BETWEEN the TIDES

Friends of Fitzgerald Marine Reserve

December 2012

Dardanelle Trail is Upgraded to Create a Portion of the California Coastal Trail

by Jenna Kinghorn

The California Coastal Trail (CCT) now officially runs through Fitzgerald Marine Reserve (FMR). The CCT is a network of trails intended to stretch along California's 1200 miles of coast. The paths are designed to be accessible for all members of the public, including hikers, bikers, wheelchair riders, and equestrians. Planning for the CCT began in 1972. In 2001 the state legislature refocused on completing the trail, and the CCT's web page (http://www.californiacoastaltrail.info/cms/pages/main/index.html) indicates the network of trails is now more than half complete.

The paths are designed to be accessible for all members of the public, including hikers, bikers, wheelchair riders, and equestrians.… the network of trails is now more than half complete

In a 2003 report to the state legislature the California Coastal Commission (CCC) listed as one of its goals to "work with San Mateo County and private landowners to design and construct a trail on the landward portion of the Fitzgerald Marine Reserve." It took several years to break ground, in part because the planned "improvements" met with objections raised by concerned citizens. These objections included:

• The proposed 14-foot width far exceeded the 3-to-4-foot width required for Americans with Disabilities Act (ADA) accessibility.

• The planned asphalt paving, which would drain directly into San Vicente Creek and thence into the ocean, had been recently recognized as a source of Polycyclic Aromatic Hydrocarbon (PAH), a contaminant harmful to mammals, birds, fish, invertebrates, and plants. ADA accessibility calls for a firm surface, but does not require paving. Furthermore, asphalt paving seemed to contradict the Master Plan for FMR, which dictates that all paths in FMR have a pervious surface that allows rainwater to percolate through.

• The installation of a 60-foot-long, 12-foot-wide bridge over tiny San Vicente Creek, which has for years been spanned by a bridge about a third that size, was contentious.

Public comments and a petition filed with the County by concerned citizens resulted in some changes. The trail width was reduced to eight feet, which accommodates equestrians and pedestrians on separate sides. Instead of asphalt the

continued on page 3

The new bridge will span from the concrete structure in the foreground to the concrete footing on the far side of the creek (near photo's center). The small bridge on the right will be removed.

Friends of Fitzgerald Marine Reserve

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Our Mission:

To inspire the preservation of our unique intertidal environment through education and the support of research.

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California Coastal Trail

New route of the California Coastal Trail through Fitzgerald Marine Reserve.
Geographic map: Google; map detail: Martie Sautter

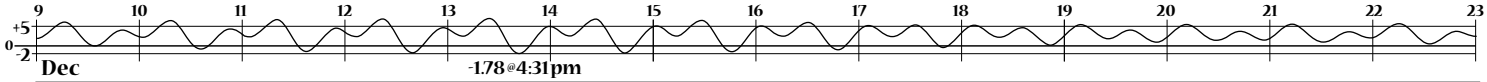
To see the spectacular color of the creature photos in this newsletter, be sure to check it out on our website: http://fitzgeraldreserve.org/resources

The graph displayed across the page bottoms shows tides for 12/11/12 to 04/27/13. Where the date appears is midnight. The reefs are accessible for exploring during low tides—at least 0 or below. See: http://fitzgeraldreserve.org/resources and click on "Tides" for a more detailed tide chart.

Good winter tides are in the afternoon, changing to morning tides by late March. There are almost equally low tides several days before and several days after the noted low tide dates.

The lowest tides this period are:

-1.78	12/13	4:31 pm
-.53	12/28	4:46 pm
-1.45	1/11	4:17 pm
-.28	1/26	4:22 pm
-.92	2/8	3:15 pm
-.33	3/8	2:08 pm
-.54	3/30	7:30 am
-.27	4/12	6:39 am
-1.38	4/27	6:26 am



California Coastal Trail *from page 1*

surface will be rain-permeable gravel on a geotextile fabric underlayment. The County stuck with its planned 60-by-12 foot bridge, a fiberglass structure which will adjoin the sidewalk along North Lake Street and span from there across the San Vicente Creek. The bridge, supported by 12-foot-wide buttresses, is designed to withstand a 100-year flood, and is being placed in a way that avoids sensitive cultural and natural resources on the creek banks.

The bridge, supported by 12-foot-wide buttresses, is designed to withstand a 100-year flood, and is being placed in a way that avoids sensitive cultural and natural resources on the creek banks.

