950s and 1960s, as well as Pb-210 dating from a series of shells to estimate age, growth and longevity. These estimates will be compared to those computed using traditional methods. These comparisons will establish whether large abalones are as old (or older) than predictions from growth models. Recent research findings suggest marine invertebrates such as abalone have longer lifespans than most biologists had previously assumed. Given that the white abalone is now protected under the Endangered Species Act, it is extremely timely and critical to ground recovery plans on accurate scientific information. If abalone are found to live 30 or 40 years, instead of less than 10 years which has been the assumption, conservation plans might best be directed away from protecting smaller, younger individuals to ones that protect larger, older individuals. This research will benefit state and federal biologists involved in the conservation and management of California abalone populations.

Krill and Krill Predators: Ecosystem-Based Management in the Gulf of the Farallones-Cordell Bank Krill Production Domain
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Euphausiid crustaceans (krill) are a critical source of carbon in marine food webs and an important source of fat and protein for hake, chinook and coho salmon, rockfishes, seabirds and large whales. Despite their ecological importance as being near the base of the food chain, little is known about where krill live at different times during their life history, their abundance or reproductive dynamics. This project seeks to fill gaps in basic understanding of this important forage species. Biologists will examine the relationship between seasonal changes in oceanographic conditions in the Gulf of the Farallones-Cordell Bank region and the distribution and abundance of two important krill species – *E. pacifica and T. spinifera.* A series of research cruises will let scientists examine whether coastward movement of cold, salty bottom water during intense upwelling pushes *E. pacifica* (the more oceanic species) onto the continental shelf where they become an abundant, early-season food source for predators. Later in the season, *T. spinifera* (a coastal species) is relatively more abundant, most likely because

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of a relaxation of winds that generate upwelling. The goal of this project is to test the hypothesis that the relative abundances of these two species are indeed directly related to upwelling and associated changes in ocean currents. Although krill is not commercially harvested in California, it is an important forage species for commercially important fishes, including salmon.

Exposure of Santa Cruz Wharf Anglers to Domoic Acid. Mary Silver/UC Santa Cruz, 831-459-42908, msilver@ucsc.edu, Caroline Pomeroy/California Sea Grant Extension, 831-763-8002, cmpomeroy@ucdavis.edu.

Although commercially sold fish and shellfish are tested for levels of the potent marine biotoxin domoic acid, similar safeguards for protecting public health are not in place for recreationally caught fish. In fact, little is known about anglers' exposure to domoic acid or how this exposure varies among different socioeconomic groups or with harmful algal bloom events. The goal of this project is to begin to quantify the levels of algal toxins consumed by different sub-populations of anglers at the Santa Cruz wharf. This wharf is among the most heavily fished in Northern California and sits squarely within Monterey Bay, an area where domoic acid outbreaks in the past have caused bird and marine mammal deaths. Given its toxicity to fish-eating wildlife, there is a growing concern that domoic acid may also be an emerging health hazard for anglers. California Sea Grant Marine Advisor Caroline Pomeroy will oversee socioeconomic aspects of this research. By understanding who is eating fish and why anglers fish, this research will greatly assist the state in elevating public awareness of the potential health implications of biotoxins in recreationally caught fish.

New Zealand Update

By Christopher M. Dewees

I began my sabbatical leave project by completing 30 in-depth interviews of my long-term Auckland region sample of fishing businesses. I have been following the strategies, perceptions, experiences, and fates of these people since the New Zealand Quota Management System began in 1986. My original sample included 62 fishermen and company managers. In 1995 I was able to re-interview 52 of them and Tracy Yandle (Emory University) met with 40 of them in 1999 as part of her dissertation research. I hope to be able to reconnect with 35 to 40 of participants this time.

C. Dewees interviewing retired fisherman M. Ashby.

In this longitudinal study, time has taken a toll on the interviewees through age, retirements, death, and moves overseas. So far, roughly one-third of the participants are retired, a third have sold their quota shares and moved on to new careers, and the rest are still fishing.

In the interviews to date, I'm finding that Auckland region fishermen, who depend primarily on export markets, are being squeezed by the effects of the very strong New Zealand dollar, weaker demand for high-end exports to Japan, and rising operational costs. Similar problems currently exist for other primary production export industries in New Zealand.

I will soon begin a study of new entrants into the fishing industry, using Nelson-area ports as a case study. In addition, I am organizing a tour of U.S. fishing industry leaders to visit New Zealand during March 2006 to learn about the management system here and the issues that have arisen since 1986.

Results of these projects will be written up and shared when I return to California next summer.

Coast-wide Study of Juvenile Rockfish and Cabezon Habitat Associations

By Susan Schlosser

Our large collaborative study with sites between Newport, Oregon and Morro Bay, California, is nearing completion. Our final sample in December 2005 will complete three years of collaborative research on nearshore juvenile rockfish and cabezon habitat associations. Nine fishermen have collaborated throughout the project and four additional fishermen have worked on the project as samplers. Jennifer Bloeser, Scientific Director of the Pacific Marine Conservation Council and I are the principal investigators of this project. Numerous state and federal agency biologists, California and Oregon Sea Grant Marine Advisors, and private individuals have assisted us during the project.

Monthly sampling includes setting traps for 24 hours in nearshore (kelp, rock reef, sand, sand/boulder) and bay (eelgrass, unvegetated mud or sand, artificial structure, kelp) habitats. We initially proposed to study juvenile rockfish habitat associations but early results suggested we could also include cabezon in our analysis. Most juvenile rockfish were found associated with sand/boulder, eelgrass, and artificial structures. Juvenile cabezon were most strongly associated with rock reefs and kelp.

In 2003 and 2004 most juvenile rockfish were trapped between June and October. Total length increased from approximately 50 mm to 90 mm in this period. During 2005, we are finding juvenile rockfish later in the year with some trapped in November. Juvenile cabezon have generally been found between July and November. In Port Orford, Oregon and Humboldt Bay, California cabezon have been trapped every month.

Juvenile Black Rockfish trapped in Coos Bay, Oregon. Photo by Susan Schlosser

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Twelve species of rockfish have been trapped including black, black and yellow, blue, bocaccio, brown, copper, gopher, grass, kelp, olive, yellowtail and vermillion. Black rockfish have been trapped in the greatest numbers, followed by copper, grass and brown rockfish. Total count of these four species at all nine ports was 308 fishes in 2003; 869 fishes in 2004; and 294 in the first half of 2005. Total numbers of cabezon from all ports was 150 in 2003, 259 in 2004, and 64 in the first half of 2005. Annual fluctuations in numbers suggest a longer-term study would be useful to understand the pattern of recruitment in juvenile rockfishes.

S. Schlosser and E. Nakada measuring fish near Morro Bay, California. Photo by John Richards.

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