Alolkoy

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SANTA BARBARA MUSEUM OF NATURAL HISTORY

CHANNEL ISLANDS NATIONAL MARINE SANCTUARY

From the Bridge

What a Welcome!

By Ed Cassano, Sanctuary Manager

The Channel Islands National Marine Sanctuary (CINMS), just a name and few brief glimpses to me prior to my arrival in January, is now a living, breathing entity. I am awed by its beauty, its uniqueness and its many facets. I am humbled by the responsibility of managing this national treasure, but I am enthusiastic about meeting the challenge of raising public awareness and understanding of this ecosystem's resources.

As impressive as the CINMS is to me, the community support for this Sanctuary is equally as impressive. I have met many of the citizens and members of local institutions who work, study and play in this area. I thank everyone for welcoming me so quickly, and for sharing their experiences and knowledge with me.

I have learned a lot in my first two months of managing the Sanctuary, but I realize I have only scratched the surface. I will continue to rely on the vast local knowledge available to me.

I have begun the process of forming a Research Activity Panel to help evaluate, determine and focus research efforts for the Sanctuary's use of our new research vessel *Ballena*. This effort, and the strengthening of existing local, state and federal relationships, will heighten the Sanctuary's role as the coordinating agency for regional research efforts in and near the CINMS.

I am eager to discuss new or evolving issues regarding the Sanctuary with interested individuals. Please feel free to call, write or stop by the office any time.

Editor's Watch

Illustrating Diversity

Stephanie Diani is a photographer and graphic designer who enjoys experimenting with the computer. One result is this issue's cover, the first *Alolkoy* cover to use digital imaging to create a composite picture.

The issue's theme is the diversity of research on the Channel Islands, the surrounding Sanctuary waters and beyond. Diani's cover captures the sample of research subjects inside, and to her surprise touches on the archaeology she trained in at the University of California, Santa Barbara.

Born in Goleta and raised in Santa Barbara, Diani started her business in editorial photography and digital imaging about two years ago. It's called Diani Photo-Graphics. Manipulating images in a computer gives her freedom to arrange the composition, but she says she prefers "straight photography."

We are happy to share this illustration with our readers, and to credit the photographers and artists whose work has been used: Jan Timbrook supplied the Chumash artist; Jay C. Carroll provided the sea lion and kelp; Mary Beath drew the gray whale, and the pygmy mammoth is by Susan Morris.

Cover: A Chumash communicator and a pygmy mammoth skeleton are overshadowed by a gray whale, a sea lion and giant kelp in this research sampler designed by illustrator Stephanie Diani.

Upcoming

How to educate people of all ages about wise resource use of the Santa Barbara Channel and Sanctuary is a challenge explored in the next *Alolkoy*.

New Species Discovered in Channel

By F.G. Hochberg and Paul H. Scott

The dark, cold depths of the Santa Barbara Channel teem with life. Elegant vase-shaped cloud sponges tower above the seabed like castles, sheltering armies of tiny shrimps. Giant white plumose anemones and colonies of corals stretch delicate but deadly tentacles to capture plankton. Throughout this matrix of larger invertebrates are microhabitats for even smaller worms, encrusting moss animals (bryozoans) and hydroids which form a living tapestry of amazing complexity and diversity.

Though many people assume that everything is known about the Channel's animals this is far from reality. A recently concluded five-year survey of the bottom community discovered more than 140 new species, the largest of which was a crab eight inches long. This survey covered only part of the Sanctuary's sea floor and that of the nearby Santa Maria Basin.

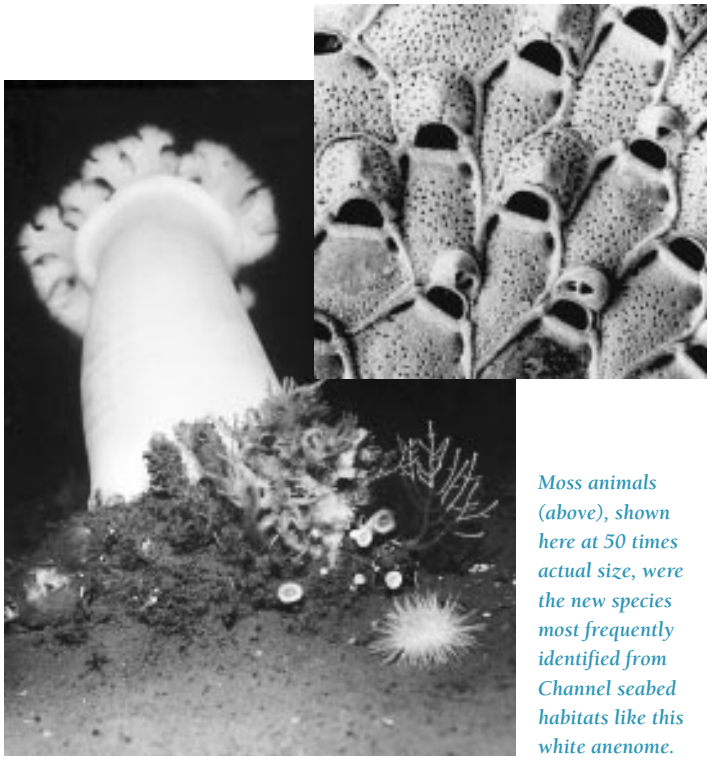
Marine invertebrates in the Santa Barbara region have been extensively studied since the disastrous oil spill in 1969. For more than 20 years the Santa Barbara Museum of Natural History's Department of Invertebrate Zoology archived specimens of our area's diversity. As a regional clearinghouse and repository the department presently houses more than 200,000 voucher specimens from surveys and scientific research conducted offshore.

