Young Rangers Become Naturalists, Beachwatch Monitors at Reserve

Eleven young people became proud junior naturalists last month after completing five hours of instruction at the Marine Reserve. All of the youths, graduate junior rangers, will join adult docents at the tidepools on weekends and vacation times during low tide to introduce other youngsters to the habitat and behavior of marine creatures.

Under the auspices of the Friends of Fitzgerald Marine Life Reserve, the new naturalists were instructed by Bob Breen, supervising naturalist, Tim Sullivan, park ranger, and Ellen Gartide, park aide.

Each student was required to read a small book, Pacific Intertidal Life, and had to identify twenty marine animals. They also learned how to approach and teach other children within their age group about the marine environment.

Special training included beachwatch monitoring, which is designed to educate the public about the coastal environment and assist the Sanctuary in the early detection of natural and human caused environmental problems. Such problems might include cold water events, oil spills, and the migration/distribution of marine organisms.

The new junior naturalists are:

Misty Heaton, Pleasanton; Krista Heaton, Pleasanton; Angela Guglielmino, San Francisco; Brian Morrison, San Mateo; Carly Gunther, El Granada; Ryan Huber, Moss Beach; Shelby Green, Montara; John Vollmer, Montara; Les Lamcke, Sunnyvale; Elizabeth Barone, Half Moon Bay, and Lillie Halverson, Half Moon Bay.
Occasionally, by just lifting up a rock to see what is underneath, a visitor exploring the tidepools can have an unusual experience. A loud, popping sound begins to emanate from the sandy mud below, unseen and mysterious. The startling noise is produced by the burrowing pistol shrimp (see fig. 1).

The sound is made by its large, outsized, right claw, armed with a thumb-like projection that is cocked back and then allowed to strike the side of the claw with great force (fig. 2). This adaptation is used for both defense and offense, and the loud racket is especially produced when the shrimp feels that it is being threatened. The sound is thought to frighten away predators and the noise itself is enough to crack a glass container which holds an imprisoned shrimp.

On the offense, the snapping claw is used to stun and subdue prey. It is even known to render senseless such small fish as the burrow dwelling goby, Clevelandia ios. A fish may be dazed by the noise concussion, and then dragged into the shrimp’s burrow by the smaller left claw and given a final karate whack with the larger claw.

Pistol shrimp are most numerous at the reserve, but can sometimes be seen under rocks that are at the end of the access ramp to the beach. The experience of holding one in your hand will give you a good idea of what it is like to be a goby, since the snapping produces a sharp, stinging sensation on your hand.

Scenic Views, Creature Search in Store for Frenchman's Reef Hike

Ranger Tim Sullivan will conduct a tidepool hike Frenchman’s Reef on Saturday, March 26 at 1 p.m. Hikers will meet at the ranger station at the reserve and carpool to the end of Ocean Blvd. The hike will proceed along the bluffs, giving fantastic views of the sea lion rookery at Flat Rock, the destination of Frenchman’s Reef and the world famous Maverick’s. The trail ends just north of the reef and hikers will proceed south to a rich rocky area to begin the tidepool creature search.

The reef provides a large variety of rich habitats; flood channels, overhanging ledges, shallow pools, and deep cracks with great opportunities to see abalone. "If you love searching for nudibranchs, the butterflies of the sea," says Sullivan, "then this is the place for you."

According to Sullivan this part of the reserve is less travelled, and the abundance of plant and animal life provides tidepoolers with a "very remote feeling." Sullivan advises hikers to bring rubber boots, a snack, and a keen sense of sight. "We will provide you with an adventure you won’t forget," he adds.

The walk will be free for all members of FFMLR, and three dollars for non-members.
CHECKING TIDEPOOL DATA DURING JUNIOR
Naturalist training at the reserve in December are Shelby
Green, Krista Heaton, and Misty Heaton with Park Aide
Ellen Gartide.

Pillar Point Walk Promises Cast of
Noisy Seals, Sea Otters and Kelp

An early morning walk to sight harbor seals and other
marine creatures will take place for early risers on
June 23 at 6:30 a.m. Guiding the tour will be Bob
Breen, supervising naturalist at the reserve. Breen
will lead the marine mammal walk to Pillar Point.
The trip begins at the ranger station with carpooling
to the Pillar Point parking lot. The Princeton Harbor
will be the focus of the trip where harbor seals are
sighted. The trail leads to the breakwater and
provides a view of kelp beds. Sea otters are often
found wrapped up in the beds, or are diving for
various sea food. The kelp beds often are a great
playground for harbor seals. Visitors may observe a
sudden splash, a snort, or a great amount of
movement on the water. These are the telltale signs.
The outer rocks, or Sail Rocks, are good habitat for
California sea lions who are usually visible from
shore because of their size and ability to vocalize.
This loud, raucous behavior is the reason they were
named "Sea Wolves," and was first given to them by
early inhabitants of California. The tide will be low
and provide an opportunity to explore the rich
resource.

