

The Pinniped Press

A newsletter by and for Noyo Center for Marine Science volunteers

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Sea Stars 101

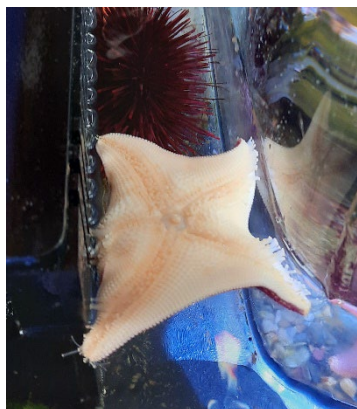
By Peggy Martin

Walking along the bluffs north of Glass Beach, I noticed six colorful patches on a rocky formation, playing “peek-a-boo” with me with each swell of the ocean.

Using binoculars, I discovered they were Ochre Sea Stars (*Pisaster ochraceous*). Ochre Sea Stars are among the almost 2000 different species of sea star. Covered with spiny skin and bumps, sea stars have a hard skeleton made of calcareous plates that move like flexible joints. Commonly called starfish, they have almost nothing in common with fish other than that they live in the ocean. They do not have gills, scales, or fins. Sea stars are invertebrates, related to sea urchins, sea cucumbers and sand dollars - all echinoderms (meaning spiny skin). Sea stars are found in all the world’s oceans, from warm tropical waters to kelp forests, to the cold waters of the polar region. From the intertidal zone to the deep-sea floor. They cannot survive in fresh water, and only a few species can live in brackish water.



Most species have five arms, but some have many more. The sunflower star (*Pycnopodia helianthoides*) has the most arms. Speaking of those arms, parts of most/or all of their vital organs are housed in their arms, including the digestive tract and reproductive organs. This gives some species the ability to regenerate damaged parts, lost arms, or even a whole new star from a single arm attached to a portion of the central disk.



Sea stars have a groove extending from the mouth into each arm. Along the groove there are rows of small tubular projections called tube feet, tipped with muscular suction cups. The tube feet are used for locomotion, feeding, respiration, and sensory functions. The arms can bend and twist allowing sea stars to move over irregular surfaces, grasp prey, or even flip themselves over.

The sea star’s arms are arranged around a central disc which surrounds the internal organs and is where the mouth and anus can be found. Using their strong sense of smell and light receptors, sea stars find and capture prey. They grasp and pry it open with their tiny suction-cupped tube feet. Located in the center of their bottom side, the sack-like stomach --which looks and feels like an egg white -- emerges from the mouth and is inserted into its prey’s shell (or the stomach will surround its prey) to digest the food. When they are done eating its stomach reenters the body. They feed on almost anything they come across, though its favorite food is shellfish, including mussels, clams, and oysters. Most sea stars have a complete digestive system including an anus. Although most

undigested food is regurgitated, there is a small opening located on its dorsal (top) side where other waste is ejected.

A sea star even has eyespots, which lie underneath its skin, at the tip of each arm that allows it to detect light, dark, and large structures such as a coral reef. If you get a chance to look at the very tip of the arm you may see a black or red dot. That's the eyespot! It is a compound eye, like that of an insect, but it doesn't have a lens to focus the light. Having no brain, sea stars have instead a complex network of nerves which serves the same purpose as the central nervous system in humans.



In addition, they have a unique system for nutrient circulation (gas exchange, and locomotion). Sea water, instead of blood, is used to pump nutrients through their bodies by way of a water vascular system. The water is taken in through a spot on the upper part of its body, called the madreporite. Water can go both in and out through the madreporite.

Many marine animals feed on sea star eggs, larvae, and very tiny sea stars. Hungry birds and very big snails in the open sea can be a threat to adult sea stars. Conversely, sea stars can be a serious threat to mussel and oyster beds, as well as coral reefs.

Thought to be the largest sea stars in the world, the sunflower sea star, can grow to 3.3 feet in diameter, have up to 24 arms, and move at 3.3ft/min – making it one of the fastest moving sea stars. Once common on the west coast of North America, and a voracious predator of sea urchin, snails, clams, and more, the International Union for Conservation of Nature (IUCN) in 2020 officially placed the sunflower sea star on the groups Red List of Threatened Species, meaning that it is critically endangered and may be on the brink of extinction. Its population rapidly dropped due to the combination of warming oceans and sea star wasting syndrome (first noticed in ochre sea stars in 2013). It has been estimated that more than 90% of the sunflower sea star population has been lost. According to the Cornell Chronicle (December 2020), "...scientist have noted no signs of a population recovery." That level of sunflower sea star decline allowed purple urchin populations to increase dramatically and devour large areas of kelp.