Construction finally began in September 2011 to widen and regrade the existing Dardanelle Trail footpath. This 1500-foot-long section of the CCT runs from the corner of California Street and North Lake Street, where the FMR parking lot and ranger station are located, over San Vicente Creek, and along the edge of the reserve property to Cypress Avenue. The project widens, regrades, and surfaces what was a narrow pedestrian-only dirt path winding through trees and undergrowth along the inland boundary of the reserve grounds.

The trail will be marked by CCT signs and has been situated to avoid an ancient midden and historical archaeological sites. There will be a bench, information kiosk, and trash receptacles near the Cypress Street end of the trail segment. A handful of trees that were cut down will be replaced by new plantings in another part of the reserve.

The CCC provided $250,000 for the project through the Coastal Conservancy, and the County received a little over $500,000 from the California Department of Parks and Recreation. The work was put out to bid and awarded to Half Moon Bay Grading and Paving. The original schedule for the project called for completion on November 15, 2012, but the County now hopes to have the work complete by December 1, 2012.

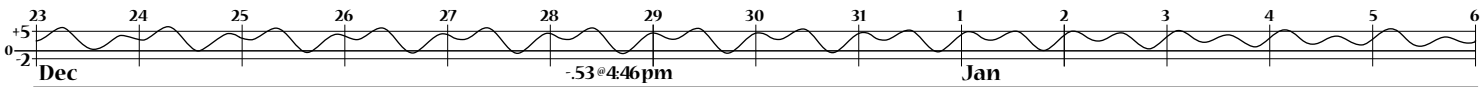
The County is now working on finalizing plans for revamping the parking lot. On November 14 neighbors and other members of the public gathered at the reserve to present their comments during a San Mateo County Planning Commission Study Session. Six of those present had attended previous meetings and spoke against a plan that called for closing North Lake Street and changing the parking lot traffic flow to one-way. They were thus surprised to hear from County Planner Sam Herzberg that that plan had been designated the Preferred Alternative and was considered ninety percent complete, and they expressed concern that their previously aired objections were not addressed in this plan. Of those in attendance at the meeting, eight spoke in opposition to the plan on November 14, and no one spoke in its favor. Concerns ranged from construction of new parking spaces having too much impact on San Vicente Creek to the proposed new parking lot exit disrupting traffic flow and impinging on neighbors' privacy.

The County will next take the parking lot plans to the County Board of Supervisors for approval, and then to the California Coastal Commission for final approval and permits. Readers interested in following the progress of the project or in voicing their opinions should contact Angela Chavez at the County of San Mateo Planning and Building Department at (650) 599-7217 or achavez@smcgov.org. ◆

California Coastal Trail signs on a three-foot-high post near the corner of Cypress Ave and Airport Street point the way to the trail under construction.

A slight widening of the trail as it nears Cypress Avenue provides space for a bench, trash bins, and an information kiosk.

Work progresses on North Lake Street.



Adventures at Carmel Point

by Julie Walters

Carmel is usually thought of as a great place to get away for the weekend with beautiful, sandy beaches. But if you take some time to explore the rocky areas beyond the beaches, you will find a colorful world of marine life waiting to be explored.

Carmel Point tidepool area

Directions: Carmel is approximately 95 miles south of Half Moon Bay. Once you pass Monterey, continue on Highway 1 south. Take the Ocean Avenue turnoff toward Carmel. Driving west on Ocean Avenue you will pass Carmel's commercial area. Just before you reach Carmel Beach City Park at the end of the road, turn left, or south, onto Scenic Road. Continue south on Scenic Road until you come to Martin Road. Park either on Martin Road, Ocean View Road or along the few spots on Scenic Road.

Blood Star (Henricia sanguinolenta)

Red sea cucumber (Cucumaria miniata)

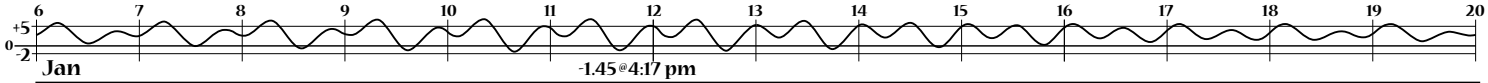
How to get to the tidepools: Look for the steps going down to the beach near the intersection of Martin and Scenic. Head south, or away from the sandy beach, and toward the rocks. The best tidepooling is between Martin Road and Ocean View Street. You will need to climb over quite a few rocky boulders during your tidepooling adventure but it is worth it. This area can be a little slippery due to algae and surf grass. Waves are typically not too intense, but it's best to wear rain boots.

To get the most out of your visit: Get down low and look under the low rock ledges and you'll see a colorful world where a variety of species live.