The walk will be free for all members of FFMLR,
and three dollars for non-members.

Junior Ranger Program Will Offer
Two Training Sessions in 1994

The Friends of Fitzgerald Marine Life Reserve will
be giving its Eighth Annual Junior Ranger program at
the Marine Reserve this summer for boys and girls
ages 9 to 12. Two sessions will be offered. The first
one will be on June 27 to July 2. The second is from
August 29 to Sept. 2.

This year the FFMLR will be using the curriculum
guide entitled, Biological Diversity, written by the
National Park Service and the Minnesota Department
of Education. This guide emphasizes the importance
of habitat in preserving plant and animal diversity,
the role of adaptation in species diversity, and the
importance of biodiversity to human life on the
planet.

The Monday through Friday sessions are from 9:30
to 12 noon with the exception of August 31,
September 1, and 2, when the times will be 10 a.m.
to 12:30 p.m. to take advantage of the low tide.

The cost of the five day program will be $14 for
FFMLR members and $21 for non-members. Class
size is limited to 12 students. Reservations can be
paid by mail, sent to the Fitzgerald Marine Reserve,
PO Box 451, Moss Beach, Ca., 94038, or paid in
person at the Marine Reserve ranger station.

PILLAR SPRING PROGRAMS FOR 1994

The following programs are offered by the Friends of
Fitzgerald Marine Life Reserve this spring. Check the
programs desired in the space (s) indicated, and detach and
mail your check to: Friends of Fitzgerald Marine Life
Reserve, Box 451, Moss Beach, 94038.

--- Tidepool tour, Mar. 26 ($3 for non-members. No charge
FFMLR members. See story page 2).

--- Mammal Walk, June 23 ($3 for non-members. No charge FFMLR
members. See story page 3).

--- Jr. Rangers, June 27 and Aug. 9, ages 9-12. ($14 for FFMLR
members, $21 non-members. See story page 3).

NAME______________________________________________

ADDRESS_________________________ZIP________
Plankton Critical to Food Chain
And Much of Earth's Climate

By Pat Smith

What's small, green and lives in glass houses? Phytoplankton! These microscopic, single-celled algae occur worldwide and form the base of the marine food chain. They have been called the grass of the sea, and that's just what they are.

Phytoplankton are not strictly plants but, like plants, have chloroplasts, using them to make sugars and other carbohydrates for energy from sunlight and carbon dioxide. Phytoplankton are responsible for removing major portions of carbon dioxide from the atmosphere and taking it to coastal seafloor sediments when they die. By doing so, phytoplankton are instrumental in controlling Earth's overall climate. Because they need sunlight to live and reproduce, phytoplankton live in surface waters – not deeper than 100 to 200 meters in the clearest open ocean water, or the top 15 to 50 meters in coastal areas where upwelling provides large amounts of nutrients in the spring, triggering spring blooms and providing food for zooplankton and small fish.

One group, the diatoms, make their shells, called frustules, from silica - the same mineral that makes glass and opals. These highly decorated and intricate frustules not only make species easier to distinguish, but help concentrate the sunlight right on the chloroplasts, like little solar cells.

A second group, the coccolithophores, are covered with tiny plates made from calcium carbonate. Deposits of these cells can be extremely thick. For example, the White Cliffs of Dover are composed exclusively of these microscopic organisms.

Another group, the dinoflagellates, are famous for creating displays of light in breaking waves. These cellulose-covered cells produce bioluminescence that is visible when dinoflagellates are present in large numbers, usually when they bloom in the summer. California's coastal Indians would watch for these nightly lightshows to know when shellfish were unsafe to eat. One species of dinoflagellate (Alexandrium catinellum) causes potentially fatal paralytic shellfish poisoning (PSP) along both coasts of North America. For this reason, wild shellfish collecting is quarantined in California from May 1 to October 31, since the majority of PSP cases have occurred during this period. Commercial growers are monitored to assure the safety of their product year round.

Recently, one genera of diatom (Psuedonitzschia) has been discovered to produce a toxin, domoic acid, which was responsible for the deaths of four people, and illness in about 100 others in Canada in 1987, as well as hundreds of pelicans and cormorants in Monterey Bay in 1990. Domoic acid causes a syndrome called amnesic shellfish poisoning, because it causes loss of memory. Currently, phytoplankton samples are collected for the Department of Health Services by volunteers at 26 sites along the entire California coast, including Fitzgerald Marine Reserve, in order to discover how widespread toxic phytoplankton species are.

