Late Summer 2015 captured the ocean's vigor, teeming with wildlife in superlatives: tens of thousands of sooty shearwaters were swarming, huge humpback whales were spouting, breaching, arching backs, and hell-bent diving brown pelicans with tagalong birds were closing in on the catches. Onshore food sources had serendipitously lured inland an extravaganza of usually pelagic birds and mammals. All this exuberance created a visual bonanza for the many excited observers.

At Mussel Rock on the San Mateo coast, on a hot afternoon in September, there was a rare event, an extraordinary happening, in a moving white mass in the water about a hundred yards offshore. Binoculars circled a team of bottlenose dolphins ferrying an afflicted companion, white belly-up, both pectoral flippers pointed askew. One dolphin, with what I can only assume was great effort, held the stricken one afloat, apparently with her own body aligned with the long white belly. About five escorts flanked the pair, mostly in twos, sometimes ahead or behind. The intermittently visible entourage coalesced about the rescuer, who urgently swam first west, then north about 250 yards, turning south and then way out west, all the way around Mussel Rock despite surging waves. Momentarily lost from view, the carrier dolphin plowed out from behind the huge rock structure, and then continued south toward Esplanade Beach, only to return north again, with attendees along. This episode occurred over 2-3 hours. Though bottlenose dolphins are reputedly strong and powerful swimmers, their focused endurance was amazing.

While watching, I’d notified both the Marine Mammal Center and the California Academy of Sciences (CAS); then, after more than three hours, I went home. The next morning, September 10th, fog blanketed the water, and I scanned the nearby beaches for the affected dolphin. Moe Flannery, Collections Manager from CAS, let me know that “your” dolphin had probably washed up at Linda Mar Beach. Sue Pemberton, Curatorial Assistant for CAS, was at the site collecting data for the Marine Mammal Stranding Network and harvesting parts for the research collection of the Academy.

*continued on page 3*
Dolphin Resources

Selected here are just a few dazzlingly informative sources on dolphins in general:
http://animaldiversity.org/accounts/Tursiops_truncatus/
http://www.monkeymiadolphins.org/
http://www.californiacostaldolphinproject.org/#!news/cusy

Epimeletic/Caregiving Behavior:

Examples of Epimeletic Behavior In Action:
http://www.bing.com/videos/search?q=dolphins+raft+for+other+dolphin&go=Submit&qs=n&form=QBVR&pq=dolphins+raft+for+other+dolphin&sc=0-18&sp=-1&sk=&view=detail&mid=82342618843E63704FBF82342618843E63704FBF

And Meet Sue Pemberton, Specimen Preparer at Work:
https://twitter.com/SealsNSue      see chronicle of strandings 7.15.15-10.22.15
https://usesthis.com/interviews/sue.pemberton/

To see the spectacular color of the creature photos in this newsletter, and for shortcuts to all the weblinks, be sure to check it out on our website: www.fitzgeraldreserve.org/

The lowest tides this period are:
- .82 12/12 5:14 pm
- .80 12/25 4:35 pm
- .96 1/10 4:56 pm
- .81 2/8 4:33 pm
- .86 4/10 7:38 am

The graph displayed across the page bottoms shows tides for 12/7/15 to 4/25/16. Where the date appears is midnight. The reefs are accessible for exploring during low tides—at least +1 or below. See: http://fitzgeraldreserve.org/resources and click on “Tides” for a more detailed tide chart.

The winter afternoon low tides change to morning low tides in March. There are almost equally low tides several days before and several days after the noted low tide dates.

Friends of Fitzgerald Marine Reserve

Membership Secretary, P.O. Box 669, Moss Beach, CA 94038, or through our website: www.fitzgeraldreserve.org

Contribution Levels:

- $25
- $50

- $100
- $500

- $1000
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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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Sandy Emerson
Bottlenose Dolphin continued from page 1

I rushed down and watched Sue artfully carve the head of the mammal. Sue said, “The dolphin was a female bottlenose dolphin who was 9-3/4 feet long. She was fresh dead but heavily scavenged by small sharks. She was most likely a young adult, as she was not as huge as my other females that stranded around that time.”