Predominant species found here:

- Abalone (Look for these deep in rock crevices)
- Six-rayed sea stars *Leptasterias hexactis*
- Bat stars *Asterina miniata*
- White spotted rose anemone *Tealia lofotensis*
- Brooding anemones *Epiactis prolifera*
- Knobby seastars (the ones in Carmel have more of a royal blue color than those seen at Fitzgerald) *Pisaster giganteus*
- Black Katy chiton *Katherina tunicata*
- Flame lined chiton *Tonicella lokis*
- Woody chiton *Mopalia lignosa*
- Pacific plate limpet *Tectura scutum*
- Rosy bryozoan
- Ringed Topshell snail *Calliostoma annulatum*
- Blood Star *Henricia sanguinolenta*
- Limpets, mussels and sea urchins
- Nudibranchs: I saw a very large (over 5" long) sea lemon, Hopkins Rose, *Hermissenda crassicornis, Rostanga pulchra* and *Cadlina modesta*
- Red and white sea cucumbers *Cucumaria miniata, Eupenctata quinquesemita*
- Colorful sponges and tunicates underneath overhangs
- Snowy egrets
- Harbor seals ◆

Flame lined chiton (Tonicella lokis)



Volunteer Appreciation Barbecue

A luncheon was held September 23 to honor active Friends of Fitzgerald Marine Reserve docents. The event, organized by Linda Ciotti, was held at the Half Moon Bay Yacht Club in Princeton thanks to Carol Davies and her husband who are members of the club. Mary DeLong presided over the awards ceremony.

One of the awards given each year is the 'Ginny' award, named for Virginia Welch, the first president of the Friends of Fitzgerald Marine Life Refuge (FFMR's original name). Ginny organized a group of volunteers and worked with Bob Breen to establish a training program and the volunteer organization. She remained active and on the board of directors until she passed away in 2003. The first 'Ginny' award was given in 2005 to Mary DeWolf Ryan.

This year the 'Ginny' went to Betty Sills, a long-time volunteer and creative force behind our participation in the Fourth of July and Pumpkin Festival Parades. Betty heads the Harbor Seal Station at the reserve, training volunteers to assist her in educating visitors about the natural history and protection of harbor seals. Betty is also a volunteer at the California Academy of Sciences.

The 'Sea Star' award is given to a volunteer from the year's training class. Kris Liang was given the award this year in recognition of her enthusiastic participation and volunteering efforts throughout the year. In addition to leading tours Kris is often seen manning the ranger station and helping Betty at the Harbor Seal Station. Most weekends Kris can be found on the beach interacting with visitors.

Kris Liang receives the 'Sea Star.'

Jenna Kinghorn, Arpi Haleblian, Kumi Ishida

Kelly Huber received the award with the unfortunate title of the 'Boring Clam.' Kelly was given this special award in honor of her many years as an active volunteer, and for her service on the FFMR board of directors. She is retiring to spend time with her new grandchild.

Many wonderful raffle prizes were given, and all volunteers received the traditional annual pin for their docent jacket lapels. This year it was an octopus. ◆

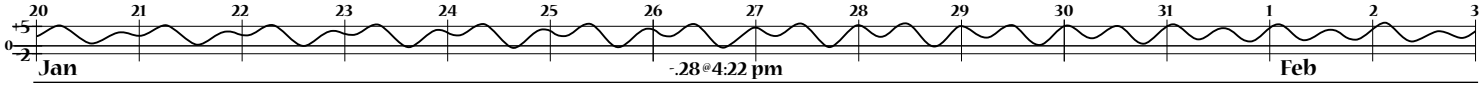
Scott Snow and Ron Olson in serious discussion

Betty Sills, Betty Cosgrove and Ellen Gartside

Betty Sills is presented the 'Ginny' by Mary DeLong.

Kelly Huber receives the 'Boring Clam.'

Jennifer Brey and Susan Evans pause to pose.

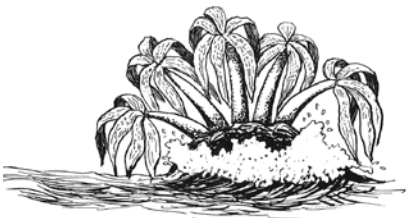


The Mussel Clump Habitat

by Tom Niesen

Figure 1: A mature clump of the California sea mussel, Mytilus californianus.

Figure 2: Close up of mussel's byssal threads. Note the ends are attached to the rock by flattened, adhesive plaques.