(Pat Smith was born in San Francisco. She earned her B.A. in biology with honors, and her M.S. in Marine Science at U.C. Santa Cruz. Her thesis work was done on the effects of the 1982-83 El Nino on the phytoplankton populations in Monterey Bay. She is currently employed as phytoplankton monitor for California under an FDA grant examining the distribution of relative abundance of toxic phytoplankton species along the west coast of the U.S.)
UNEARTHING MIDDENS AND ARTIFACTS AT THE MARINE Reserve earlier this month were (l to r) Loraine Escobar (a descendant of the Esselen American Indian people), the author, Mark Hylkema, Gary Parsons and Arnold Sanchez (descendant of the Ohlone people). This location was a campsite for early Indian tribes. The project is being funded by a grant from the National Earthquake Reduction Program, United States Geologic Survey. See story below.

Diggings at Marine Reserve Seek Early Native American Campsites

By Mark Hylkema
(Consulting Archeologist)

The Fitzgerald Marine Reserve has been selected as the location for a combined archeological and geological research investigation. The purpose is to excavate a prehistoric Native American campsite at the reserve that is located directly on top of the San Gregori (Seal Cove) earthquake fault. By examining earth movement at the site and radiocarbon dating the age of the archeological deposit, a history of earthquake activity can be developed. This is important for urban planning purposes as this fault traverses through areas that are densely populated.

Just a day before discovering San Francisco Bay, the first Spanish land expedition passed by the reserve in the year 1769. The explorers encountered many Indians in the Half Moon Bay area. Later mission records note that a tribal community called the Chigwan (She-wam-ne) controlled the area from Point Montara to Pilarcitos Creek. They were a sub-group within the Ohlonean cultural sphere, which itself was composed of over 50 tribal groups. The ancestors of these folks hunted and fished here for thousands of years.

By exposing the fault line after excavating the site, a history of seismic activity can be created.

The archeological investigation at Fitzgerald Reserve has recovered a wide variety of dietary shell and bone from terrestrial and marine fauna. These materials can be dated. By exposing the fault line after excavating the site, a history of seismic activity can be created.

The project is being funded by a grant from the National Earthquake Reduction Program, United States Geologic Survey. The project geologist, Jay Noler, is the principal investigator, and the author is the consulting archeologist directing the excavation of the prehistoric site. Results from this research will ultimately be published.

(Mark Hylkema works for Caltrans, and is an archeologist for the State of California. He earned a bachelor and master's degree in archeology at San Jose State University in 1991. He lives in Santa Cruz, and he and his wife are expecting their first child.)
Marin Mammal Center is Refuge for Disabled, Deserted Marine Animals

Nestled in the rolling hills of the Marin Headlands, not far from Ft. Cronkhite and old army batteries built during W.W. II, is The Marine Mammal Center. Here, more than 600 volunteers work around the clock, seven days a week, caring for diseased and disabled marine animals until they can be returned to their natural habitat in the wild.

Established in 1975, The Center occupies seven acres in a hilly and remote area. It is especially busy during the heavy seal pup season in the spring months. Most of the animals being rehabilitated are seals and sea lions, although some former patients have been sea otters, whales and dolphins.

Not all rehabilitation and rescue treatment is conducted at The Center. A few years ago a call was received about a whale that was trapped in the mud of San Francisco Bay. As feared, the victim was Humphrey, the endangered humpback whale that personnel from The Center had rescued several years before. As the world watched, The Center’s rescue team and medical experts worked around the clock to save him. With the tide going out and his huge bulk slowly crushing him, the team had to work fast. Eventually he was freed, and Humphrey lumbered back to the open sea.

Numerous times in the past, abandoned and injured seal pups have been picked up at the Fitzgerald Marine Reserve by volunteer workers from The Mammal Center. Last year, nearly 800 animals from a number of areas along the northern and central California coastline were treated at the Marin facility. A special-equipped hospital, where volunteers work closely with veterinary staff, treats patients for a variety of health problems.

Treatment for newly arrived animals normally includes weighing, intravenous feeding if necessary, and sometimes x-raying for internal damage. For the very young that arrive at The Center a weaning process is often applied.

One case was Katana (the animals are frequently named by the volunteer caretakers), who was left helpless soon after birth on a crowded public beach. Only a few days old when rescued, she was comforted and nourished by a milk bottle hidden in a toy-stuffed walrus. Holes were cut in the stuffed animal so that the nipple of the milk bottle could be inserted to simulate a mother’s teat. It took the volunteers caring for Katana months to teach her how to swim and eat fish on her own so she could be released. She was last seen with a herd in the wild, an active and healthy juvenile.

