EARTY MORNING TIDEPOOL WALK JUNE 4

If you're an early riser and enjoy the crispness of a morning on the beach then you will want to join Naturalist Bob Breen for an early morning tidepool walk on Sunday, June 4. Although this is an early start for tidepooling, this day will be the lowest tide of the year, something in itself that should attract consummate tidepool walkers. Add to this the expertise of Bob Breen and you will be in for a very special treat. A nice way to start a day.

Cost for the tidepool tour is $2 for FFMLR members, and $3 for non-members.

Visiting a Coastal Lagoon

FFMLR Members, Guests Explore Marine Habitat at Pescadero

On May 6, eleven members and guests of Friends of Fitzgerald Marine Reserve joined Dr. Jerry Smith of San Jose State University for an investigation of the estuary/lagoon habitat at the mouth of Pescadero Creek. Participants got to “seine” the estuary for fish with a 100 foot-long net, sample for invertebrates with a bottom sled, and measure important water chemistry data with oxygen, temperature and salinity meters. The trip was an opportunity to learn about one of the most valuable but neglected coastal habitats - the coastal lagoon.

Reposited Sand Creates Dams, Forming Lagoons

In spring and summer milder ocean waves redeposit sands on central California's beaches. Not only are beaches widened by the sand deposits, but the streams which cross those beaches are dammed to create summer lagoons. These lagoons start out the summer as a mixture of salt and freshwater, but if streamflows remain strong the lagoons convert to freshwater. Whether freshwater or salt water, these summer ponds provide valuable habitats. However, the values of many coastal lagoons are damaged by stream channelization or breaching of the sandbars for flood control. The lagoons, being at the downstream end of the watershed are also impacted by all of the upstream landuses: water diversion, erosion and sedimentation, and toxic urban and agricultural runoff.

Since 1984, Dr. Smith has studied San Gregorio, Pescadero and Waddell Creek lagoons for the California Department of Parks and Recreation. His studies have (Please turn to page 3)
Multiple Activities for Youngsters

Two-Week Junior Ranger Outing Set for July 3-14 at Marine Reserve

The Friends of the Fitzgerald Marine Life Refuge will again be offering this summer a Junior Ranger program for youngsters ages 9 to 12 for two weeks at the Marine Reserve, beginning July 3, from 9:00 a.m. to 12:00 noon.

Junior Ranger activities will include orienteering, bird watching, fish printing, as well as tidepooling. Most of this course will be concept-based instruction related to the students' experiences in the intertidal, with major emphasis placed on such biological concepts as adaptation and natural selection, food webs, and a survey of the major animal groups, or phyla. A variety of teaching techniques will be used including hands-on field activities, work sheets designed for elementary school life science as well as tidepool discovery walks.

The fee for this eighteen hour course is $12.00 for FFMLR members, and $18.00 for non-members.

Space is limited. The dates for the course are:

- July 3 - Monday
- July 5 - Wednesday
- July 7 - Friday
- July 10 - Monday
- July 12 - Wednesday
- July 14 - Friday

Reservations and sign ups will be taken by mail or telephone. Please include or send a check payable to the Friends of Fitzgerald Marine Life Refuge, P.O. Box 451, Moss Beach, CA 94038. (415) 728-3584.

It is expected that reservations for this course will fill rapidly due to the popularity of last year's program.

(please turn to page 7)
SEINING (Continued from page 1)

shown that the lagoons are heavily utilized as rearing habitats for some juvenile salt water fishes, such as staghorn sculpin ("bullheads"), starry flounder, and shiner surf perch. He has also found that if water quality conditions are suitable, the lagoons provide critical feeding and rearing habitat for steelhead trout. In fact, these small seasonal ponds may be the most important habitat in the entire watershed for maintaining our dwindling runs of steelhead.