Little information has been published to document the rich transitional area between the warmer ocean waters to the south and the cool waters to the north. To remedy this the federal Minerals Management Service (MMS) sponsored a five-year project to survey and monograph bottom-dwelling invertebrates in the Santa Barbara region. Animals that live on the seafloor at depths of 160 to 3,300 feet (50 to 1,000 meters) were targeted for study.

An international team of experts was assembled in partnership with museum staff, including the authors and zoologist Henry Chaney, and scientists associated with Woods Hole Oceanographic Institution in Massachusetts. Specimens from the department's environmental collections were shipped to taxonomic specialists around the globe for description.

Each species recorded from the region was described and illustrated on the basis of specimens examined and published accounts in the scientific literature. Information was included on species biology and ecology, when known. All entries are being compiled into an atlas, or manual, of scientific identification. When completed, the 14-volume *Taxonomic Atlas of the Benthic Fauna of the Santa Maria Basin and the Santa Barbara Channel* series will be one of the most detailed and up-to-date publications in the world on continental shelf and deep water invertebrates.

For example, the recently published volume on the bryozoa, or moss animals, treats 124 species, more than 30 percent of which are new to science. Bryozoans are minute animals which grow as attached colonies. They are so small they are often overlooked by the casual observer. The moss animals found off Santa Barbara are known from as far north as Alaska and as far south as the Galapagos Islands, which is additional evidence of this region as a transition zone.



Santa Barbara Museum of Natural History photos

Moss animals (above), shown here at 50 times actual size, were the new species most frequently identified from Channel seabed habitats like this white anenome.

The atlas format also provides a framework for continuing to explore the diversity of marine invertebrates in the Sanctuary and elsewhere offshore. Future projects hopefully will detail the invertebrates that live in the intertidal zone or open-ocean animals residing in the water column. Microscopic animals from this region that live in bottom sediments or as parasites in other animals are poorly known and eventually need elucidation.

Understanding the world's biological diversity tops today's global scientific agenda. Biodiversity initiatives recently have been drafted by federal agencies such as NOAA's National Marine Sanctuary program, the Environmental Protection Agency and the National Biological Service. Taxonomy and biodiversity have been at the core of the museum's organismal research throughout its 80-year history, and continue to be the primary focus of the Invertebrate Zoology Department.

Santa Barbara Museum of Natural History Curator F.G. Hochberg is head of the Department of Invertebrate Zoology. Paul H. Scott is senior associate curator of that department and editor of the Taxonomic Atlas.

Pygmy Mammoth a World-Class Find

By Larry D. Agenbroad

In June 1994, geologists Tom Rockwell and Kevin Colson discovered what appeared to be the skeleton of a pygmy (or dwarf) mammoth eroding from a sand dune on an elevated marine terrace, on northern Santa Rosa Island. While parts of dwarf mammoths (*Mammuthus exilis*) had been unearthed on Santa Rosa and two other Channel Islands beginning in the 1870s, this discovery would prove unexpectedly complete.

Don Morris, the Channel Islands National Park archaeologist, asked a colleague, Dr. Jim Mead, and I to verify the identification. We did so; I suggested the skeleton be recovered prior to the arrival of winter storms, little realizing the intensity of those upcoming storms.

In August we excavated the specimen, aided by Dr. Louise Roth of Duke University and my son, Brett Agenbroad. The result of our nine-day effort was the recovery of the most complete (more than 90 percent) pygmy mammoth specimen ever found. The skeleton was shipped to the Mammoth Site in Hot Springs, South Dakota, for cleaning, preservation, stabilization, molding and casting, prior to its return to California.

Measurements of selected bones and teeth indicate the animal was a mature male, about 56 A.E.Y. (African elephant years) of age at the time of death. His body was buried in a sand dune, but the cause of death is unknown. Loose sand helped speed the excavation, which was conducted on a 30 degree slope.

Calculations indicate a shoulder height of 5.5 to 6 feet (1.7-1.8 meters) while living. This contrasts to shoulder heights of 12.75 to nearly 13 feet (3.9 m) for comparable aged Columbia mammoth (*M. columbi*) from the Hot Springs site. The Santa Rosa dwarf's height was about 45 percent of that of his mainland cousins.

Leg bones fused early in the growth of the Santa Rosa Island mammoths. This affected their ultimate size, but may also have enhanced their mobility. If so, this could have allowed them to compete more successfully for island resources, especially if they shared these resources with full-sized mammoths.

John Miller

Excavating Santa Rosa Island's pygmy mammoth in 1994 was done on a precarious slope that winter rains virtually washed away.

Though evidence for this theory is sketchy, a mandible from a full-sized Columbia mammoth has been found recently on another part of Santa Rosa. Its age at death was about the mid-50s; the jawbone, however, has yet to be dated.

Pygmy mammoths from the California Channel Islands were first reported in the scientific literature in 1873, but not until 1928 was any paleontological attention paid to the fossils. Their small size suggested insular isolation as a dwarfing mechanism, similar to what may have happened to the pygmy proboscideans of Malta, Sicily and other islands in the Mediterranean Sea. The mystery was how did they get from the mainland to the islands?