Some newly arrived seals at The Center are kept in the shelter of a pen flat overnight. They are brought to the pool area outside for exercise and feeding by the volunteer caretakers who use herding boards to prod the animals onto a ramp leading to the fresh water pool. The average rehabilitation for most seals is from two to three months before being returned to the wild.

MARGARET CANADAS

Margaret Canadas, a long time member of the Friends of Fitzgerald Marine Life Refuge, died on January 30 at her home in Half Moon Bay.

Among her many other activities Margaret was in charge of assembling and mailing the Tides newsletter to members. Survivors include her husband, Jack; her daughters, Jean McHenry and Sallie Tscharen; a son, Tom, a sister, Chris Alves, five brothers, John, Bill, George, Dan and Joe, and five grandchildren.

Funeral services were held at the Crystal Springs Methodist Church in San Mateo. A private burial took place in Skylawn Memorial Park.
**FINANCIAL REPORT**
(January 1 thru December 31, 1993)

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**Roving Naturalists at Tidepools**

By Kumi Ishida

Some day when you are visiting the tidepools at Moss Beach you may notice people walking among the rocks wearing green jackets with a county ranger patch on the sleeve and a hermit crab logo of the Friends of Fitzgerald Marine Life Reserve stamped across the back of their jackets. These are volunteer roving naturalists who help visitors learn more about the unique inhabitants of the tidepools, as well as educating the public on the importance of protecting this natural resource.

Current roving naturalists who are sharing their knowledge of this special place are Dorothy Baughman, Jan Brown, Jim Cobbold, Willa Dallas, Elaine Eisenberg, Arpi Halebian, Mary Ellen Hill, Kelly Huber, Dona Juergens, Kumi Ishida, Kim and Robert Lawrence, Marjory McConn, Bart Oxley, Mary Ragan, and Marjory Segal. Ed Erdelyi, Myrtle Johnson, Doris Newberry, Jane and Bob Payne and Virginia Welch are roving naturalists who volunteer in the ranger station.

Our thanks to these roving naturalists who play an important role in helping to see that visitors have a safe and rewarding experience at the tidepools.

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**The President's Corner**

By Virginia Welch

(FFMLR Board President)

Congratulations to Erin Morrison on earning her Girl Scout Gold Award on December 4, the highest award in Girl Scouting. She has been working toward this award for many years. Her final requirement was to plan and do a project lasting at least four months. She chose to do an erosion control project at the Fitzgerald Marine Reserve. Starting in January, 1993, she worked with Tim Sullivan in developing a plan of what was needed, and a schedule of her work days. She transplanted wild strawberries, planted other native seedling and poppy seeds. You may have seen her with her helpers working during the spring. Congratulations and thanks, Erin!

I would like to thank Bob Breen and his staff for the great job they did on December 27 with graduates of our Junior Ranger Program. They spent the day training the graduate rangers to work with the public - particularly children - as naturalists, and to assist in the beachwatch program. They are a wonderful group of kids, and they are already out there doing a great job. Watch for them!
The beauty of the inside of an abalone shell is due - like so many of the wonderful things in life - to an intangible factor: how light is reflected. The outside of an abalone shell contains pigment, and is covered with a translucent, shellac-like covering which helps protect the shell from encrusting organisms. Our red abalones, though, often are covered with hydroids, algae, and sometimes barnacles. The inside iridescent layer of the shell contains no pigment, and yet is so colorful it is used for jewelry around the world.

All shells are made of calcium carbonate, but there are different kinds of calcium carbonate and it is the arrangement of the crystals of carbonate and the distance between their atoms, the structure of the crystals, which produces the characteristic appearance of different shells. Abalone shell is a high grade form of carbonate similar to an opal, and high magnification shows flat tablets of nacre, mother-of-pearl, which absorb and reflect light and create the effect of looking through a prism. The flat layers of this nacreous layer break up the light into its components and create the optical effect which we perceive as multi-colored iridescent beauty.

UNIQUE STRUCTURE PRODUCES PREDETERMINING COLORS

Abalone are worldwide in distribution, and many more species are found in Australia and New Zealand than along our coast. Individual species have such a distinct micro structure they can be identified from bits of nacre because the unique structure produces various predominating colors. For example, the nacreous layer of our red abalone is silvery with much blue and green.

Because our west coast abalones are the largest and best eating in the world, their numbers are dwindling due to the increased interest in them, both sport and commercial. Regardless of their numbers, they will always be held in high esteem for their beautiful shells, and to see one of them on a visit to the tidepools is like receiving a gift from nature.