(Dr. Jerry Smith, a Professor of Biology at San Jose State University, wrote the above article for the Tides newsletter)

Early announcement for 1989 Tidepool Docent Training was made this month in preparation for Fall classes. Each year a number of new volunteers receive training in intertidal interpretation and group tour direction at the Coyote Point Museum. This year, people interested in learning more about the life that occurs along our seashores, and how to interpret this knowledge to others, will have the opportunity by attending classes in mid-September. The thirteen-week course will include lecture and laboratory sessions with five afternoon field trips scheduled at the Fitzgerald Marine Reserve.

Tidepool docents will be exploring such subjects as intertidal habitats, food chains, invertebrate animal phyla and their adaptations to the intertidal. The weekly sessions are conducted from 9 a.m. to 12 noon.

Following the training, docents will be expected to conduct small groups of visiting school children on tidepool tours at the Marine Reserve.

Training for museum exhibit docents, a separate program from the tidepool docent class, will also begin in September. Further information for both classes can be obtained from Lori Mann at the Coyote Point Museum, 342-7755.

BUSY DOCENTS AND EXCITED CHILDREN are shown together in the above photos. These pictures were taken on a chilly morning before exploring the tidepools. At left is docent Leah Cohen, displaying a seaweed discovery to her group of interested children. Center photo catches Ed Krdely with a starfish and some fascinated observers, while at right, docent guide Dona Juergens describes the intertidal rock formation to her group of youngsters.
Tidepool Scampers

Intertidal Sculpin Readily Adapts to Rocky Confines of Tidepools

By Bob Breen, Supervising Naturalist

"It's a tadpole! No, it's a catfish!" These are all exclamations heard each spring as hundreds of school children on classroom field trips discover the small (1 to 5 inches long) fish living in the tidepools.

There are 42 species of these generally intertidal or inshore fishes called sculpins. The ones that we observe along the central California coast are bottom dwellers. With their large heads and tapering bodies, there is no need for a streamlined body in the confines of the rocky intertidal. Instead, they are adapted with an all-purpose body with large pectoral fins that are capable of fast, darting movements.

Pectoral Fins Have Multiple Use in Rocky Areas

Frequenting rocky areas, they are found all along the western coast of North America. The outsized pectoral fins are not only designed for rapid movements, but can be used to hold the fish's body and gills above the sandy bottom. Some species, such as the grunt sculpin, have been observed to use their pectoral fins as crawling appendages, much like the mudskipper of Southeast Asia and nearby islands.

Although most are found in the rocky intertidal, one sculpin is found as deep as 6,500 feet (the flabby sculpin) and others are found in coastal streams, with one species found as far inland as the Pit River in Modoc county.

Sculpins lay eggs that are sticky egg masses, stuck to the bottoms of rocks. They are predators, with our local varieties feeding upon shrimp, crabs and the larvae of crustaceans and small fishes.

Large Sculpin Feed on Crabs, Abalone, Octopus

The largest sculpin is the cabezon, measuring up to 30 inches long. They migrate in and out with the tide feeding upon red rock crabs up to four inches across by gulping them down whole and then digesting the crab, carapace and all. In addition, cabezon feed upon small abalone and the octopus. During the abalone planting experiment in the summer of 1986, divers noticed that the cabezon exhibited a great deal of interest in the planting boxes which would contain up to 1,000 20 millimeter abalone. Divers noted that the fish would swim near to the boxes for to half an hour at a time.

Tidepool sculpins are a varied group with the ability to change colors to mimic their surroundings. Therefore, it may be difficult to see them at first. However, after careful examination, each pool should turn up at least one of the little fish. Some will be mottled, others will have broad stripes, and even some with kelly green colors or rose red that camouflage them against the background colors of the associated plant life.

WAVE ACTION CAUSED BY WIND FRICTION

Waves are swells of water that eventually end their journey on some beach where they become breakers. Waves have a crest and a trough. The crest is the highest part, the trough is the lowest part, and the vertical distance between the crest and the trough is the wave height.