A note of interest... in 1966 ochre sea stars were the first animals identified and classified as a keystone species. In an experiment conducted by ecologist Robert Treat Paine it was proven that sea stars were essential to the ecosystem. When removed, the food web became completely unbalanced.

Interested in learning more about one group's effort to help conserve and recover the sunflower sea star? Go to our website, Noyocenter.org, and watch the July 6 Science Talk, [The Life History and Captive Rearing of the Sunflower Sea Star \(*Pycnopodia helianthoides*\)](#). Also, the September 28 Science Talk, [Sea Star Wasting Syndrome](#), will be posted to the website soon.

If you prefer to be more hands-on, The Sea Star Project, headed by Noyo Center's Jo-el Houle, enlists local community scientist volunteers for a monthly search to locate and count sunflower stars, as well as other sea star species. The teams go out for about two hours at minus tides and document their finds.

There are reports that some sea star populations, in some areas, are starting to make a comeback. With every sighting of this jewel of the ocean... I am hopeful.

Volunteer Highlight: Becky Stenberg

By Linda Francis



I met Becky Stenberg for the first time at the Slack Tide Café. As we sat on the deck, seals, sea lions, and even a river otter cruised by as we chatted about volunteering for the Noyo Center for Marine Science (NCMS). She'd just come from collecting, shelling, and freezing mussels to be shipped off to the CA Department of Public Health in Richmond where they would be tested for assorted toxins. This task, as part of the Red Tide Program, is one of several jobs she does for NCMS. Another component to the Red Tide Program is collecting plankton samples each week from the Noyo River, which Becky does along with other volunteers. She also does beach surveys twice a month for two beaches in the Westport area.

Becky has been volunteering for NCMS for over a year. Her volunteer work reflects the continuation of a lifelong love of the ocean and its critters that started as a kid with trips to the beach and then solidified in a marine biology class at Piedmont High School.

In 1972 she found herself in Fort Bragg doing everything from fishing for salmon and albacore to painting boats and became a self-declared “harbor rat”. In 1986 she married a “Coastie” who was transferred to Two Rock Coast Guard Station for 10 years. She again found her way to the ocean working on the docks in Bodega Bay, at an abalone and trout farm, and the oyster farms on Tomales Bay. When the family moved back to Fort Bragg in 1996 fishing was in decline, with little harbor rat work available. So she took Greg Grantham’s marine biology classes at the College of the Redwoods. She got her Marine Science Technology Certificate which led to employment by Fish and Wildlife Dept. where she worked until she retired ten years later.

Why does she volunteer for NCMS? It’s a way to get involved and give back. Plus, it is what she likes to do and it gives her an excuse to go to the beach and to look at plankton, a microscopic critter she loves. She attributes this love of plankton to Greg Grantham and volunteers in his honor.

Becky volunteers with our Beach Survey Program, the Red Tide Program, STAR and helped with the Slack Tide Café renovations.

What Washed In?

By Nancy Lloyd

Stranding Coordinator Sarah Grimes and her team have been busy again this month. A deceased juvenile male Humpback whale washed ashore near Glass Beach in Fort Bragg on September 12, and once again, the Noyo Center was part of the response effort and the collection of data. The information from the response provides valuable information about the health of the animal at the time of death, as well as learning more about the conditions surrounding the stranding incident itself. In addition to the community interest, this whale created opportunities for other interested participants to get some “hands on” response experience, including a local (large animal) veterinary team who brought specialized equipment needed to get radiograph images of the intact flipper. That flipper was a whopping 7 feet long and weighed about 300 pounds! Observers from a bluff trail also helped, even assisting with hoisting the large flipper up the cliff for ongoing study, taking candid photos and video to document the event, and talking to the public. This Humpback was the third whale since May of this year to strand on a Mendocino County beach, the others being a rare Hubb’s beaked whale and a sperm whale. Beaked whales and sperm whales are not often seen on our coast, and are not as widely studied as other species, so they provided a great learning experience for the community and research opportunities for further scientific studies.