Watching Sue work, I saw the young dolphin’s beautiful teeth, alternately paired, top to bottom, and I thought about bottlenose dolphins, scientifically called Tursiops truncatus, the species name citing truncated or flat teeth. Dental rings are age indicators, so teeth are also collected specimens. Sue showed the surrounding observers the gelatinous melon in the forehead, the echolocation site that enables the dolphin to find prey. Because the aqueous humor, fluid within the eyeball, preserves body chemistry composition at the time of death, the eyeball was sent for evaluation.

Sue Pemberton writes that in her work, she “wants to know how the mammal died.” She also wrote in her Twitter account of September 10th regarding this dolphin that, “Unfortunately, the fourth dead bottlenose dolphin since mid-July has washed ashore in Pacifica. This is totally unprecedented.”

Sue photographed this dolphin’s condition of “raking” on the dorsal fin. Dorsal fins are distinguishing features that all researchers use to communicate with each other regarding a specific dolphin, an important part of this work. (For example, #2 stranded dolphin, Falce, had been followed since 1991 and, sadly, Sue was able to inform the researcher of Falce’s demise in 2015.)

Izzy Szczepaniak of Golden Gate Cetacean Research was there at Linda Mar and later shared his photos. To questions about care-giving behavior, he offered the exotic term “epimeletic” (relating to altruistic behavior in which a healthy animal cares for an injured, ill or dead individual) which has propelled me since to read about dolphins’ social behavior.

Dolphin epimeletic (epi-mel-etic) behavior can be found in the research literature, over time and distance: from Australia, Brazil, Japan, and South Africa. Even Aristotle (384-322 BC) noted in his Historia Animalium both nurturant and succorant behaviors in dolphins. Specifically, he cited the dolphins’ strength of parental affection and also mentioned two dolphins supporting a little dead dolphin at the surface of the water. Distinction is made concerning aiding behavior: toward the young, it is “nurturant”; it is “succorant” if in response to distress. M. C. Caldwell and D.K. Caldwell wrote that succorant behavior is extremely rare and involves a complex pattern of cooperation. Dolphins also produce whistles that convey either contact or distress, and other dolphins will decrease their vocalization if a distress call is made. (Please see “Dolphin Resources” on page 2 for more detail.)

That whole Summer 2015 exuberance has calmed now, as I see the sparse back-to-the-ordinary surf scoters bobbing on the swells. One lone humpback slid past, moving north about a week ago, spouting an exclamation mark on this whole experience. I feel fortunate to have had the privilege of a glimpse into the wonderful, wet world of dolphins.
I was born back east, grew up in Brockton, MA. I went to Cape Cod a lot as a kid, and participated in a high school summer science program at Woods Hole Marine Biology Laboratory. We studied the life cycle of Loligo peleii, the east coast squid. At one time I had a great collection of calamari recipes, but my mom made me get rid of them along with my baseball cards. I went to college at the University of Rochester in upstate New York, where I realized that I preferred water in its liquid form rather than solid snow. After school, I moved to Chicago where I lived for 20 years—didn’t get rid of the snow yet—and met my wife when we were both studying to be docents for Chicago Architecture Foundation. Professionally, I worked at a bunch of high tech firms in various marketing roles.

Most of my jobs involved explaining technology to lay audiences. For example, I wrote a how-to book for telecom application engineers, edited the monthly newsletter of the MIT Enterprise Forum of Chicago, and designed the initial branding for an enterprise software firm and a barcode printer manufacturer prior to their IPOs. All is proof that there can be professional life for a history major. We moved to California in time for the dot com bubble, working years at IBM. I was involved mostly with business partners along with the revolving door of IBM employees. On each assignment, I’d publish a daily newsletter trying to keep the IBMers and partners apprised of the latest. It turned out to be an educational value-add, because people could read a handful of my posts and get up to speed fairly quickly.