The theory of a land bridge that allowed mainland mammoths access to what is currently the Channel Islands was disproved by the late 1970s. If no dry-land connection existed in the late Pleistocene epoch, the parent stock of mainland mammoths had to reach the islands by swimming.

Two factors make this feasible: Documented accounts of modern elephant swimming abilities, and the fact that during the last Ice Age worldwide sea levels were as much as 300 feet (100 m) below present levels. That would have exposed a very large island as close as 4 to 5 miles (6.4 to 8 km) to the coast of Pleistocene California (see Fall 1993 *Alolkoy*).

Phil Orr called the island Santarosae, a name that has endured. Orr, an archaeologist with the Santa Barbara Museum of Natural History, found island mammoth remains on digs between1940 and the mid-1960s. These bones, which together make up the display animal in the museum, were dated between 12,000 and 28,000 years before the present.

One theory he advanced was that the ancient Chumash people exterminated the last of the island mammoths. That theory has had little support, but current and continuing paleontological and archaeological research promises to shed some light on Orr's hypothesis.

Director of the Mammoth Site in South Dakota, Larry D. Agenbroad, Ph.D., is also a professor of geology at Northern Arizona University in Flagstaff. Currently, he is a visiting researcher at the Santa Barbara Museum of Natural History.

Sanctuary Research Support Takes Whale of a Leap Forward

By Ed Cassano

There is a new research boat cruising the Santa Barbara Channel, a 56-foot former Navy mine hunter that bears the name *Ballena*. The story of how she got that name is elsewhere (see page 10). This story is about what the *R/V Ballena* can do to help science understand the Channel Islands National Marine Sanctuary (CINMS) and the Channel in general.

The boat proved seaworthy during her transit from Seattle, Washington, where she was outfitted. Her overall specifications show she has the endurance necessary to conduct research throughout the Sanctuary (see box below).

Ballena, which means whale in Spanish, is undergoing a major facelift as she evolves from a mine hunter to a floating multi-disciplinary research platform. This transition should be completed by the end of April when the boat is scheduled to begin her first, long-term research project.

To meet the needs of long-term continuous studies and individual research programs, the *Ballena* is equipped with a continual data acquisition system. This system collects sea surface temperature, salinity, depth, time, and position at intervals as short as 10 seconds. These data are simultaneously displayed on the ship's computer and stored for later retrieval.

The ship carries a hydraulically operated A-frame that is coupled with an oceanographic winch capable of sampling most depths within the Santa Barbara Channel. The *Ballena* has over 150 square feet of laboratory space, which is designed to accommodate a variety of research activities. *Ballena* will soon sport a new dive tank air compressor, allowing extended dive operations.

Initially, the *Ballena* will be used to support on-going, cooperative work established prior to her arrival. In April, the vessel will start on a three-year project that entails conducting twice-monthly cruises within the Channel. This project, titled "Plumes and Blooms," is headed by Dr. David Siegel of UC Santa Barbara.

In addition, the vessel will continue to support the efforts of the National Biological Service in on-going seabird work and support monitoring efforts by the Channel Islands National Park. The Sanctuary is working closely the Southwest Fisheries Science Center to facilitate marine mammal research within the CINMS.

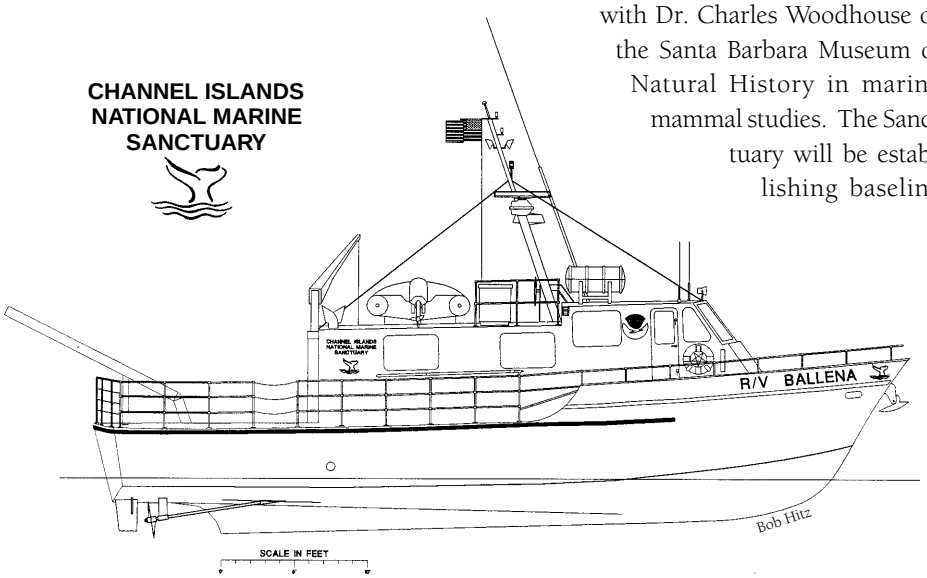
We are also working closely with Dr. Charles Woodhouse of the Santa Barbara Museum of Natural History in marine mammal studies. The Sanctuary will be establishing baseline transects throughout the area to collect material for a long-term data base for studying the resources of the Channel.

Though the level of support is rising, neither doing research nor helping others with their inquires is a new function for Sanctuary staff. In fact, that is part of the reason CINMS was created in 1980. A cornerstone of the federal law establishing marine sanctuaries requires us to "support, promote, and coordinate scientific research and monitoring of the resources of (CINMS), especially long term monitoring and research..."

