# Terra Cognita

**A student's way of understanding the earth**

Summer 2013 Volume 3, Issue 4

***Welcome to Terra Cognita,***

*a student-written, environmentally-focused report on events within Skills Center Natural Resources Program, the Olympic Peninsula, and the globe.*

## In This Issue:



**Skills Center Natural Resources**
www.nopsc.org/naturalresources

## Cultural and Natural Resources

**By Stefanie Colliton**

*Natural Resources students at the Elwha River*

I very much wish that I could take the new Skills Center 'Cultural and Natural Resources 1' class next year, because my Skills Center Natural Resources project regarding the largest dam removal in history got me fascinated with the environment and Native American history.

My name is Stefanie Colliton, and I am a Natural Resources 2 Intern at the North Olympic Peninsula Skills Center. From September 2012 to January 2013, I was enrolled in the Natural Resources Options course at the Olympic National Park Visitor Center, where I based my project on the cultural renewal and significance of the salmon returning after the Elwha River dam removal in September 2011.

While the Elwha is muscling out tons of sediment and debris and creating new beaches along the Strait of Juan de Fuca, the environmental bounce back has been astounding. Despite having been deprived of their spawning grounds and reduced to less than five percent of their historical population levels, salmon, including coho, pink, and Chinook, have made a rapid return and are picking up exactly where they left off a century ago. In correlation, many new plants have grown after the silt-rich sediment was released and nourished their seeds.

As well as the Elwha's astounding new ecology, the dam removal was significant because it revitalized the culture of the Lower Elwha Klallam Tribe. The salmon were a very important food source to the Klallam people, and the river was their source of life; with the dams up, they had to watch the fish fade away. Bea Charles, one of the elders, had said, "We cherished it, and we respected it....We didn't waste it, we used every bit of it....I may not see the abundance of fish come back in my lifetime, but I would like to see it come back for my grandchildren, my great grandchildren, and the rest of my people, the following generations to come. It was a gift from our Creator, it was our culture and heritage." The dam removal event also warranted more cultural enlightenment when the Klallam 'creation site' was discovered, a large rock with two deep depressions (shaped like coiled baskets and filled with water) where, as told by oral traditions and recorded reports, was the place where the ancient people would be bathed and blessed by their creator and where they would discover their calling in life.

Ms. Jamie Valadez, the Klallam language teacher at Port Angeles High School, will be co-teaching 'Cultural and Natural Resources 1' class with Mr. Dan Lieberman. Ms. Valadez is a prominent figure in raising awareness and understanding about the history of the Native Americans and the region's boundless importance to them. She was also a stakeholder in creating the Klallam dictionaries, and would be an excellent addition to Mr. Lieberman's already successful 'Natural Resources 1' class by bringing in human stories.

Future students will be studying and learning a lot about history and the environment, including but not limited to the Elwha River and people. Students will have the opportunity to see for themselves the cultural and natural northwest beauty of which we are all part. As for me, I will be graduated from high school and unfortunately not able to take 'Cultural and Natural Resources 1'; however, I recommend the class to anyone.

*Note: to register, please visit the Skills Center at 905 W. 9th St. in Port Angeles or call 360-565-1533*

*Natural Resources 1 students survey birds in PA Harbor*

## Field Work: Marine Debris

*Kortney (right) and the Dungeness National Wildlife Refuge crew collecting data*


*An article of Asian emergency food packaging found on the Dungeness Spit.*

*Natural Resources Options Science student Jennah Matheny takes a break during a marine debris survey on West Elwha beach*

*Notched lumber on Dungeness Spit*

# Tsunami and Marine Debris By Kortney Oen

In March of 2011, a 9.03 magnitude earthquake shook the coastline of Japan. 25 million tons of debris was created, and it is unclear how much of that made it into the Pacific Ocean, and how much of it has sunk since then. Some debris has been found on our beaches. Although tsunami debris is of concern right now, marine debris has been a persistent issue. Coastal cleanup is regularly needed to maintain our beaches' natural beauty.