Maxine and I were energetic travelers, pursuing far-flung adventures where we could find them. Zaire, Tuscany, Bali and Bhutan were highlights. She loved collecting beads for ethnic jewelry and I took lots of photos. Many of these trips ended up near water; it’s where people live. I remember a Cambodian fishing village with bamboo houses built high above the ground, ready for monsoon season. The men all worked on their boats, or went out into the lake to throw their nets. The women cooked, raised kids and patched nets. The village of maybe 50 families had been there for centuries, and I couldn’t help thinking that the residents were as much a part of the ecosystem and as endangered as any of the aquatic species.

I joined FFMR in 2012 after I retired. It seemed a natural fit given my love of marine life, nature in general and availability on weekdays. I thoroughly enjoyed the initial training and ongoing continuing education. Getting outside in the fresh air and poking around in puddles really became a joy. So last year when Linda Ciotti, reclaiming her life by off-loading some of her many tasks, asked me if I’d like to take over regular communication with the docents, I liked the idea.

That’s how Information of Interest came into being. Using Facebook as my primary source of information, I follow a couple of dozen feeds and post the most interesting ones to my own Facebook thread daily. Then once a week I back up my postings and copy the relevant links to the Information of Interest email. I do like to keep up with what’s going on in the Bay Area and beyond, but believe it or not, I don’t post everything. And I do miss things; so please send along anything you find that may interest the group.

The Octopus is a Cephalopod
*A Illustration: Kelly Huber

A Nautilus is another Cephalopod.
Apart from the newsletter, I enjoy taking kids out on the reef. On low tide weeks, I try
to go out at least once or twice and fill in when

*It can be a challenge to take out high school kids one day and third graders the next, but I think it's something we all experience. It keeps you flexible.*

needed. It’s never boring, because you find new creatures every time out, plus you need to tail-
lor the tour to the audience. It can be a chal-
lenge to take out high school kids one day and third graders the next, but I think it’s something we all experience. It keeps you flexible. I’m very
proud to be part of FFMR. Everyone pitches in
and helps each other, but we still maintain our
personal styles that make the tours unique. I’ve
never been a big joiner, but this group really is a
pleasure. And I’m happy to put in the time.

Given my early exposure at Woods Hole, I do have
a decided preference for cephalopods and, surprise, nudibranchs. I remember being 16 that summer, just got my drivers license, think-
ing that I’d found the secret of adult life. It took almost 50
years, but now as I walk my two Airedales on the coastal
trail every day, volunteer at Fitzgerald Marine Reserve a
half dozen times a month, I think, “You know, it turned out pretty good.” Thanks
everyone.

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Use of Compost to Capture Co₂ Catches On

An article in the December 2014 issue of
BTT (“Soil Composting May Help Ease Ocean’s Burden”) described the development of the idea
that ½ inch of compost made from organic mat-
ter when spread over 5% of California’s rangelands would absorb enough CO₂ to offset the
amount of CO₂ produced by the farm and ranch
industry. The research began on a local ranch
and evolved into the Marin Carbon Project.

This practice is enthusiastically supported
by the Sierra Club. In February the organiza-
tion approved a new Agriculture and Food pol-
icy that supports healthy soil, and in May the Loma Prieta Chapter formed a Soils Committee
to promote carbon sequestration in soil.

Equally encouraging, officials of San Francisco have recently calculated that they can offset 100% of all their CO₂ emissions by making
compost from the yard waste they collect and spreading it on city land.

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In the November 2015 Loma Prietan, the
publication of a local Sierra Club chapter, Bill
Buchholz reported a further development. Rec-
ognizing the impact this strategy could make on
our atmosphere, last year the State of California
approved a protocol to allow ranchers to sell
Carbon credits under California’s cap-and-trade
system. The American Carbon Registry, an
organization that certifies how carbon credits are measured, approved one for applying compost to
rangeland.

