Environmental Firm Selected to Research Intertidal Problems

By Bart H. Oxley

Following several months of preparation of a Master Plan, Pat Sanchez, director of Parks and Recreation for San Mateo County, recently announced the selection of Brady/LSA, a Berkeley environmental consulting firm, to develop a work project that will protect the ecosystems and maximize educational and recreational opportunities at the Fitzgerald Marine Reserve.

According to Sanchez, this firm was chosen over five surviving respondents out of 32 original requests for proposals. "Their presentation was the most impressive and practical for our purposes," he said.

Plan to Include Reserve Staff Input

The work assignment includes the Marine Reserve and Pillar Point Marsh, and directs the consulting firm to develop a plan that will ensure protection of natural resources that will be balanced with appropriate visitor access and facilities. Included in the plan development will be public participation, reserve staff input, field visits, and members of public resource management from other government agencies.

In its capacity as primary consultant, Brady/LSA will be supported by sub consultants experienced in habitat restoration, geology and geometric-technical issues, coastal and intertidal biology, and surface and groundwater hydrology. The work will be under the direction of the County Park & Recreation Department, with final approval of recommendations coming from the Board of Supervisors. Completion of the project is expected to take from eight to ten months. Total cost is estimated to be $93,000, most of it coming from the County, with a $20,000 grant from the Coastal Conservancy, and $3,000 from the Friends of Fitzgerald Marine Life Refuge who received this grant from Genentech Corp.

Recommendations Could Include Seasonal Closures

Sanchez said that Brady/LSA will be provided with problems and issues that have long plagued the tidepools where more than 130,000 people annually have unwittingly damaged the precious marine plant and animal life by their trampling, overturning of rocks, and disturbing animals in their natural habitat. He added that recommendations for protecting the intertidal could include seasonal time closures.

"The principal question," he said, "is how best can we protect this valuable resource and still assure some public access."

Visitations to the reserve over the years has grown to levels that have stressed the intertidal resources, as well as vegetation, coastal bluffs, archeological resources and facilities. According to Bob Breen, supervising naturalist at the reserve, weekend and summer levels of visitors are especially high. During these high use periods enforcement exceeds the capabilities of staff management. Parking facilities are overcrowded, and the visitors' center and restrooms are inadequate to meet both public and staff needs.

In 1992 marine biologists from the firm of Harding Lawson were retained to provide an environmental assessment with respect to the impact of visitors and users at the tidepools. The results revealed human impact having an effect on resident fauna. Additionally, there was a serious decline in the protected marine life as well as to the intertidal and sub-tidal fishery for eels and abalone. This led to an RFP (request for proposal) submitted by staff personnel and FFMLR members at the reserve that was approved by the Park and Recreation Commission.

Brady/LSA is a full service environmental design firm. As landscape architects and planners, they are active in community planning, urban design, site design, land use, and resource planning and management. The document of the Harding Lawson study, which focused primarily on the tidepools, will be a guide for the consulting firm in developing a comprehensive Master Plan.
MARINE RESERVE - RANGER Deirdre Hall, who developed and directed the Junior Ranger program this year, is shown helping young rangers, while group at right pulls a seining net onto beach.

New Junior Rangers Introduced to Intertidal Life at Marine Reserve

The outing ended with 14 happy young folks, ages 9 to 12, and their proud parents' approval on August 8 at the close of the second Junior Ranger program of 1997.

As usual the activity was a busy five days for instructors as well as the energetic youngsters. Bob Breen and ranger staff members Deirdre Hall, Scott Clark, Steve Durkin, Tim Sullivan (who appeared on the final day) and helpers Lillie Halverson and Monica Morrison kept pace with the group each day from 9:30 a.m. to noon in gorgeous weather. And the kids let them know how happy they were with the proceedings.

"This was really cool," said Elizabeth Edwards, of Half Moon Bay. "We really learned a lot and had fun doing it."

The annual program is sponsored by the Friends of Fitzgerald Marine Life Refuge, and has been so popular that an additional five-day program was added five years ago. This takes place in June of each year, and again this year was filled with applicants.