Many innovative and cooperative efforts have been made over the years between Sanctuary staff and marine research institutions in the region. Cooperative arrangements with the park, the National Biological Service, the National Marine Fisheries Service, and UCSB, to name a few, have launched our understanding of the Sanctuary's environment and resources.

The *Ballena* is well suited to augment that effort by serving as a multi-use platform. Certainly, she is an improvement over the 32-foot vessel we were using to support research projects. If you see her out and about, give us a call. We would love to fill you in on what we are doing.

Ed Cassano is manager of the Channel Islands National Marine Sanctuary, headquartered in Santa Barbara, California.



R/V BALLENA Specifications

Engines—Twin Detroit 671s (350 hp each)
Fuel Capacity—900 gallons
Generator—Northern Lights 12 kW
Speed—11.5 knots @ 100 rpms
Duration—40 hours with 300 gallon reserve
Sleeping Accommodations—4 (with an additional 4 using dinette berths)
Fully, equipped galley

Keeping Track of Island Kelp Forest Comm

By David Kushner

The boundary waters of the Channel Islands National Park and Channel Islands National Marine Sanctuary contain about one-third of southern California's giant kelp forests, one of the world's richest marine ecosystems. This large brown algae can grow up to two feet a day during optimal conditions, and provide shelter, food and substrate for many of the 1,000-plus species of plants and animals that call the kelp forest their home.

Giant kelp (*Macrocystis pyrifera*) and the creatures associated with it experience large and poorly understood population fluctuations. Some years there will be bountiful amounts of giant kelp, while other years there may be almost none. This may occur within a small area due to high densities of sea urchins, which feed on kelp, or may occur island wide, or along much of the California coast due to natural disturbances, such as large storms or El Niño events.

In dynamic communities, like kelp forests, it is difficult to assess the impacts of disturbances, whether natural, such as an El Niño or man-made, such as an oil spill, unless monitoring furnishes enough baseline information to do the job. The only way to learn about these broad scale events is to watch the community and document the changes for many years, possibly longer than a human lifetime.

Since 1982, the park, with support from the Sanctuary, has conducted long-term ecological monitoring designed to develop a baseline of information. During this period the Kelp Forest Monitoring program has consistently monitored 14 permanent sites at Santa Barbara, Anacapa, Santa Cruz, Santa Rosa, and San Miguel islands.

The economic importance of healthy kelp is great. Many commercial and sport fisheries are dependent on thriving kelp forests, as are recreational diving and tourism. Giant kelp, itself, is harvested—more than 128,251 tons in 1994—and used as an important ingredient (usually as an emulsifier) in food products. Around 70 different kinds of products use kelp, including everyday items such as toothpaste, shampoo and ice cream.

Due to the logistics and high costs of underwater monitoring, 68 species or taxa were chosen as indicators of the overall health of the kelp forest community. By monitoring changes in population structure and the distribution of these index species at permanent sites we can piece together a picture of the overall happenings in the kelp forests.

For example, if small bat stars (*Asterina miniata*) are found in high densities this means a high survival rate for young animals. If this happens at only one site it is assumed to be a local event, but if it happens at all sites it likely to be a widespread phenomenon.

Pinnipeds of the Channel Islands

By Brent S. Stewart

The northern Channel Islands today are at least seasonal homes to three species of eared seal, like the California sea lion, and two of true seals, like the harbor seal. These flipper-footed marine mammals, or pinnipeds, breed on land and feed in the ocean. Among them are the rare Guadalupe fur seal and the giant northern elephant seal, an animal that recent research suggests may hold the deep-diving record for any marine mammal.

Harbor seals (*Phoca vitulina*) haul out and breed on all the Channel Islands; northern fur seals (*Callorhinus ursinus*) tend to stick to two rookeries around the western end of San Miguel Island. Indeed, San Miguel is *the* preferred spot in the Sanctuary for mating and birthing of the elephant seal (*Mirounga angustirostris*) and the California sea lion (*Zalophus californianus*). An estimated 70 percent of today's total elephant seal population was born at rookeries on the Channel Islands.

Guadalupe fur seals (*Arctocephalus townsendi*) once bred at San Miguel but fur hunters exterminated them by the early 1800s. Now they evidently breed only at Isla de Guadalupe, 150 miles off Baja California. However, each summer a few adult and subadult males show up on San Miguel to defend territory against California sea lions.

Brent S. Stewart, Ph.D.

A bull northern elephant sea bears temporary bleach markings by Hubbs-Sea World Institute researchers. A time-depth recorder has been glued to the seal's back.

Steller sea lions (*Eumetopias jubatus*) had rookeries on San Miguel, and perhaps Santa Rosa and Santa Cruz islands, from the 1940s until the 1980s. For unknown reasons the Stellers (also called northern sea

unities

When the program was started in 1982, giant kelp was present on all sites. During 1983-1984 California experienced the effects of a extremely strong El Niño that brought poor water conditions for giant kelp. By 1985 the kelp was almost gone from 10 of the 14 original sites. Since then, it has taken from three to 10 years for giant kelp to return to these sites, and there are two sites where kelp has not yet returned.

Collecting baseline data gives a better understanding of the dynamics of the complex kelp community. That is what monitoring does best—record changes. Monitoring is often better at raising questions than providing answers, such as why young bat stars survived at only one site.