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In February the [Sierra Club] approved a new Agriculture and Food policy that supports healthy soil, and in May the Loma Prieta Chapter formed a Soils Committee to promote carbon sequestration in soil.

Here’s a link to the full Sierra Club Loma Prietan chapter article:
The FFMR Board of Directors sponsored a delicious barbecue luncheon to express appreciation to all the naturalists for their hard work and support throughout the year. The annual event was held at the Half Moon Bay Yacht Club on Sunday, September 20, with more than 50 volunteers and guests in attendance.

Everyone was met at the door and given a name tag and door prize ticket, and socialized while munching on appetizers. Linda Ciotti, organizer of the event, opened the gathering by introducing and thanking Ranger Rob Calla and Marleen Finley, Director of the San Mateo County Parks Department, for attending. A big thank you was given to Carol Davies who, as a member of the Half Moon Bay Yacht Club, graciously arranges for use of their facility every year. Linda thanked Hope Suchand who took care of the food arrangements, and Roger Hoppes who made sure no one went thirsty. She also thanked Sandy Pethan for creating a beautiful slideshow of the summer camp.

Recognition was given to those who were involved in leading two major projects during the year. Susan Evans organized a very successful 2015 training program earlier in the year, and Kathleen Hayes led a very successful Junior Naturalist camp during the summer, assisted by many dedicated volunteers, and by Park Aide and Naturalist Katherine Wright, who gave a daily “Camp Power Hour.”

FFMR President Tom Ciotti reviewed the significant accomplishments of the season:

* Naturalists conducted 94 tours and many participated in the Half Moon Bay annual Fourth of July Parade, where FFMR received a second-place ribbon.
* As FFMR’s policy is that every public school child should have the opportunity to visit the tidepools, when the Board of Directors learned that students from Lorenzo Manor Elementary School in Hayward and Cunha Intermediate School in Half Moon Bay would not be able to attend a field trip to the tidepools due to lack of money to pay for buses, the Board funded their transportation.
* The yearly award of scholarships to Half Moon Bay High School students continued in 2015. This year three students received $5,000 each.
* The FFMR Board of Directors collaborated with the San Mateo Parks Department to help fund the salary of a park aide who would be dedicated to the protection of the harbor seals in the reserve.
Scientists are presently questioning how the Eastern Pacific gray whale (*Eschrichtius robustus*) will adapt to climate change and fear that the drastic change in the Arctic environment may impact the whales’ summer feeding habits.

In the lower Arctic, the Bering Sea and Hudson Bay, sea ice is disappearing earlier in spring and forming later in the autumn. Satellite observations show that nine of the past ten years have included the lowest ice extents on record and that 2015 is on track to be another low year for arctic summer ice cover. The sea ice's extent is the area in which a defined minimum of sea ice can be found. As the Arctic continues to warm, sea ice melts more rapidly in the spring over the continental shelf areas and withdraws toward the deeper ocean where productivity lessens and bottom feeding becomes increasingly more difficult.

That may not bode well for the gray whale’s feeding habits. Gray whales customarily neither gulp nor skim ocean waters for food, as do other baleen feeders. The eastern gray takes a deep inhalation of air, arches its body, throws its flukes high into the air, and dives to the muddy bottom, usually in relatively shallow water that is 10 to 15 m (30 to 50 ft.) deep. On the bottom, it rolls on its side (normally the right side) and pushes its head through the top few inches of sediment. It then opens its mouth slightly, and by expanding and contracting its throat grooves and retracting its huge tongue, creates a powerful suction to suck up the food-filled sediment. It uses its tongue to force the mud and water through the baleen plates on the opposite side of its mouth. The baleen acts as a filter or strainer retaining only the food, which the whale maneuvers with its tongue so the amphipods, tube worms, mollusks, and other bottom invertebrates can be swallowed. The whale leaves a trench in the ocean floor and trails a plume of mud behind it as it surfaces.