In addition to healthy outdoor fun, the group received instruction in biodiversity concepts, adaptation and natural selection, food webs and food chains, fish printing, coastal bird study and one day of beach seining. The agenda also included use of material by the National Park and Minnesota Department of Education.

One of the more exciting activities of the week was the beach seining. This takes time and coordination of the instructors because it involves dragging a net offshore to catch specimens of fish. While Tim Sullivan busily rowed a plastic kayak carrying a large net into deeper water, Scott Clark, who was with him, released the net into the water where eager young hands grabbed the tow line and pulled the net onto the sand where it deposited a lively catch of small fish. That brought screams and cheers of delight.

"Look at the sardines," one youngster exclaimed.
"I've got a shore crab," another shouted.

As they placed the bounty into large buckets of water, they sat down with their instructors and studied each species. There were smelt, crabs, perch, flat fish, rock crabs, bay shrimp and some invertebrates, sorted out and discussed. At the end of the week the children were unanimous in their favorite activity: "Beach seining," they chorused.

On the last day of activity each boy and girl received a certificate making them new members of the Junior Rangers.

Those receiving certificates were, Kelly Hodges, Vernon McFarland-Brown, Tiana Nomura-Saul, Elizabeth Edwards, Ginger Davis, Jade Riotto, Mackey Noguchi, Jessica Lilley, Linda Smutz, Erica Wincheski, Alix Bollman, Emily Heilman, Adele Close and David Close.
VISITING THE TIDEPOLLS for the first time are young people from universities around the world. They were fascinated with the tidepools, said their docent, Kumi Ishida (in green jacket.)

ATOC Cable Grounded in Hawaii; Repairs Slated for September

Scientists with the Acoustic Thermometry of Ocean Climate (ATOC) program are planning to recover, repair, and redeploy the low-frequency sound source next month which is currently lying on the seafloor north of Kauai, Hawaii.

The transmitter, which is lying on its side in approximately 760 meters (2500 feet) of water eight miles offshore of Hawaii fell to the seafloor last October as a result of equipment failure during installation. "There is no evidence that the cable was damaged by a shark or a trawler," Dan Costa, director of the Marine Mammal Research Program, in Santa Cruz, said.

The cable for ATOC was originally installed at the south end of the Marine Reserve in November, 1995, and placed in a device in 900 meters of water at Pioneer Seamount, over an ancient and extinct volcano 50 miles off the California coast. The sound transmission through the cable is designed to learn whether increases in the rate of global warming can be detected by using underwater sound waves to measure long term changes in ocean temperature. Noise emitters have been placed more than 3000 feet under the Pacific waters, linked to the power cable at Pillar Point.

The sound source in Hawaii, with the acoustic source on Pioneer Seamount, will transmit sound to receivers distributed across the Pacific Ocean. Acoustic travel times from the sources to the receivers will be used to study ocean variability and climate change. The transmission will also be used to assess the effects of low-frequency sound on marine mammals. This work is proceeding under a permit issued by the National Marine Fisheries Service.

Start-up of ATOC was delayed in 1994 when some biologists and environmentalist groups expressed concern that ATOC sound could harm - or even deafen - whales and other marine mammals with sensitive hearing.

THE GULF OF THE FARALLONES National Marine Sanctuary (GFNMS) will be hosting its Fourth Biennial Workshop on Current Research in the Gulf of the Farallones on Wednesday, October 1, from 8 a.m. to 7 p.m. at The Golden Gate Club, in the Presidio, San Francisco. Interested personnel should call Jan Roleto or Amber Mace at (415) 561-6622 for more information.

FFMLR RECEIVES GRANTS. Two new grants were received by the Friends of Fitzgerald Marine Life Refuge this month. A $1500 donation was received from NOAA (National Oceanic and Atmospheric Administration) to support the third class in marine biology at Half Moon Bay High School, and a $1,000 grant has been donated by the Alan Balsam Family for a bird study at Pillar Point.

KUMI JOINS COAST WALKERS. Kumi Ishida, tidepool docent and FFMLR board member, joined the Coast Walkers on a recent walking tour along the Northern California beaches. The Coast walkers are a group of concerned environmentalists regarding the protection of our shores and beaches. Kumi walked the beaches with the group in San Francisco County and spent three nights at Julia Pfeiffer State Park. A highlight for her last year with the same group was a boat trip to Angel Island and a night spent in the army barracks in the West Garrison.