Sea Palm

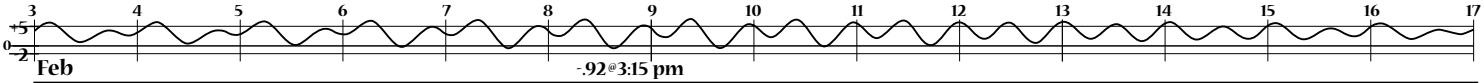
Large beds or clumps of the California sea mussel, *Mytilus californianus* (Figure 1), are common all along the open California coast, and are quite prominent at Fitzgerald Marine Reserve. The mussel thrives in areas of high wave energy and, indeed, its distribution corresponds to the most exposed, wave-tossed rocky intertidal habitat. Look for clumps in the middle tidal zone on flat, horizontal substrates. Good places to look at Fitzgerald are the outer edge of the reef between Nye's Rock and Cypress Point, and Frenchmen's Reef. But be careful, as these are areas where sleeper waves can catch you by surprise. Chose a day with a good low tide and a quiet ocean, and always keep an eye to the sea.

Mussels reach five inches or longer in length in the intertidal zone, and up to ten inches in subtidal clumps. The shell is thick, pointed at the anterior end, and sculptured with radiating ribs and growth lines. The shell is often eroded or worn from abrasion in the clump, and frequently colonized by barnacles and limpets. Mussels are filter feeders, and the average mussel filters two to three quarts of seawater an hour when submerged. They filter mainly small particulate detritus and dinoflagellates.

Mytilus californianus is able to settle and grow in wave-exposed situations because it attaches itself to the bedrock with stout fibers made of protein called byssal threads (Figure 2). Byssal thread protein is produced in a special gland at the base of the mussel's foot. The protein is secreted into a closed groove that runs the length of the mussel's foot. The long, red, prehensile foot positions the thread for attachment, the groove opens and the protein solidifies into a stout thread. The tip of the foot shapes the end of the thread into an adhesive, plate-like anchor called a plaque. The plaques are attached to the bedrock and, as the clump grows in size, to other mussels in the clump.

> *The sea mussel is ultimately its own worst enemy. As the mussels grow… the clump becomes several mussels deep, and fewer mussels are attached directly to the bedrock.…with less and less direct attachment,…large areas of the clump are torn away, leaving bare rock behind.… Thus begins a cycle that may take seven or more years and will end up with* Mytilus *back in control only to grow and be torn away again.*

In time the mussel can monopolize the horizontal surfaces to the exclusion of other species that require attachment to the rocky substrate. However, mussels are not the only organisms that can inhabit this habitat successfully. First of all, the sea mussel is ultimately its own worst enemy. As the mussels grow and new larval mussels recruit into the mussel clump, the clump becomes more and more unstable. This occurs because the clump becomes several mussels deep, and fewer mussels are attached directly to the bedrock. Instead, they are primarily attached to one another by their byssal threads. The growing clump offers more and more resistance to the pounding waves with less and less direct attachment, until large areas of the ➤



clump are torn away, leaving bare rock behind. This rock becomes available for new settlement, and a number of new organisms move in. Thus begins a cycle that may take seven or more years and will end up with *Mytilus* back in control only to grow and be torn away again. Look for bare patches in established mussel clumps at the reserve, especially after big winter storms. Visiting these patches regularly over a few years will allow you to witness the cycle of recruitment and mussel clump growth.

The mussel's upper distribution is limited by its physiological tolerance to exposure. In areas of consistent wave action, the mussels can inhabit high intertidal zones successfully because of the wave splash, but in areas of periodic calm like Fitzgerald, their upper limit is the middle intertidal zone. Another control of the mussel is the Pacific sea star, *Pisaster ochraceus* (Figure 3). We know from the pioneering research of Dr. Robert Paine of the University of Washington that *Pisaster's* predation on the mussel is sufficient to preclude it from moving into and monopolizing the lower intertidal zone in the way it can dominate the middle intertidal zone. Thus *Pisaster* keeps the lower substrate open for other species to colonize and inhabit, allowing for a much more diverse assemblage of organisms in the mussel clump habitat.

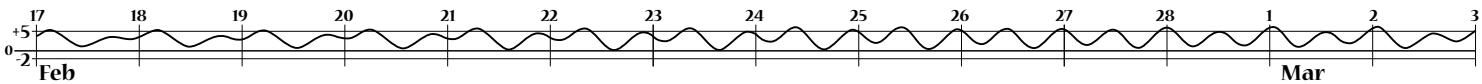
In addition to *Pisaster* and *Mytilus,* several other prominent organisms inhabit the mussel clump. The stalked barnacle, *Pollicipes polymerus* (Figure 4), occurs in round aggregations, sometimes surrounded by mussels. This filter feeder is capable of rotating its upper body on its muscular fleshy stalk. It can thus position its filtering mechanism, a series of modified legs with closely placed filtering hairs, into the current for the most favorable feeding on large particles of detritus and large zooplankton. The individual stalked barnacle may reach a length of three inches. Close inspection may reveal smaller barnacles attached to its stalk, because like the mussel, *Pollicipes'* larvae seek out and settle on the adult animals. Large barnacles are relatively immune to attack by most intertidal predators. However they are not immune to the crushing, lateral pressure generated by the growth of individual mussels and that of new recruits, which add to the clump's outward expansion. Ultimately the stalked barnacles' attachment to the substrate is undercut and they are washed away.