When their food moves to deeper waters grays must look elsewhere for sustenance. According to Wayne Perryman, the government’s leading expert on Eastern Pacific gray whale cows and calves, “Right now, we can feel comfortable saying that the gray whales are feeding in different places (farther north) and on different prey than they did back in the 1980s.” The National Oceanic and Atmospheric Administration says that grays are now forced to abandon their favorite fatty amphipods and instead surface feed, gulping small schooling fish, pelagic crabs, and swarms of krill. They are also foraging in kelp beds for mysid shrimps. Grays

*Barbecue continued from page 6*

...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. Susan was awarded the “Ginny” for her work in creating and coordinating this year’s naturalist training program.

* The Sea Star award is given to a volunteer from the year’s training class. This year it went to Karen Kalumuck who has been an enthusiastic naturalist throughout the season.

A drawing for door prizes followed—gift certificates for Sam’s Chowder House and It’s Italia restaurants and world globe balloons that were provided by Carol Davies. The program ended with the announcement of this year’s Pewter pin. Each year a different marine animal pin is given to all FFMR naturalists. This time it was a beautiful sea anemone.

* The eastern gray takes a deep inhalation of air, arches its body, throws its flukes high into the air, and dives to the muddy bottom…[where it sucks] up the food-filled sediment.
Gray Whale continued from page 7

must consume much more of these animals to gain enough fat for their more than 10,000 mile round-trip migration journey. These changes in feeding habits require more time than bottom feeding.

This shift is disrupting the timing of the eastern Pacific gray whale's yearly migration. Whale observations have shown a delay in their southward migration. Perryman explains that grays arrive in the Monterey Bay area two-weeks later than they did two decades ago. “This isn’t trivial,” he says. “It’s a significant change. It takes a long-time series of data to know how this is affecting the whale population. Climate changes slowly in the long term while weather can fluctuate widely in the short term, so it takes time to tease out the long-term effects from the short-term ones.”

The good news is that gray whales have survived many drastic climate changes over the past few million years. In an article in Live Science, Remy Melina writes, “The oldest gray whale fossils date back 2.5 million years, and since then, the earth has gone through more than 40 major cycles of warming and cooling. The California, or eastern, gray whale is one of two surviving populations of gray whale and can be traced back about 150,000 to 200,000 years.”

They appear to have “a lot more evolutionary plasticity than anyone imagined,” says David Lindberg, University of California, Berkeley, evolutionary biologist.

One group of the grays seems to have stopped migrating altogether and remains off Vancouver Island in Canada year-round.

Perhaps this flexibility will help the eastern Pacific gray whale survive future climate warming and the melting of sea ice.

Gray Whale Sets New Migration Record

According to a report issued this year, a western Pacific gray whale set a new mammal migration record. Varvara (Russian for Barbara) left her home off Russia’s Sakhalin Island, crossed the Bering Sea, an area with deep water and little in the way of landmarks to guide her, and followed the North American coast all the way to the tip of Baja, Mexico. The journey of 13,988 miles took 172 days. And she took a different route to get home, hugging the coast of Alaska.

Researchers had placed satellite-monitoring tags on seven western gray whales to learn more about their migration routes. Varvara was the only whale whose tag stayed intact throughout the entire journey, according to the study’s lead researcher, Bruce Mate, the director of the Marine Mammal Institute at Oregon State University.

“Usually calves follow their mothers from breeding area to foraging grounds,” says Mate. And they continue to use the same route throughout their lives. He thinks that perhaps the western grays that have appeared in the eastern Pacific may have been born there.

Normally western Pacific grays feed in the China seas. It is not yet known whether there is a small group of eastern Pacific gray whales among western gray whales, or if western gray whales are an extension of the eastern population and not a separate group.

“The genetics work to date says they are separate,” says Mate. But other researchers are analyzing a larger genetic dataset.