DOCENT SCHEDULER NEEDED. Kelly Huber, who has performed so well for the last three years as tidepool scheduler, has resigned from the job due to family and school responsibilities. At the present time the few summer schedules are being handled by Coyote Point. "We need somebody who has had docent experience at the tidepools," Bob Breen said. Interested persons should call the reserve office at 728-3584. Kelly will continue to schedule Half Moon Bay High School docents at the tidepools.

COMPLETING A CHALLENGE. Debbie Rogers, docent and feature writer for the Tides, recently climbed up Half Dome in Yosemite National Park. She hiked the 20 miles round trip in one day. "It was a challenge," she said, "and I slept very good that night."

FISH & GAME authorities arrested two poachers at Pillar Point Headlands for the taking of nine illegal abalone. Five of the abalone (four black and one red) were placed in the ranger aquarium at the reserve until they could be placed back on the reefs.

TIM SULLIVAN, a park ranger for several years at Moss Beach, recently resigned his position with the county to pursue other interests. At the present time he is managing property in Pescadero where he lives. "I plan to send a letter to all my friends through the "Tides" in the near future," he said.
This Deceiving Poacher Conceals Its Presence in Prey’s Habitat

By Bob Breen (Supervising Naturalist)

Predators often play a dramatic role in intertidal communities. Their presence is often not visually apparent, since many are small or have taken on the same coloration and appearance as their prey.

One such predator is the shag rug nudibranch, *Aeolidia papillosa*, so called because of its dense, shaggy covering of gray or brown cerata, with its long tentacle-like projections that give the appearance of a sea anemone. Nestled among the sea anemones it looks like just another one of them. Most are one to three inches long; a larger one may even resemble a mouse in amongst the seaweed.

The major prey of this nudibranch are sea anemones. In different areas different species of anemones are preferred. At Moss Beach it shows a preference for the aggregated sea anemone. As the sea slug digests more and more anemones it begins to take on the color of its prey. *Aeolidia* is greenish-gray at the reserve, elsewhere they may be ruddy-red in color after feeding upon the proliferating anemone, *Epiactis*.

*Aeolidia* feeds on anemones by crawling up onto the anemone’s column, at the same time coating itself with mucous from the anemone. In addition to consuming the anemone column it also feeds upon sea anemone tentacles that are loaded with stinging cells called nematocytes. To protect itself from stings, the slug’s buccal cavity and esophagus is lined with a calcium-hardened substance known as chitin. In the gut the undigested stinging cells are passed to the tips of the cerata. As in all nudibranchs of this type, the nematocytes became stored in special compartments called cnidosacs that are located at the tip of each cerata. These are exploded into the mouth of a predator if the nudibranch is attacked. In many nudibranchs, these areas are identified by white tipped cerata.

Discharge of the stinging tubule is driven by the stinging cell (actually a capsule) that has a high, very internal hydrostatic pressure of 150 atmospheres. When a trigger-like device, located at the tip of the cell, is touched, this causes the evisceration of the internally folded tubule and enables it to penetrate the flesh of a potential prey or opponent. This is reminiscent of the penetration of pathogenic fungi into leaves, using enormous turgor pressure.

In sea anemone and jelly fish stinging cells, high speed photography has revealed that the tubule penetrating event occurs within 3 milliseconds at acceleration up to 40,000 g’s. Discharge of cnidarian stinging cells is one of the fastest events in biology.

The tubules themselves are hollow and barbed and contain venom protein crystals, making the bulb and tubule a tiny syringe for toxin delivery. Mechanically, the nematocyst is not strictly a syringe apparatus, but rather an ammunition capsule that functions as a carrying case for propelling the toxin loaded tubule, which serves as the shell or warhead of the system.

There are more than 40 species of nudibranchs along the Central California coast that possess this characteristic, and as a group they are known as the *Aeolididae*. The stinger bearing cerata can be club-shaped, branched, look like a bunch of grapes, or simply be unadorned tentacles. What is remarkable is that this is the only group in the animal kingdom that co-opts the defenses of the sea anemones as part of its own defense.