Not every organism falls victim to the pressure of the expanding mussel clump. The granddaddy limpet of them all, the owl limpet, *Lottia gigantea* (Figure 5) occurs on the most exposed middle intertidal rocks. This is the largest of our limpets, with a shell over three and a half inches in length. At low tide large individuals of this species occupy 'home scars' on the rocks that fit the margin of their shell. Studies show that each limpet lives within a 'territory' approximately the size of a dinner plate, which consists of patches of closely cropped algae on which they graze. Striation marks in the center of the illustration are grazing scrapes left by *Lottia's* radula. Each *Lottia* remains in its territory and keeps it free from other animals that may move in from adjacent areas including mussels from a dense mussel clump. *Lottia* discourages intrusions onto its territory by mussels by periodically patrolling the edge of its territory and using the edge of its shell to actively "bulldoze" the ➤

Figure 3: Predatory Pacific sea stars, Pisaster ochraceus, *wait for high tide to forage in the mussel clump at Frenchmen's Reef.*

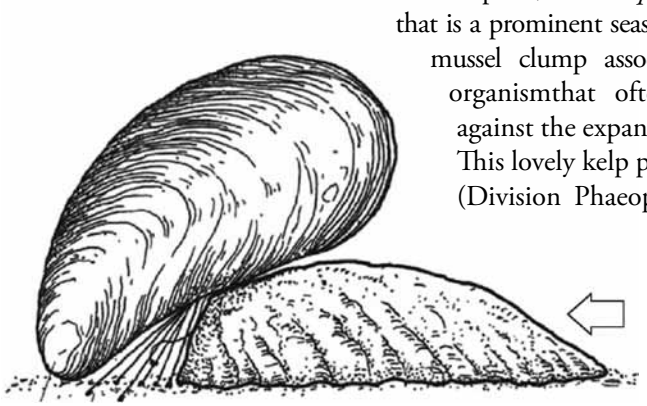
Figure 4: The stalked barnacle, Pollicipes polymerus, *commonly occurs amongst the mussels.*

Figure 5: A large owl limpet, Lottia gigantea, *is seen at the top center of its territory, which it actively maintains against the pressure of the growing mussel clump.*



attachment plaques of would-be encroaching mussels, holding them at bay.

The sea palm, *Postelsia palmaeformis,* an alga that is a prominent seasonal member of the mussel clump association, is another organismthat often holds its own against the expanding mussel clump. This lovely kelp plant is a brown alga (Division Phaeophyta) although its color is green. Sea palms have hollow, flexible stems (stipes) that allow them to bend with the force of the waves and backwash, and snap back into their upright posture. Almost all sea palms are torn away during fall and winter storms but return, growing from microscopic germlings on the rocks in the late spring. This alga maintains its tenuous hold on middle intertidal space via a very interesting life cycle, which I showcased a few years back in a BTT piece called the "The Sea Palm's Secret."



An owl limpet, Lottia gigantea, *uses its shell to dislodge the byssal threads of a mussel encroaching on its territory.*

Close scrutiny of the mussel clump will reveal a myriad of smaller, motile animals and encrusting forms that combine to form one of the most diverse of all intertidal habitats. In addition to the shells of the mussels, the webs created by their collective byssal fibers provide a maze of nooks and crannies for marine invertebrates to inhabit. Young sea urchins, less than an inch across, find shelter at the base of the clump. Worms are especially able to maneuver here, and a wide variety of species occurs. Prominent are the polychaetes known as clam worms, pile worms, or mussel worms, in the genus *Nereis.*

The ribbon or rubber band worms (Phylum Nemertea) also thrive in the mussel clump. These elongated, predatory night-stalkers retreat into the protective maze of the mussel clump by day and actively forage through it and beyond at night. They are predators on a wide variety of invertebrates including polychaetes, and small crustaceans like amphipods and isopods.

Crabs abound in the interstices of the mussel clump. Young of the familiar green lined shore crab, *Pachygrapsus crassipes,* and the purple shore crab, *Hemigrapsus nudus,* are common. Other common crabs are the porcelain crabs, whose flat bodies allow them to move easily in tight quarters from which they seldom venture.