One example of monitoring giving an early warning of trouble is the decline of the black abalone (*Haliotis cracherodii*). In 1985 a monitoring program similar to the kelp project identified the start of a drastic decline of the black abalone populations. Within five years these populations had decreased by 99 percent on Anacapa and Santa Barbara islands. Though such a sharp drop-off would likely be identified by means other than monitoring, without monitoring no comparison could have been made to the original population size.

This information aided the decision to close the black abalone fishery. Closure hopefully will protect survivors which may be resistant to the unknown pathogen that nearly wiped out black abalone in the Channel Islands.

It is too early to say what will happen with these animals, but monitoring the kelp forests gives resource managers an early warning system for some kinds of natural disasters. It also provides a way to measure the impact of both man-made and natural disturbances.

John N. Heine

Bulblike gas floats hold giant kelp strands upright, toward the sunlight.

Marine biologist David Kushner is in charge of the Kelp Monitoring Project for the Channel Islands National Park, based in Ventura, California.

lions) have disappeared from the Channel Islands, but they interbred with California sea lions, and a few hybrid offspring may still be here.

Most pinnipeds share beach space at many sites on the islands. Timing differences in breeding seasons or the annual shedding of pelts (molting) have fostered cohabitation, much like time-sharing a resort condominium. Relatively easy access to diverse pinniped populations attracts many researchers to the Channel Islands.

Pinniped diets and foraging habits are of wide interest to resource managers as well as zoologists. Attaching small, water-resistant computers (called time-depth recorders) to animals and tracking them by satellite has revealed where different pinnipeds find prey inside the Sanctuary and beyond. Northern elephant seals, for example, dive for up to two hours on a single breath, feeding on squid at depths of 1,500 to 2,000 feet (450 to 600 meters). Sometimes they descend to nearly a mile.

While in the Sanctuary in winter they eat virtually nothing, surviving on stored nutrients in blubber for one to three months when breeding and molting. Leaving the Channel, the seals swim to foraging grounds far off the coasts of Oregon, Washington, and even Alaska. Regardless of how much foraging occurs within the Sanctuary, these waters are important marine corridors to the islands' vital breeding and molting beaches.

On the other hand, harbor seals prefer to eat octopus, rockfish and cusk-eel within Sanctuary waters year round. They find prey on the bottom at depths of 300 to 1,000 feet (90 to 300 meters). California sea lions, which prefer anchovies, market squid and sardines, have variable foraging patterns. Adult females and juveniles primarily feed in areas of upwelling near Point Conception and elsewhere in the Southern California Bight, but supplement their diet by hunting the islands' kelp forests.

Individual identification of animals with flipper tags, brands or natural marks yields detailed information on characteristics of survival, reproduction, loyalty to breeding sites and migratory patterns. Evaluation of blood samples provides a baseline on the health of pinniped populations. It also establishes genetic relations among the Channel Islands' animals and colonies along the coast.

Such studies sketch the life histories, ecologies and community interactions of one of the most complex predator guilds in the world's marine environment.

Brent S. Stewart, Ph.D., is a senior research biologist with Hubbs-Sea World Research Institute in San Diego, and has been studying Channel Islands pinnipeds since 1977.

Hunting Answers to Big Whale Questions

By Paul Fiedler

Blue whales' numbers were severely reduced by whaling during the first half of this century. As shore-based whaling was coming to an end in California in the 1950s and early 1960s, blue whales (*Balaenoptera musculus*) were rarely taken. In 1966, they were designated an endangered species.

Twenty-five years later, marine mammal surveys in 1991 and 1993 placed the world's largest stock of blue whales—about1,900 individuals—in California waters. Whale-watching boats now regularly take passengers out to the Channel Islands to see these spectacular animals from July through September.

We do not yet know why there are now so many blue whales off the coast of California, particularly in the Channel Island National Marine Sanctuary. In general, whales aggregate for two reasons: to breed or to feed. We do know the blue whales among the Channel Islands during summer are feeding, not breeding.

To learn more about this activity, the Southwest Fisheries Science Center of NOAA/National Marine Fisheries Service conducted a Whale Habitat and Prey Study (WHAPS95) off southern California last August. We embarked on NOAA's oceanographic research ship *McArthur,* ready to count, photograph and tag whales, sample krill with trawls and a three-frequency echo sounder, and measure the biological productivity and temperature/salinity characteristics of the water.

Total cetacean sightings reached 580, including 146 blue whale, 62 fin whale (*Balaenoptera physalus*) and 81 humpback (*Megaptera novaeangliae*) whale sightings. Each whale sighting consisted of from one to 24 individuals (typically two).

Blue whales were most abundant to the west and north of the westernmost Channel Islands (San Miguel and Santa Rosa). Most blue whale sightings were in relatively cool water found off Point Conception and points south. Because upwelling creates cold, well-mixed waters rich in nutrients, these areas support a high plankton productivity.

The krill, or whale food, of the Southern Ocean around Antarctica is *Euphausia superba*, one of the euphausiid family of small, shrimp-like crustaceans. *Euphausia pacifica* and *Thysanoessa spinifera* are common euphausiid species in the California Current system, though the slightly larger *T. spinifera* is more restricted to continental shelf waters. They frequently form dense swarms near the surface during the day when most vertically migrating euphausiids are found at greater depths, so it might be a preferred prey species for baleen whales.

Our plankton sampling revealed dense layers of *T. spinifera* near the Channel Islands and Point Conception, where many blue and humpback whales were observed. These krill swarms were often at depths of 330 to 660 feet (100 to 200 meters), and were sometimes associated with the shelf edge around the islands.