THE SHAG RUG NUDIBRANCH (above) conceals itself in an anemone colony where it finds its prey. Above, the stinger cells (B) from the aggregated sea anemone (A) are ingested by the nudibranch. The undigested stinging cells of the anemone are passed up to the tentacle-like cerata of the nudibranch where they are ready to sting any unsuspecting predator, such as a fish, with a penetrating acceleration of 40,000 g’s. See story at left.

Seashore Docent Class Scheduled For September 4 at Coyote Point

If you would enjoy the challenge of teaching marine life to young people at the Moss Beach tidepools, an opportunity awaits you on September 4. This is the date for the 25th Annual Seashore Docent training class that will be offered again at Coyote Point Museum.

The 15-week course is scheduled for weekly meetings of three hours duration with Bob Breen, a marine biologist at the Fitzgerald Marine Reserve, who will teach the class.

The classroom course will include studies of local marine organisms and natural history as applied to biology. Students will be introduced to common marine life that lives in the tidepools as well as learning teaching strategies which will include practice in leading groups. The principles taught in class will also apply to land organisms, Breen explained. "In addition," he said, "teaching and interpreting the intertidal life to children in an outdoor environment is a highly motivating experience to most volunteers."

On completion of the course the students will join a corps of active docents conducting tours for school children. At the present time there are about 90.

Interested parties should call the reserve at 728-3584. There is a cost of $35 for each volunteer student. This cost covers handout material in class.
Blue Whale Sightings at Farallones May be Due to El Nino Warming

The early arrival of blue whales at the Farallone Islands has created excitement among marine biologists and mammal observers. Normally these behemoths don't make their appearance around the islands until late summer. However, scientists believe that El Nino - pushing warm currents of water northward - may be the reason for the early arrival. The warm water currents inhibit upwelling. One report indicates there has been particularly strong upwelling around the Farallones and that has attracted small shrimp-like crustaceans, called krill, which are a popular food with whales and larger fish that follow their food source.

"This certainly explains the presence of the whales' early arrival," a biologist with Cascadia Research, an organization in Olympia, Wash., said. Other whales spotted by observers were gray whales and several humpbacks.

But it is the blue whale that has been getting the attention. This leviathan can attain the incredible length of 100 feet, a girth of 45 feet, and a weight of 150 tons, or 300,000 pounds. According to Blue Whale, a book by Joseph Cook and William Wismer, Dodd, Mead & Company, N.Y., the largest land animal today - the elephant - with a size potential of up to ten tons would be extremely small alongside a behemoth such as the blue whale. In fact, an elephant could stand on the floor of a blue whale's open mouth without even touching its upper jawbone.

The blue whale is the largest animal known to have inhabited our planet in water, air, or land. Other great animals such as the dinosaurs, unable to adapt to a changing environment, have long since vanished into oblivion. The enormous blue whale, with its great bulk, and other big whales, have successfully adapted to their place in the world.

Blue whales migrate between Central America and Northern California. They have their calves off Costa Rica and Baja in the winter, and spend the summer and fall in Northern California.

Almost decimated by commercial fishing, blue whales were estimated to number more than 200,000 in 1900, but today only about 10,000 survive worldwide. The concern for the survival of this magnificent animal was expressed by Steve Leatherwood of the Whale Watch Program, Naval Undersea Center, in San Diego, in his introduction to the book, Blue Whale:

"I found them unexpectedly as I walked onto the deck one morning in the silver-gray dawn, the morning still wet on the canvas of the Baja sky. Two big ones, they surfaced suddenly, with a whistling rush of air, rolled for an instant at the surface, and then disappeared in a swirl of rings upon the glassy sea.

"I have seen other blue whales since, and each one has thrilled me in the same way. And it saddens me to admit the possibility, however remote, that man could drive so magnificent a creature from the face of the earth."