The waves you commonly see at the seashore are wind waves. They are caused by the friction of the wind blowing across the water. The size of wind waves depends on three factors: the distance over which

( Please turn to page 5)
The wind blows; the strength of the wind; and the length of time the wind blows. If all three factors are large, the waves are large.

The most spectacular kind of wave is the seismic wave, commonly called a tidal wave. Seismic waves are caused by earthquakes, usually underwater but sometimes on land. In fact, the word seismic means earthquake in Greek. The scientific name for a seismic wave is tsunami (pronounced soo-na'-mee), the Japanese word for seismic wave.

People on a ship at sea would hardly notice tsunami because the crest and the trough are so far apart. But the situation alters radically in shallower water where the waves may become breakers as high as 100 feet. The 1964 Good Friday earthquake in Alaska produced a tsunami that destroyed large sections of Crescent City in northern California. Even marinas inside San Francisco Bay were badly damaged by the tsunami caused by that earthquake.

Keep a Lookout for This Bird
Oystercatcher’s Bill a Powerful Tool to Stab and Hammer Prey

By Maryann Danielson, FFHLR Program Chairman

This large distinctive looking shorebird is a year around resident of our coastline from Alaska to Baja California. Its blackish plumage is highlighted by a bright red bill, a yellowish eye surrounded by a red eye ring, and pinkish legs and feet. Black Oystercatchers prefer the rocky offshore rocks and reef and forage in the intertidal area exposed at low tide.

As the name suggests, these birds (6 species, worldwide) feed primarily on oysters and other invertebrates. The Black Oystercatcher prefers mussels but will also dine on limpets, chitons, crabs and worms. How do they open the mussels or pry the limpets from the rocks, often in less than thirty seconds? The answer is the form and shape of the bill, which is their foraging tool. Oystercatchers have long, stout bills, laterally compressed and tapering near the end to a chisel-like point. In addition it is internally reinforced so that it doesn’t bend easily. But to be successful, they must learn to use their bill as a tool. Studies on the Eurasian Oystercatcher have shown that Oystercatchers use one of two techniques -- stabbing or hammering.

When dining on mussels, the Oystercatcher either hammers the shell to break it or if the two valves are slightly ajar, the bird quickly inserts its bill between the valves and by biting or stabbing, cuts the adductor muscle which held the two valves together. Then the soft parts are removed and eaten. Limpets are invertebrates covered by a single concave shell and attached to the rocks with a strong muscular foot. Small limpets can be dislodged with a single, sideways stab but the larger limpets require added strategy.

(Please turn to page 6)
Looks Like a Clump of Algae
Camouflage and Low Profile Hides Mossy Chiton from Beachgoers

Mary K. Wicksten

It's easy to ignore a m OSSY CHITON (proounced KITE-on). The animal is low in profile, camouflaged, and usually immobile during daylight. Many beach-goers walk past this common species without noticing it at all.

The mossy chiton (Mopalia muscosa) gets its name from the shaggy edge of its body. This edge, called the girdle, contains sensory cells and secretes the series of eight plates that constitute the shell. The girdle can produce a tight grip against the rocks at low tide, preventing air currents from drying the gills and retaining moisture against the animal's body. At a distance, the mossy chiton looks much like a clump of low-growing algae, which probably helps to conceal the chiton from gulls which eat chitons.

CHITONS MOST ACTIVE AT NIGHT, HIGH TIDE

Chitons are mollusks, related to clams, snails and slugs. They are herbivores, using a series of teeth (called a radula) to scrape small algae off the rocks. They are most active at high tide and at night, which is why beach-goers rarely see them moving. During low tides, they tend to take shelter in a hold or crack.

The name "chiton" comes from Latin, and originally meant an army breastplate. The arrangement of the overlapping plates suggested a breastplate to shell collectors of the past. The plates differ in shape from front to back, as one can see in a dead specimen. This arrangement can be easy to see because gulls, crabs and other predators prefer to eat the foot and internal organs of a chiton, leaving the plates attached to the touch girdle.