Blue whales were making 8- to 12-minute dives where we saw subsurface swarms. Humpback whales were feeding at the surface in the same areas. Although we didn't see humpbacks using bubble "curtains," as they do in other locations, we think they can use bubble "clouds" to force krill up to the surface.

Are the Channel Islands feeding grounds richer than they were 30 years ago? We know the California Current ecosystem has been changing. Scientists at Scripps Institution of Oceanography in La Jolla, California, have shown that, due to warmer surface water, zooplankton biomass has declined by 70 percent since the 1950s.

While their samples did not include the larger krill organisms, it is unlikely that krill has increased while the smaller zooplankton have decreased. If krill abundance is declining, perhaps the whales are concentrating on the best feeding grounds.

Many questions remain about blue whales in the Sanctuary. Another WHAPS cruise is planned this August so that we can collect more habitat and krill data, attempt to observe nighttime whale activity, and investigate the seabirds that also eat krill.

Michael Marzolla

Scientists aboard the NOAA ship R/V McArthur spent much of last summer trying to find why blue and humpback whales were spending so much time in or near the Sanctuary.

Oceanographer Paul Fiedler was one of the lead scientists on WHAPS95, and is with the National Marine Fisheries Service in La Jolla, California.

Window of Words: Seeking the Chumash

By Kathryn Klar

Chumash people studying and learning their ancestral languages often ask about the history of those languages: How many languages were there? What do they tell us about the lives of the people who spoke them? Linguists, using records collected between 1769 (Pedro Fages' expedition) and 1965 (the death of Mary García Yee, last speaker of a Chumashan language), are finding answers to these questions.

Chumashan, as linguists call the group, consisted of three divisions: Northern Chumash (Obispeño), Central Chumash (Ventureño, Barbareño, Ineseño, Purisimeño), and Island Chumash (Isleño). These groups are related to one another as a family; they share a common ancestor language (of which no record remains). Chumashan does not appear to be closely related to any other California or North American language group.

While there are similarities between the language groups, there are profound differences as well. Each group is at least as different from one another as English and Norwegian. Speakers of, say, Northern Chumash would have not been able to understand the speech of the Island Chumash. This would have been true for centuries before the first written records.

Because of the deep differences between Northern Chumash dialects and either Island or Central Chumash, linguists conclude that the ancestors of Northern Chumash speakers split off from other Chumash speakers very early in Chumashan history. Island Chumash is also very different from Central Chumash. Perhaps the ancestors of Island Chumash speakers also split off (moving to the islands) not long after the separation between Northern Chumash and other Chumash speakers occurred.

We have historical records only from speakers who lived on the mainland. The last Isleño speaker, Fernando Librado, also spoke Ventureño. Fernando indicated many times during work with linguist John P. Harrington that Isleño was very different from mainland Chumash.

According to John Johnson (*Alolkoy*, Winter 1995) the Channel Islands have been occupied by human beings for about 10,000 years. It is doubtful that island inhabitants have been speaking Chumash all this time. (After 10,000 years we would be hard-pressed to recognize any systematic similarities between languages.)

Though exact dates aren't possible, the fact that the Chumash languages are so different from one another indicates that the "time depth" —the amount of time between the present and the date of the common ancestor language—is long, on the order of 2,000 to 3,000 years, with the separations between the three groups occurring perhaps 1,500 to 2,000 years ago.

While many of the words and phrases that have been preserved in written records are common to all Chumash languages, each language developed vocabulary that reflected the special conditions under which its speakers lived. Though we have only about 700 vocabulary items of Isleño recorded, a high percentage of them reflect maritime culture: fish, shellfish, ocean, boats, fishhooks, harpoons.

In older records, one sees distinctions between "Cruzeño" (the language of Santa Cruz Island), "Roseño" (Santa Rosa Island), and "Migueleño" (San Miguel Island). The differences, however, are so slight as to be almost nonexistent. One language—Isleño—which all Island people understood, was spoken.

The table above shows comparative lists of a few words in each of the Chumash groups (using Barbareño as representative of Central Chumash).

Linguists, archaeologists and historians are sharing findings about this unusual family of languages. Much work remains to be done on Chumashan; it is certain that the next 10 or 20 years will bring exciting insights and understanding to the wider relationships of this special family of languages.

Kathryn A. Klar is a linguist who studied comparative Chumashan for her Ph.D. thesis. She currently teaches at the University of California, Berkeley.

Comparison of Chumash Words

Island Chumash	Central Chumash (Barbareño)	Northern Chumash	English
'aqmil	aqmil	'aqmiLha	'drink, be thirsty'
tu, tu'u	tu'	tu'	'ear'
tech	tïq	tityï	'eye, face'
hew	xew'	sewene	'pelican'
qwapsh	xwapsh	t-qmapsï	'nettles'
txamal	taxama	tqema	'skunk'

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Channel Tidings

State Bans Taking of All but Red Abalone

Since March 1, California has halted the harvest of pink, green and white abalone below Yankee Point in Monterey County. Taking black abalone has been forbidden throughout state waters since 1993.

This leaves the red abalone (slightly) available to commercial and recreational divers. Only two of this species, each at least seven inches wide, can be taken each day through season's end on September 30.

"It's something that has to be done before the entire resource becomes depleted," said Pete Haaker, a marine biologist with the California Department of Fish and Game. Haaker, who noted that the ban is in effect for two years, said that the combined effects of harvesting and disease-induced die-offs led to the moratorium.