New Pamphlet Distributed at Reserve

A new pamphlet - Meet the Friends of Fitzgerald Marine Life Refuge - is now available for visitors to the tidepools. Prepared by Bob Wolfe, Membership Secretary for the Friends, the handy, folded package tells the story of the Friends of Fitzgerald Marine Life Refuge from its beginning in 1987 to its present development and the numerous programs it sponsors today. It also includes a map of the tidepools and an application blank for new members. Bob also developed the application blank and special containers for the "Tides" newsletter. Pick one up at your next visit to the Marine Reserve.
Geological Survey May Determine Earthquake History at Seal Cove

By Gary Simpson

Earlier this month geologists from William Lettis & Associates began a new phase of earthquake hazard studies of the Seal Cove fault at the Marine Reserve. The purpose of the study is to determine the earthquake history of the fault.

Previous study of the fault in the cypress grove near the southern park entrance revealed valuable information on the timing of the two most recent earthquakes.

Working closely with archaeologists, who analyzed the native Californian campsite in detail, the team of geologists identified two large earthquakes that had occurred in the past 1300 years. The most recent earthquake had ruptured through a buried cooking hearth that radiocarbon analysis determined could have been as old as A.D. 1270. Therefore, the most recent earthquake occurred within the past 700 years.

Analysis of the second most recent earthquake suggested it occurred sometime after A.D. 690, and was associated with right-lateral displacement on the order of three meters. Comparison of this amount of displacement with other worldwide quakes suggest the second most recently event was probably in excess of magnitude 7. The results of the first phase of geological investigations suggests that although the Seal Cove fault is seismically quiet, it is building stress and is capable of generating a large earthquake.

The second phase of research began recently near the edge of the San Vicente Creek terrace, further to the northwest along the fault within the reserve. The purpose of this trench is to extend the earthquake record beyond the two most recent earthquakes, to develop an idea of the repeat time of large earthquakes. An 85-foot long trench was dug from the east facing slope near the park boundary onto the alluvial terrace of San Vicente Creek. Geologists from Lettis & Associates are currently evaluating the strata within the trench to determine whether the necessary relations exist to interpret the sequence of past earthquakes. This work will last two to three weeks, then the trench will be filled in and the area will be re-vegetated and returned to its original condition.

The scientists on this job welcome your questions if you would like to visit the study site.

(Gary Simpson is the project geologist for Wm. Lettis Co. He has earned both his bachelors and masters degrees in geology from Humboldt State University. He is familiar with a wide range of subsurface exploration, and has had extensive experience in earthquake activity.)

Third Class in Intertidal Course At HMB High School September 15

A new and revised curriculum in marine biology will greet a third class of 24 students at Half Moon Bay High School on September 15.

According to Bob Breen, who will conduct the class with Ellen Gartside, a former park ranger at Fitzgerald Marine Reserve and now teaching marine biology at Skyline College, this will be a more updated course with greater emphasis on marine biology, including a new textbook and assigned homework projects.

The course, sponsored by the FFMLR, has received a grant of $2500 from GFNMS (Gulf of Farallones National Marine Sanctuary.) Grant monies will be used for teaching, supplies, and preparing students to qualify as docents.

Half Moon Bay High School is the first high school in the country to implement a curriculum in intertidal training for students. The subject and course content for all three classes at the school has been developed by Breen and Ellen Gartside. The students will join other docents at the tidepools after their graduation on January 19, 1998.

Referring to previous classes in this subject, Breen said, "The experience with these kids has been gratifying to both Ellen and myself. They have performed well at the tidepools, and relate positively to the children they lead." And they do all this, he added, in addition to their regular school studies.


Docent Enrichment Classes Planned

Special talks and field trips for docents that describe the geology of the Marine Reserve are being planned to begin in September. Tim Hall, a geologist and consultant, will lead the one day discussion groups that will be held at the reserve. If interested, call the ranger station at 728-3584 for more information.
Elaine Eisenberg, an 11-year docent and tidepool photographer whose photographs of the Marine Reserve have been displayed at both the San Mateo City Hall and San Mateo City Library, has focused her hobby on marine life.

Her photos and postcards of the Marine Reserve appear in the gift shops at Coyote Point, as well as the kiosk at the reserve. Many of her pictures have been featured in the "Tides," and some of her post cards displaying animal life at the Marine Reserve are on sale at the Harbor Seal store in Half Moon Bay.