ANIMAL DIES WHEN WASHED ASHORE

At times, mossy chitons are cast ashore alive or newly dead on the beach. Frequently, the animals become dislodged from the rocks because heavy seaweeds attach to the plates. The drag from the seaweeds over time can cause the chiton's foot to lose its grip on the rocks. Once detached, the chiton will be tumbled by the surf and cast ashore. Unable to crawl on sand, the chiton is doomed.

The mossy chiton can be seen in upper to middle levels of the rocky intertidal zone. Other species, including the giant chiton, can be observed at low tide.

(English)

BLACK OYSTERCATCHER

(CONTINUED FROM PAGE 5)

Holes must be pecked in the shell and the bill inserted in the hole to pry the limpet from the rock. Look for limpet shells with a chipped edge. This is evidence of Oystercatcher foraging activity. To eat a large crab, Oystercatchers flip the crab on its back and kill it with a stab to the nervous system center. Hammering will then break the exoskeleton and permit access to the flavorful crab meat.

YOUNG BIRDS LEARN TECHNIQUE FROM PARENTS

Young Oystercatchers learn the techniques from their parents who feed them beyond the fledgling stage. The family group may stay together for up to a year, during which time the young birds hone their skills as stabbers or hammerers.

Next time you are along the rocky coastline, watch for the Black Oystercatcher. Admire its color and then watch how it works to get its food.
NEW VOLUNTEER PROGRAM TENDS FFMLR SERVICES

The Friends of Fitzgerald Marine Life Refuge has announced plans to introduce a Roving Interpreter program at the Reserve.

Referred to as "Roving Interpreters," the program calls for volunteers (experienced docents) who will assist the San Mateo County Parks Division in maintaining a safe and enjoyable usage of the intertidal areas of the park. The scope of the volunteer group will be to provide information to visitors, and to observe, report to, and assist park staff.

Roving Interpreters will be stationed at strategic locations where there are points of interest. They will also roam the reef at low tide, giving interpretive explanations to interested persons.

Volunteers will be asked to look for and report on any hazardous or destructive activities that would not only endanger other visitors, but would cause damage or deterioration to the marine resources at the Reserve.

It is planned to give volun-

FFMLR TEAM MEMBERS APPLAUDED FOR ACCOMPLISHMENTS IN 1988

By Virginia Welch
(Board President)

As we come to the end of our second year I would like to thank some of the people who have done so much to develop our Friends group. Program chairman, Maryann Danielson, and members of her committee - Sue Kocienski, Jane Payne, Dr. Diane Conrado and Janet Urioste. They have provided interesting and diverse programs for us to enjoy. We thank you and look forward to the coming year's programs.

We would also like to thank Bart Oxley, the editor of Between The Tides. He has done a tremendous job. A special thanks to Myrtle Johnson also for typing each issue, and to Margaret Canadas for addressing and mailing them.

Then there is Bob Breen, our membership chairman, contributor of scientific articles for Between The Tides and general support in all the things we plan and do. How can we ever thank you enough?

Pat Dal Porto, our secretary-treasurer, has done a huge job keeping all our (Please turn to page 8)
MOSS BEACH TIDE TABLES

June, 1989

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* A TIDAL MILE IN 
VISITORS WILL BE GIVEN 
AT LOW TIDE ONLY 
DUE TO THE PRECIPITATION.

July, 1989

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BOARD NEWS (Continued from page 7)

books. Pat is relinquishing the treasurer’s post to our newest board member, Walter Burnell, but will continue as secretary. We welcome Walter to the Board of Directors of FFMLR. Recently retired from C&H Sugar, he comes to us with a wealth of experience and expertise.

MEMBERSHIP REPORT: Renewals of Sponsorship are Dale and Sue Kocienski, Floyd and Virginia Welch, and the Half Moon Bay Nursery. New Sponsors are Bob and Jane Payne, and Bart and Minitee Oxley. Life Members are Randy and Sue Dardenelle.

FRIENDS OF FITZGERALD MARINE LIFE RESERVE
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