BBC to Swim in Gray Whales' Wake

Ever wonder what the Santa Barbara Channel might look like to a migrating gray whale? Andy Byatt wondered what the whole migration route would be like. As a producer/writer for the British Broadcasting Company's Natural History Unit he now has the challenge of bringing it off on film.

"We're trying to use sights and sounds to create their route," Byatt explained. Santa Barbara photographers Tom Fitz and Glenn Allen are helping him get the images and sounds he needs. "Having local cameramen and support from the Sanctuary were important"

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Beckwith Joins Sanctuary

By Vic Cox

For the last five years Lt. (jg) Stephen Beckwith worked at sea for the NOAA officer corps, rising to command one of the agency's research vessels. Under Beckwith the *R/V Gloria Michelle*, a former fishing trawler confiscated in a drug bust, carried scientists and equipment along New Jersey's shoreline and into the Gulf of Maine. Now he is going to be performing similar duty in the Santa Barbara Channel.

In April, Beckwith became assistant manager of the Channel Islands National Marine Sanctuary (CINMS). Besides being second in command to Sanctuary Manager Ed Cassano, Beckwith's duties include managing the Sanctuary office and the *R/V Ballena*, the CINMS' newly acquired 56-foot research vessel. Cassano said that as skipper Beckwith will plan the logistics for the boat's marine research and monitoring expeditions.

"Steve is an outstanding mariner, and the right person to manage both the office and the expanded Sanctuary research support efforts in the Channel," said Cassano. "We are happy to have him aboard, and I'm sure the scientists will be, too."

Beckwith, who has conducted shrimp and groundfish stock assessments on the East Coast, is looking forward to the diverse nature of Channel research. It fits his own educational background. At Pennsylvania's Villanova University, where he graduated with a B.S. in general science, Beckwith concentrated on chemistry, biology, physics and mathematics. "I had too many interests to select a major," he explains.

One summer he interned with the microbiology laboratory for the Hempstead, Long Island, Department of Conservation and Waterways. While enjoyable, "it was not exciting enough to my liking," Beckwith recalls.

He declined a permanent lab job and eventually enlisted with NOAA's Officer Corps. There the federal Department of Commerce continued his education in seamanship and management. Beckwith learned to dive as well repair a diesel engine, navigate a computer as well as a ship, and many other skills. Indeed, with the *Ballena*'s computerized data acquisition systems both kinds of navigation skills will be needed.

"My first priority will be to provide a safe working platform for the scientists," Beckwith says, but he welcomes the opportunity to continue learning about the never-routine sea. Joining him will be his wife, Deana, and their two-year-old son, Stephen.

Vic Cox is editor of Alolkoy.

A Boat Named Ballena

After sifting through more than 500 entries in the contest to name the Sanctuary's new research vessel the judges spied a winner. Angelina Chavez's *Ballena* gulped top honors and won a free trip for her family to Anacapa Island aboard the boat whose name means whale in Spanish.

Chavez, a fifth-grader from Franklin School in Santa Barbara, was guest of honor at a special unveiling ceremony last February 24. She accompanied Chumash greeter Julie Tumamait-Stenslie in a musical blessing of the boat.

"The name *Ballena* really reflects what the Sanctuary is all about," said Sanctuary Manager Ed Cassano. "More than 27 different types of whales and dolphins visit Sanctuary waters, and are among our most important resources."

Making up the panel of judges were Fred Benko, captain of the *Condor*; John Johnson, curator of anthropology for the Santa Barbara Museum of Natural History, Diane Pleshner, executive director of the California Seafood Council, and Gary Robinson, manager of the Sea Center. Cassano was a non-voting participant.

Marie Murphy

Sanctuary Manager Ed Cassano holds the microphone for Angelina Chavez aboard the boat she named. Behind Chavez are Julie Tumamait-Stenslie, Education Coordinator Laura Gorodezky (in sunglasses), and Chavez's relatives.

Students Spotlight Trashy Tide

By Andrea Moe

At present, an estimates 14 billion pounds of trash are in the world's oceans. This debris entangles wildlife, pollutes waterways and washes up on beaches. Last fall, nearly 800 Santa Barbara Los Marineros students had a chance to study this problem during a series of lessons about marine debris.

The results of this study were turned into an exhibit, entitled "Turning the Tide on Trash," which is currently on display in the Sea Center on Santa Barbara's Stearns Wharf. The local city council also heard a presentation of the results in English and Spanish from students of Ms. M.K. James' fourth-fifth grade class at Cleveland School.

To determine what type of garbage makes its way to the ocean, students staked out a 100-square-foot (30 square meters) grid in the wrack line at West Beach, next to Stearns Wharf. On 14 separate dates students collected garbage within the grid. Then they sorted the debris into categories, such as plastic, rubber or glass, and counted the amounts of each.

The results were staggering. Students collected 7,916 pieces of debris, including surfboards, tires, syringes, cans and more than 3,000 cigarette butts.

"There was so much trash," said John Goodman, a student from Washington Elementary. "By looking at flyers and videos I didn't believe there would be so much, but when I did the beach clean-up, I started to believe. As the saying goes, 'Seeing is believing'."

Gary Robinson

The results of a Los Marineros beach trash survey are now on exhibit at the Sea Center.

Andrea Moe is program assistant for Los Marineros in Santa Barbara, California.