The surface of the mussels' shells also serves as available habitat space. Acorn barnacles and numerous small limpet species of the genus *Lottia* occur. Individuals of the aggregating anemone, *Anthopleura elegantissima,* and the proliferating anemone, *Epiactis prolifera,* can also be found on mussel shells.

With this abundance of small invertebrate prey, it is not surprising to find that the small, predatory six-rayed sea star, *Leptasterias* spp., and the barnacle-eating whelk, *Nucella emarginata,* are also common inhabitants of the mussel clump. These are only the larger, obvious animals of this habitat.

When exploring the mussel clump habitat take your time and remember that many of the animals are small, an inch or less. Get on your hands and knees, get close to the mussels and look carefully. You will be amply rewarded for your patience. ◆

Close scrutiny of the mussel clump will reveal a myriad of smaller, motile animals and encrusting forms that combine to form one of the most diverse of all intertidal habitats.

Young sea urchin

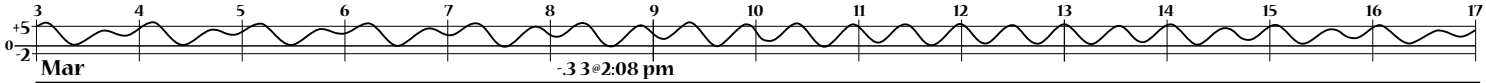
Six-ray star

Limpet

Lined shore crab

Porcelain crab

Barnacles



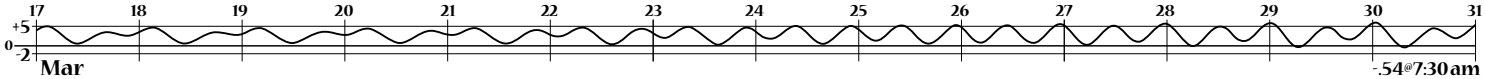
Fitzgerald Marine Reserve									Pillar Pt	Pillar Pt
Date	6/10	10/10	1/11	4/11	6/11	10/11	12/11	4/12	6/12	9/12
Acanthodoris lutea		5	4	3	1	5	3	5		
Acanthodoris nanaimoensis	1			4	4	8				
Acanthodoris rhodoceras	2	1		3	2					
Aegires albopunctatus	4			1	2					
Aeolidia papillosa	1			5	3	1	3	8		
Ancula gibbosa					1					
Cadlina luteomarginata			1		2	2		2	1	
Cadlina modesta				4	3	5	10	4	1	
Corambe steinbergae										1
Cuthona abronia					2					
Cuthona albocrusta					1	2				
Cuthona divae				4					4	
Cuthona flavovulta										1
Cuthona fulgens									1	
Cuthona lagunae									1	
Dendronotus albus	3							1		1
Dendronotus venustus										2
Dendronotus subramosus									29	1
Diaphorodoris lirulatocauda					1					
Diaulula sandiegensis	9	17	32	34	10	24	30	16	2	1
Dirona picta									1	
Doriopsilla albopunctatus		1	5	2	2	5	2	6	3	1
Doris montereyensis		12	8	6	3	20	12	4	3	
Doto amyra									9	
Doto kya								1		
Flabellina trilineata				2						3
Geitodoris heathi				4	1			1	2	
Hallaxa chani							1	1		
Hancockia californica									1	
Hermissenda crassicornis	1		1	7	2	3	4	6	3	
Limacia cockerelli				6		3		2	1	
Peltodoris nobilis	5		17	18	3	10	13	3	3	1
Phidiana hiltoni			15	26	29	22	5	9	4	
Rostanga pulchra	1	1	3	8	11	1	1	4	4	
Triopha catalinae		2	3		3	4	1		18	5
Triopha maculata	4	6	7	18	10	7	1	62	15	19
Tritonia festiva				1						
Berthella californica		1		3		2	4	3		
Adalaria jannae				1						
Acanthodoris hudsoni					1					
Total # inds	31	46	96	160	98	124	90	138	106	36
Total # species	10	9	11	21	23	17	14	18	20	11
# Observers	4	5	7	7	11	10	6	11	8	10
Time (hours)	2.5	2	2	2	2	2	2	2	2.5	2
Low tide was								-1.2	-1.9	0.4

Nudibranch Survey

The third survey of 2012 was held on September 30 at Pillar Point. The tide was a +0.3 and we met on the reef at 4 in the afternoon. Those participating were Tom Ciotti, Susan Evans, Brenna Green, Sasha Greenawalt, Terry Goslinger, Bill Kennedy, Jan Pelinka, Clarissa Shipman and Julie Walters. As the sun set we all agreed to meet at the Half Moon Bay Distillery where we enjoyed good food and learned from Terry what a nudibranch tastes like (you will have to ask him). The day's findings are listed in the 9/12 column on the chart at left depicting three years of data. This data is sent to the California Academy of Sciences for use as a baseline for future comparisons. Many thanks to Julie Walters for organizing the group and recording the statistics.