This research was conducted by A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences (IEE RAS) and Oregon State University Marine Mammal Institute in collaboration with the U.S. National Marine Fisheries Service, Kronotsky State Nature Biosphere Reserve and the Kamchatka Branch of the Pacific Institute of Geography. The research was contracted through the International Whaling Commission (IWC) and International Union for Conservation of Nature (IUCN) with funding from Exxon Neftegas Ltd. and Sakhalin Energy Investment Company Ltd.

http://mmi.oregonstate.edu/Sakhalin2011
On November 11th, while tidepooling at the southern end of Fitzgerald with fellow docents Sandi Meyer and Anne-Ly Crump Garay, we discovered a dead shark on the beach. The four-foot-long leopard shark had a section between the head and torso missing, but there were no obvious bite marks to indicate a cause of death. I asked Dr. Terry Gosliner of the California Academy of Sciences to speculate on what kind of animal might go after a leopard shark and he said that it could have been a sea lion.

Another possible cause of death could be fishing related. Fishing line entanglement is, sadly, a common cause of death and suffering for many of our marine animals. In this particular case, a fishing line may have caused the damage observed below the head. In researching the leopard shark, I was surprised to learn that it is legal to fish them and that they are in fact popular with fishermen. Per the Monterey Bay Aquarium’s website: “Though this is a fairly light level of fishing for a common species, leopard sharks take a long time to grow to maturity—about a decade.”

“Unlike most fish, which lay eggs, a mother leopard shark keeps her eggs inside her body until they hatch. After 10 to 12 months, she gives birth to a couple of wriggling shark pups, each about 7 inches long. Keeping the eggs safe inside her is a good way to make sure they all hatch, though it’s also a reason why leopard sharks have so few young – at least compared with the thousands of eggs many other fish lay. Female leopard sharks are usually about 10 years old when they have their first litter, but after that they generally mate each year.”

The sharks are quite common along our coast, ranging between Mexico and Oregon.

Female leopard sharks are usually about 10 years old when they have their first litter...

While snorkeling near Santa Barbara several years ago, I observed several of them swimming close to shore. While initially startled to be in the water with a shark, I soon learned that they do not pose a threat to people. In fact, it is a joy to watch them swim. They are graceful and quick swimmers that typically stay close to the bottom, and are rarely found in water more than 65 feet deep. They have a beautiful “leopard-like” pattern of dark ovals on their bodies. The older a leopard shark is, the paler the interior of the spots.

For more information on the leopard shark, go to: http://www.montereybayaquarium.org/animal-guide/fishes/leopard-shark

Note the shark’s multiple rows of teeth in the close-up photo of the mouth. The leopard shark eats clams, fish eggs, fat innkeeper worms, crabs and fish.
The fascinating behavior of one of our favorite tidepool creatures, the octopus, is explored in this easy-to-read book. One of the authors, Jennifer Mather, has a background not only in biology but also psychology. That proves to be a great combination for studying this highly intelligent animal.

A short life span and an intriguing sex life

One of the most amazing things I learned while reading this book was that, for animals that are fairly large, their lifespan is quite short, even for the Great Pacific Octopus (also known as the Giant Pacific Octopus). Surprisingly, Giant octopuses live only three to four years at the most, and for the smallest species, it is six months or less. Some deep-water octopuses may live longer, but everything is slower in the cold water. Octopuses don’t really die young; they die after a full life unless, of course, they get eaten first.

The book’s authors write, “Octopuses have an intriguing sex life. Hidden beyond what we know may be elaborate courtship rituals, and perhaps there may even be mate guarding, multiple mating, or cannibalism once the act is over. Octopuses die at the end of the reproductive process, females literally wasting away, guarding eggs until they die, and males going through senescence and probably getting eaten by predators. This period of senescence, which parallels human dementia, lasts about one month in the males before they die. During that time, they do not eat, lose weight, and sometimes develop skin lesions and lose their coordination.” So for octopuses, mating signifies the beginning of the end.