Noyo Center for Marine Science conducts all marine mammal stranding activities under authorization by the National Marine Fisheries Service through a Stranding Agreement with the California Academy of Sciences, and under NOAA Fisheries MMHSRP permit no. 18786-06.



Environmental Corner

By Sue Coulter

The annual CA Coastal Cleanup, which took place recently, highlights the enormous amount of marine debris that makes its way into our ocean ecosystem. What is marine debris and how does it impact the ocean environment? Marine debris, also known as marine litter, is human-created waste that has deliberately or accidentally been released in a sea or ocean. It originates from a wide variety of locations and often travels great distances before ending up in the ocean. It's a global pollution problem that impacts human health and safety, endangers wildlife and aquatic habitats, and costs both local and national economies millions in wasted resources and lost revenues.

One of the biggest issues is the prevalence of plastics and the repercussions it has on both our health and the health of our ocean. Plastics are typically made from crude and natural gas, key fossil fuels, creates an effect on our environment with increasing greenhouse gas emissions, which directly contributes to global warming. There is a concern about how single use plastics are handled once they are discarded, and it is believed that only a small amount of these materials is actually recycled. In some countries, including the USA, plastics are often burned to manage the excessive amounts, which has a negative impact on air quality, among other issues. As for impact on wildlife and aquatic habitats, we see evidence in entanglements, ingestion, and overall disruption to habitats.

The Noyo Center education team is launching a program in the schools this year called Talking Trash Again – Making Choices That Support a Healthy Ocean. This peer-to-peer project, funded by California Coastal Commission through their Whale Tail Grant, will educate, and raise awareness in elementary, middle and high school classes both in Fort Bragg and Mendocino. The program highlights some of the things we can all do such as paying attention to what we buy, thus lessening what we contribute in waste when we buy single use plastics. There are many options when it comes to single use plastics, such as reusable mugs, water bottles and dinnerware.

To learn more about what is being done to combat that ocean plastics issue, check out one of our favorite inspirational organizations: The Ocean Cleanup. Here's a couple of short videos from them to showcase the important work they're doing!

<https://www.youtube.com/watch?v=JUQnhiZirKQ&t=59s>
<https://www.youtube.com/watch?v=CQnMjYImNyQ>

Did you Know?

By Donna Worster

This is the first edition of the Pinniped Press and I learned today how unprepared I am with “authorized” information about what the ocean provides. While standing on the deck at the Slack Tide Cafe, and watching our resident sea lion wave at me, I thought surely, he has finally recognized me and was saying ‘HELLO’. Sarah Grimes, the Stranding Coordinator, said not so; he was using his “thermoregulation”. According to Google Search, “Thermoregulation is a mechanism by which mammals maintain body temperature with tightly controlled self-regulation independent of external temperatures. Temperature regulation is a type of homeostasis and a means of preserving a stable internal temperature in order to survive”. I will wave back and keep my temperature under control.

Calendar:

- October 2, Sunday, the last day to bid on some great items for our annual Silent Auction fundraiser: https://pages.snwbll.com/auction/m_EPfLolgitCyfAD9D6ghF2w/2022-fall-fundraiser#action
- October 4, Tuesday, 9:30 am, Plankton collection and training/education event, Slack Tide café dockside.
- October 5, Wednesday, 10 am, will be the New Volunteer Orientation via zoom. Register in advance for this meeting: <https://us02web.zoom.us/meeting/register/tZMkd-yqrT8qHNZAMExX-LBZV-rSpAwws4lq>
- October 7, Friday, 2 - 4 pm, Ann Vileisis, the author of *Abalone: The Remarkable History of an Iconic Shellfish* will be signing her book at the Discovery Center. The Discovery Center and the Slack Tide café have copies of her book available for sale.

- October 19, Wednesday, 6:30 pm, Zoom program. Ann Vileisis, the author of *Abalone: The Remarkable History of an Iconic Shellfish*, will be our Science Talk presenter.
Registration: <https://us02web.zoom.us/meeting/register/tZMkceCrrzgjG9QaB9qGMpfNoTuBJ2w8TEYi>

Pinniped Press team: Wendi Felson, Linda Francis, Andrew Jordan, Nancy Lloyd, Peggy Martin, Mary Patyten, Sara Rose, Donna Worster, Cynthia Travis, with Sue Coulter, Sarah Grimes and Trey Petrey. If you have photo or writing skills or have a particular idea for an article or just want to join in with a great group, let me know: wendi@noyocenter.org

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