Elaine became interested in photography at about the same time she became a docent. "Photography became a challenge to me, just as learning to be a tidepool docent did," she said. She did not receive special training for her hobby. "I attended a class or two when I purchased my camera and equipment, but mostly it's experience and practice."

She wanted to express the marine life she loved and had become familiar with through her docent training. Photography seemed to be the proper medium to achieve this. "It was like going into another world," she recalls. "There was so much detail to capture."

She has won prizes for her photo work at the San Mateo County Fair, including a second place this year for a picture of cliff rock at the Marine Reserve. Some of her work has been used at the Coyote Point Museum, as well as in classrooms for children studying the intertidal.

In addition to her photography and docent work, Elaine is an avid reader. She lives with her husband, Howard, in San Mateo. The couple have four sons and five grandchildren.

THE PRESIDENT'S CORNER

By Virginia Welch
(FFMLR Board Chairman)

Our thanks to the Gulf of the Farallones Marine Sanctuary and Jan Roletto, scientific coordinator, for sponsoring our high school biology class again this fall. This program has expanded the interest of many students in marine biology and encouraged students to go on to college. Thank you, Jan, and the Gulf of the Farallones.

Our new postcards are at the Marine Reserve and feature three of Elaine Eisenberg's photographs. Thank you Elaine for making them available to us. They make a great postcard.

The Junior Ranger program has again been a great success. Our thanks to Deirdre, Scott and Steve and all those who helped make it possible.

GARY BALSAM, left, is shown presenting a check for $1000 to Bob Breen, representing the FFMLR at the Marine Reserve. The gift is in the name of Alan Balsam, an environmentalist, "who enjoyed his life and wanted to leave something to help others," said brother Gary. The gift was presented for a bird study at Pillar Point Marsh.

Become a member of the FRIENDS OF FITZGERALD MARINE LIFE REFUGE and help to:
  - Protect and preserve a remarkable natural area;
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Fill out this slip and mail with your check made out to FFMLR to:
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Membership Secretary, 1364 Halibut Street, Foster City, CA 94404-1950
One of the prettiest sights at the Marine Reserve is found by peeking under rocky overhangs at low tide. From a crouched or prone position one can see the 'sea gardens' that are hidden, tucked away from direct sunlight, and this is where the orange cup corals are found. Midst the colorful drippings and droopings of various anemones, sponges, hydroids and algae live these small (a large one is one-half centimeter in diameter) solitary corals, and their brightness is the high spot of color in the otherwise generally muted color scheme. These corals are the reserve’s only coral inhabitant because most corals need the clear, warm waters of the tropics; and the cold water of this coast, made even colder by upwelling, prohibits the existence of reef-building corals.

The solitary cup corals are coelenterates and live very much like giant green anemones, but their hard, lime, circular skeletons are attached to rock much like a barnacle. They feed mostly at night, devouring diatoms, small larvae of crustacea, and generally anything small enough to be stung and drawn into its mouth disc which rises up to meet the morsel. Just like the green anemone, their polyps retract when touched, and they are highly sensitive to the presence of living material that might serve as food.

Cup corals, *Balanophyllia elegans*, multiply by budding new individuals which separate from the parent and become independent individuals. This writer has seen "brooding anemones" with the little offspring sprinkled around the outer edges of the 'skirt' of the animal but has yet to see a cup coral with young attached. Perhaps this find is so difficult because cup corals are so small and are tucked under and away from edges making it hard to get close enough to see any buds which must be very tiny. It seems there are always more ‘finds’ to be on the lookout for, and those discoveries are a great part of the allure of visiting the tidepools.

**Volunteers Needed for Harbor Seal Training**

A new and challenging program for volunteers who are interested in participating in a harbor seal monitoring program is being planned for this fall.

"We are looking for people who are interested in a four to five week training class to be set up at the Montara Lighthouse,” Bob Breen said. Training will include learning how to observe and identify a harbor seal’s age, sex, physical condition and behavior, he added. At completion of the program, volunteers will be assigned to locations in San Mateo County where harbor seals gather.

Interested personnel should call 728-3584 at the Marine Reserve.