Sea Lemon, Peltodoris nobilis, *one of the largest nudibranchs growing to four to six inches. Sponges are the favorite food of the Sea Lemon. photo: Scott Snow*

The bright colors of the Clown Nudibranch, Triopha Catalinae, *serve as a warning that they may not taste good to other animals. photo: Tom Niesen*



Nudibranchs in the Philippines: Animals and Ecosystems Worth Saving

by Amy Walters

Terry Gosliner, Dean of Sciences at the California Academy of Sciences and inveterate nudibranch searcher.

Terry Gosliner dives off the shores of New Guinea, turns over a rock, and discovers five toxic sea slugs—the colorful creatures known as nudibranchs. He determines what he needs to collect to document the species. His scuba diving buddy swims over, nudges him gently, and insists they end the dive. Gosliner, completely engrossed, needs two more minutes to finish his inspection. After two minutes of pestering, they finally rise to the surface.

"Why didn't you come up when I told you to?" his friend asks. "There were so many great nudibranchs," Gosliner replies. Little did he know that a twelve-foot hammerhead shark had been circling a foot over his head.

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Even after two decades of diving and discovering nudibranchs, Gosliner, Dean of Sciences at the California Academy of Sciences in San Francisco, still becomes so focused on them that everything else around him fades from view. That dedication, though, has had astounding results: of the more than 3,000 known species of nudibranchs, Gosliner alone has found one-third of them.

These sea slugs live in temperate and tropical waters worldwide. Most are very colorful, ranging from electric blue to bright orange and green. They obtain their pigment from their prey: sponges, barnacles, even other nudibranchs. Their colors also reflect a remarkably complex natural chemistry, which researchers believe may lead to new treatments for some of the most resistant human diseases.

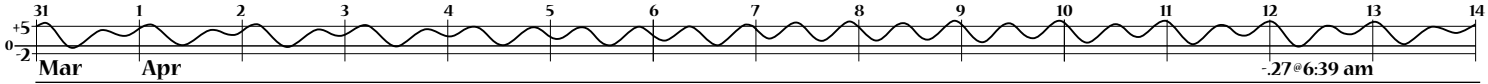
Gosliner travels to the Philippines several times a year to collect nudibranchs and study their environment. In the last few years, he has concentrated on the Verde Island Passage near Manila. His record for the most discovered in one trip is at this location: 400 species, half of them new. For the three-week trip, Gosliner averaged ten dives a day—finding about one new species per dive.

His South Pacific work first started in Papua New Guinea, where he found more nudibranchs in one bay than he has in any place in the world. A friend on the same trip told him, "If you think this is rich, you should go to the Philippines," and invited him on his next expedition. Gosliner then focused his attention on the Coral Triangle, the richest shallow water marine habitat in the world.

When not traveling, he spends time with his graduate students, naming and describing his specimens. They crosscheck the DNA and description of each animal with marine databases to determine if it is a unique species. In one case from his lab, DNA testing revealed that a few individuals supposedly from a single species actually represented eight different species. "There is a lot more diversity than we thought," Gosliner says.

Scientists now conduct biomedical research on the chemicals in various marine species, including nudibranchs, sponges, and corals. The National Cancer Institute sponsored a recent trip to New Guinea in which Gosliner collected species of nudibranchs and corals he thought might have disease-fighting potential. Nudibranchs defend themselves chemically with an unusual array of compounds, most of which are new to science. Gosliner tried to pick larger and more colorful nudibranchs, thinking they might have the best defenses. He sent his selections to the lab; some of the chemicals from these animals are now undergoing scrutiny for possible use in clinical trials for cancer or HIV treatments.

Aside from documenting new species, Gosliner is a deeply committed conservationist. This commitment literally started with a bang. ➤



During his first dive in the Philippines two decades ago, Gosliner was stunned by a huge underwater explosion. He quickly swam to the surface but saw no boats around. The explosion— a blast of dynamite used by fishermen—must have been half a mile away. Even so, fish were quivering and dying all around him. "I thought my ear drums had been blown out," Gosliner says. Each blast, he notes, devastates the coral reefs near shore. He knew he had to prevent these events from happening, and his conservation work began.