If you are out tidepooling, and see an octopus aimlessly walking around out of the water, it may be a male going through senescence. I once observed a seagull eating an octopus at Pillar Point. After reading this book, I wondered if what I had witnessed was a male octopus that was going through senescence and therefore was more vulnerable to prey.

Unlike any other animal

The authors go on to explain, “When octopuses evolved away from having a protective outer mollusk shell, their newly exposed body surface had a unique and complicated repertoire that allowed them to put patterns on themselves at will. Within the outer layers of octopus skin are many chromatophores—sacs that contain yellow, red, or brown pigment within an elastic container. When a set of muscles pulls a chromatophores sac out to make it bigger, its color is allowed to show. When the muscles relax, the elastic cover shrinks the sac and the color seems to vanish. A nerve connects to each set of chromatophores muscles, so that nervous signals from the brain can cause an overall change in color in less than 100 milliseconds at any point on the body.”

If you’ve ever seen this happen, you have also noticed that it’s not just the color that changes but also the pattern of the octopus’s skin. This is done by small muscles within the skin. The muscles pull the skin up into little peaks that make the surface appear rough or smooth depending upon what texture the octopus wants to assume. They possess reflecting cells which act like mirrors creating iridescence. They literally reflect or “mirror” what is in the surrounding environment in order to blend in.

Fitzgerald docents get to meet a Giant Pacific Octopus

Earlier this year the Fitzgerald Marine Reserve docents had an opportunity to go behind the scenes at the California Academy of Sciences and actually touch and interact with a Great Pacific Octopus. The octopus was easily six feet in diameter when stretched. The octopus gently touched each one of us on the arm and we were able to stroke its soft head. In addition we were able to see it playing with enrichment toys in its exhibit, making use of its specialized arms. Octopus arms have a lot of jobs to do at once, from walking and feeling the ocean...
bottom to capturing and holding prey, grooming, and, for males, passing a spermatophore packet to the female during mating. This task is done by the third right arm which is structurally different from the others.

New findings have shown that more than half of an octopus’s nerves are in its arms, the movements of which are largely self-directed. If an octopus loses one of its arms (while escaping prey for example), the detached arm will continue to crawl and even sense food. When it encounters something to eat, it will pass the food along the arm correctly in the direction of the phantom mouth. Because arm movements do not need to be controlled by the brain, most of the time, brain functions may be available for a greater purpose.

**Some interesting stories in the book:**

Don’t pack an octopus in your carry-on luggage. Octopuses are known as great escape artists. There’s a story of some scientists who were bringing an octopus back from Indonesia in an ice chest as carry-on luggage aboard an airplane. The octopus escaped in the cabin of the plane causing a ruckus among the passengers. The octopus was retrieved and survived.

Be wary of the bite of an octopus. If an octopus is facing a major threat from a predator, it can bite whatever is molesting it with its beak. A piercing bite from the hard, chitinous, parrot-like beak of an octopus can be a serious deterrent to predators. A scientist at the Seattle Aquarium was bitten by an East Pacific red octopus, the same species we have locally. Here is a description of the scientist’s experience after being bitten: “There was no pain initially, but after about ten minutes, swelling and a fiery pain started and extended up my arm. I was told to pour hot water on the wound and go to the doctor. The wound healed but I had headaches and general weakness for about a week after that.”

I asked Dr. Thomas Niesen, one of our board members and frequent lecturer, to share his octopus bite experience with our readers: “The initial part of my experience was the same as described by the person from the Seattle Aquarium. I was bitten on the left hand at the base of the index finger just in front of the knuckle. It was my stupidity that led to the incident. The small (dinner-plate sized) octopus was stranded on an algal flat and I was attempting to move it to a tidepool. It was OK initially but got freaked and bit me after a few minutes. My entire left arm was numb and stayed that way for a good hour or two. It gradually came back to normal and I was left with a small bite mark. I put salve on it and it never got infected. It healed and left a small scar next to where the moray eel bit me several years previously. You’d think I’d learn…”