Studying Seabirds

Rare seabirds, like the Xantus' Murrelet (left) and the Ashy Storm-petrel, are among the many subjects of research that live or feed within the Sanctuary. Since 1994 the National Biological Service (California Science Center, Dixon Field Station) has overseen studies on the status and distribution of the Channel Islands' populations of these birds. See the next issue for more about seabird research.

Bill McIver (NBS)

Darell Whitworth (NBS)

Channel Tidings

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factors, Byatt said, in his decision to film in the Channel.

In February, the film unit accompanied Sanctuary staff on dives off Anacapa Island, capturing underwater scenes for Byatt's segment of BBC's "Incredible Journeys." Byatt said he intends to show most of the migration, starting from Baja and swimming north to Alaska, from the gray whale's viewpoint.

He said he had been working on the project for a year, and expects the Discovery Channel to air the show in November.

Marine Education Gets New Forum

Marine education in Santa Barbara has received a boost in the form of the Chase Palm Park Recreation Center. The refurbished structure at 234 East Cabrillo Boulevard will give the Sanctuary and the Museum of Natural History, among others, a new forum for marine lectures, exhibits and activities.

Sea Center Manager Gary Robinson said he plans to lead nighttime grunion hunts from the building. Marine related exhibits will be provided by the Sanctuary and Sea Center. Opening day for the new center is set for June 1.

Grants from the state and the California Coastal Conservancy funded the city project. As a public meeting space the center can be rented for weddings and other activities, said Joan Russell, city recreation programs manager. Contact Curlen Lee at 962-8956 for details.

U. S. Department of Commerce
National Oceanic and Atmospheric Administration
Channel Islands National Marine Sanctuary
113 Harbor Way
Santa Barbara, CA 93109

Alolkoy

Address Correction Requested
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email: cinms@rain.org
WWW: http://www.nos.noaa.gov/ocrm/srd/nmsp/cinms/welcome.html

Channel Islands National Park
1901 Spinnaker Drive
Ventura, CA 93001
805/658-5700

Santa Barbara Museum of Natural History
2559 Puesta del Sol Road
Santa Barbara, CA 93105
805/682-4711

Sea Center
211 Stearns Wharf
Santa Barbara, CA 93101
805/962-0885

Things to Do, Places to Go

Watch Where You Dump that Garbage

Earth Day in Santa Barbara is **April 21**, and the 1100 block of State Street is where it all comes together, but some activities are already under way.

The traveling exhibit "Garbage and All that Trash" promises to explode common garbage myths, explore alternatives to toxic home methods, and look at new ways for future garbage disposal. The Sanctuary will have an exhibit for the Earth Day celebration and the Santa Barbara Harbor Festival (see below).

The Community Environmental Council-sponsored event runs until **April 29** at 1109 B State Street. Call the CEC at (805) 963-0583 for details on admission and hours of operation.

Santa Barbara Harbor Festival Set May 11

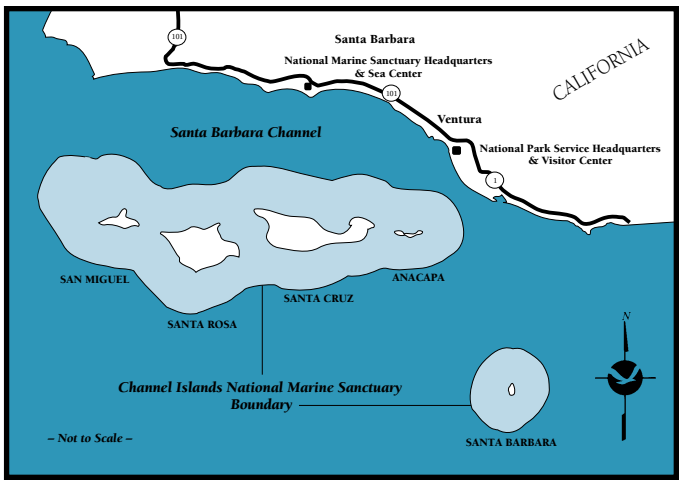
The Santa Barbara Habor Festival offers a day of activities, displays and family entertainment along the city's waterfront. The U.S. Navy will make a ship, the *U.S.S. Gary*, available for free public tours on **May 11 and 12**.

Island Plants Focus of Symposium

How plants adapt to islands is the theme of a **May 4** symposium at UCSB sponsored by the Santa Barbara Botanic Garden (SBBG). "Plant Evolution and Conservation on Islands: A Global Perspective" is the seminar's title, but speakers will address special issues of the Channel Islands. Symposium participants, who receive discounts if they sign up before **March 15**, also may sample one or more of the Channel Islands in post-lecture tours. Call the SBBG at (805) 682-4726 for details and prices.

Take Mom Kayaking

Looking for an unusual Mother's Day gift? Take her kayaking in the Channel Islands with the Santa Barbara Sea Center on **May 12**. The plan is to ferry people over to Santa Rosa Island and explore the shoreline's nooks and crannies by kayak. Call the Sea Center at (805) 963-1067 for details.

Sanctuary Cruises Set For Summer

July 7 is the first sailing date from Santa Barbara harbor for special cruises into the Channel Islands National Marine Sanctuary. The all-day voyages aboard the *Condor* feature a diver-conducted tour of kelp forests and underwater reefs, courtesy of Passage Productions. A visit to Painted Cave on Santa Cruz Island ends the day. Other cruises are planned for **July 21, August 18, and September 15**. Cost is $65 for adults; $35 for children. For more information or reservations, call Sea Landing in Santa Barbara, (805) 963-3564.