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Since he has started his work, overfishing and a particularly destructive method called dynamite fishing have decreased dramatically in the area—trends Gosliner attributes to a growing sense of pride among Filipinos about their underwater treasures. Gosliner goes to schools in the Philippines to talk with children and collaborates with local conservation programs and community leaders. Some of his fellow Academy educators have helped to show local residents the striking creatures living in their waters. Slowly but surely, he says, these programs are fostering a marine conservation ethic among Filipinos.

Coral bleaching, a major problem elsewhere, is not yet a major concern in the Philippines. Water temperatures can reach the high 80s Fahrenheit, but corals remain healthy. Gosliner saw the first real bleaching in the Verde Island Passage in October 2010. He was heartsick; he diligently documented the individual coral heads. When he returned in January the following year, things were better—and by May, the corals had virtually recovered.

Gosliner believes two factors make this area a reservoir for strong coral communities: deep water and vigorous currents. Upwelling naturally brings cooler waters and nutrients from the bottom of the ocean up to the surface, pushing out the warmer waters. Few places in the world have these characteristics. These locations will be reservoirs for corals to survive and to help repopulate the areas where they are decimated.

Gosliner's conservation goals are to create larger marine protected areas and to safeguard the most vulnerable and diverse regions. Ultimately, he would like to write a book about conservation. "We have moved from the land of plenty to the land of endangered species and mass extinction," he says. "Education and conservation are just as important as science. In today's world, you can't separate the two. Science informs conservation, and education informs the science. You really have to have a complete package to have any chance of changing the world and turning things around from the destructive path our species is on."

Amy Walters recently graduated from UC Santa Cruz with a degree in marine biology. She works as an On-call Biologist at the California Academy of Sciences. ◆

"The dorid is a new species of Hypselodoris, *and this one with purple spots and line is a beauty to behold." –Terry Gosliner photo: Terry Gosliner, Club Ocellaris, Anilao, Philippines*

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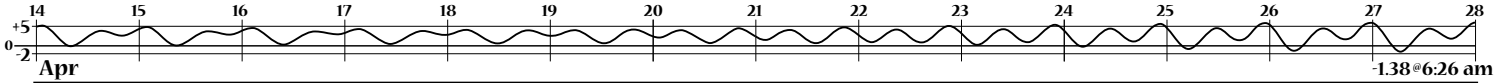

Spotlight On Julie Walters

If you love tidepooling, especially searching for nudibranchs, you have most likely come across Julie Walters, frequently seen at Fitzgerald, Frenchman's Cove and Pillar Point dressed in brown waders, sometimes up to her thighs in water.

Julie's love of the outdoors began when as a child in Michigan she spent most of her free time exploring the fields and woods near her house (an experience she believes is now missing from the lives of most children). She managed to spend enough hours inside to earn a degree in architecture from the University of Michigan. During a layover on her way to Hawaii she fell in love with the S.F. Bay Area and soon returned to live in Pacifica and work in San Francisco as a designer of commercial interiors.

Julie is especially fascinated by the visual feast of colors and patterns of the animals and feels one could not design or image anything more interesting than the tube feet of a sunflower star, the pattern of a sunburst anemone…or the colors of sponges.

Her introduction to FMR happened five years ago during a University of Michigan alumni tour where she met Tom Ciotti, who recruited her to take the docent training. She sees tidepooling and nature in general as a kind of therapy and balance to her professional work that is primarily indoors. "Living by the ocean and volunteering at Fitzgerald has changed my life," she says. "I cannot imagine ever living away from the ocean. Living by the coast and looking out at the ocean every day is like a mini vacation to me. It is never the same and always amazes me."

Her friendly manner and contagious passion for tidepooling have brought Julie many new friends with a variety of backgrounds. "We all share a common interest in the ocean and stewardship of it," she explains. "We like to share, learn and explore together and have fun trying to identify what we discovered." Julie is especially fascinated by the visual feast of colors and patterns of the animals and feels one could not design or image anything more interesting than the tube feet of a sunflower star, the pattern of a sunburst anemone or a lined chiton, or the colors of sponges.

Her travels have included Europe, Australia (including the Great Barrier Reef) and Indonesia, and she now feels her future travels will have to be near water. She is planning a trip to San Ignacio Bay in Baja California to observe gray whales up close. Julie has become an excellent photographer (she generously shares her beautiful photos which are frequently seen in our newsletter) and also loves to garden. Her daughter Amy works as a biologist for the San Francisco Academy of Sciences. They are both certified scuba divers. Julie is the tireless coordinator of the quarterly nudibranch surveys. Her favorite is the electric blue and orange *Hermissenda crassicornis.* Julie also helped to create a strong relationship between FFMR and the S.F. Academy of Sciences. ◆

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Hermissenda crassicornis. *Photo: Julie Walters*