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**Excerpted from FFMR’s “Exploring the Tide Zones of Fitzgerald Marine Reserve”**

**RED OCTOPUS (Octopus rubescens)**

One of the most amazing creatures found in the reserve’s intertidal environment is the red octopus. With a golf-ball-sized body/head and eight arms that are less than a foot long, the red octopus is very at home resting beneath ledges, tucked between rocks, or lurking beneath tufts of seaweed in the tidepools. Although it spends most of its time submerged, it is not restricted to the Sub-Tidal Zone as you might expect.

The octopus can swim by squirting water through a special organ called a siphon, which it can direct like a small jet engine. But it also can crawl and climb using its sucker-studded tentacles, and has the amazing capacity to come out of the water completely! Visitors sometimes encounter an octopus as it leaves its usual Sub-Tidal habitat and swims along the surge channels of the Low Tide Zone, or crawls between the shallower pools of the Mid Tide Zone and High Tide Zone in its search of food and shelter. It will even walk on its eight legs across the bare, dry rock of the Splash Zone in its exploratory quests.

This remarkable animal is a mollusk—a relative of the snails, limpets, and mussels that you’ve seen inhabit narrower habitat zones. If you are fortunate enough to find an octopus on your visit, don’t touch it, and watch it carefully. This master of camouflage can change its shape, its color, and even its texture, and will disappear literally in the blink of an eye!
Continuing Education Event: Elkhorn Slough Safari

by Karen Madsen and Julie Walters

One of the favorite FFMR continuing education events over the years has been the boat tour of Elkhorn Slough, located near Moss Landing between Santa Cruz and Monterey. One Sunday, over twenty docents spent a beautiful sunny afternoon on the Elkhorn Slough Safari, a 27-foot pontoon boat. Our tour left out of the Moss Landing harbor and traveled three miles up the Elkhorn Slough. We were fortunate to have enough FFMR volunteers attending to reserve the entire boat! The captain of the boat is Yohn Gideon, and he, along with an on-board naturalist, gave us a history of the area, taught us about slough ecology, and shared many wonderful facts and figures regarding the numerous birds, animals and plants living in the slough. Highlights included viewing over 300 sea otters (about 10% of the California sea otter population!), countless sea lions, harbor seals, sea nettles, purple striped jellyfish, white pelicans and many other birds.

Elkhorn Slough harbors California’s largest tract of tidal salt marsh outside of San Francisco Bay. It is a unique section of the coast where the Monterey Canyon is closest to the coastline. These natural features attract an abundance of wildlife and provide an exceptional ecosystem linking land and sea. The Elkhorn Slough tidal habitats encompass extraordinary biological diversity, providing critical habitat for more than 135 aquatic bird, 550 marine invertebrate, and 102 fish species. More than 200 different bird species feed and rest at the slough during their annual migration.

Along with providing habitat for a diverse range of life, wetlands like Elkhorn Slough provide a critical service to the environment. Wetlands provide a buffer from land to sea — protecting the water from soil erosion and the land by reducing the impact of flooding. As natural filters, wetlands can remove impurities from the water before they enter our streams and oceans. Wetlands also have been proven to be carbon sequesters — removing and storing greenhouse gases from the earth’s atmosphere, slowing the onset of global warming.

Estuaries like Elkhorn Slough are among the most threatened ecosystems in California, facing rates of habitat loss between 75 and 90 percent. As a result, a disproportionate number of rare, threatened, and endangered species reside in these areas. Recognizing the value of these resources to the country, the National Oceanic and Atmospheric Administration (NOAA) designated areas of Elkhorn Slough as part of the Monterey Bay National Marine Sanctuary and as a National Estuarine Research Reserve.

We are so fortunate to live near such an incredible natural resource. Like Fitzgerald Marine Reserve, it is another very special ecosystem that deserves our continued protection.