**Who is working on this problem?** Nir Barnea is the National Oceanic and Atmospheric Administration (NOAA) Marine Debris Regional Coordinator for Oregon and Washington State. NOAA's marine debris program has five strategic goals: Lead in the field of marine debris; facilitate, support, and conduct research and assessment of marine debris; prevent and reduce the occurrence and impacts of marine debris; develop, use, and disseminate tools and products to improve efforts to address marine debris; and encourage changes in behavior to address marine debris. The marine debris program's goal is that through knowledge people will gain appreciation and understanding of the complexity and challenges that are part of the marine debris problem, in this case debris from the tsunami in Japan, and how collaborative work by all involved contributes to addressing this challenge. Another specialist working in the field of marine debris is Ian Miller. He is a Coastal Hazard Specialist, which entails informing the public of marine debris and tsunami debris. Miller works in collation with the Washington SeaGrant program, and the University of Washington to spread information to people in Washington State. Not only does he specialize in marine debris, but also in tsunami warnings and climate change.

**What's the solution?** Because of the lack of information as to where and when tsunami debris will hit, it is hard to come up with a definite solution. However, there are some steps already in progress to help counter the tsunami debris we see washing up today. Barnea also says that it is important to include everyone in the clean-up effort; more help = better!

**State and Federal Efforts:** The NOAA marine debris program is working with the state and federal agencies on marine debris in general and the tsunami-generated marine debris in particular. Washington State and NOAA conducted a series of public meetings to discuss tsunami debris. NOAA has worked closely with the state to draft a marine debris response plan that is now on the web and Barnea encourages everyone to look at it (www.marinedebris.noaa.gov/info/japanfaqs.html). The NOAA marine debris program is working closely with the state and other federal agencies to address the dock that washed up on a remote beach of Olympic National Park. The Olympic Coast National Marine Sanctuary has also been involved in these planning efforts.

**Non-Governmental Organizations:** The NOAA Marine Debris Program has been working for years with CoastSavers (www.coastsavers.org) to help clean up marine debris from the whole length of Washington's outer coast. A number of non-governmental organizations are part of CoastSavers, who work with NOAA to assimilate and respond to tsunami debris.

**Northwest Tribes:** Barnea states that, "Washington coastal Indian Tribes and Nations have been part of the planning for addressing the Japan tsunami marine debris with the state and federal agencies. When Washington State and NOAA conducted a series of public meetings to discuss tsunami debris, the team visited four coastal tribes." The tribes provided good and useful input to the marine debris response plan, and the whole effort benefited from their participation and good insight. In addition, the tribes have been working on marine debris issues for many years. For example, the Makah Tribe assisted the Cousteau Society in filming net and crab pot removal on the Makah reservation. The tribes conduct regular marine debris cleanups and assist CoastSavers during the annual cleanup.

**What can you do?** When asked what someone can do to make an impact on tsunami debris, Miller responded with, "The info collected on the beach is what's important right now. We're waiting on the data to show a big spike in debris." NOAA is using other means, including higher resolution satellite imagery and the public's participation to collect information for planning and cleanup purposes. NOAA developed a model and a map to track where debris will likely circulate in the Pacific Ocean. It launched a marine debris tracker app, which people can use to log rubble they find along coastlines and in waterways. They can also email the agency with their finds. If you or someone you know encounters tsunami debris please contact:

Oregon: Call 2-1-1
Washington: Call 1-855-WACOAST (1-855-922-6278)

# Mountain Pine Beetles By Karsten Turrey

In recent years, the mountain pine beetle has become a problem for Industrial logging and private land owners that have forests in their property. It is a rather small beetle, about 5 mm, and lives under the bark of ponderosa, whitebark, lodgepole, and other types of pine trees. The mountain pine beetles eat through the bark of the pine trees and lay their eggs in the sapwood. Around the time that the beetle enters the tree they introduce blue stain fungus, a type of fungus which stops the tree from repelling or killing the beetles. The fungus also stops the flow of water and nutrients through the tree, which starts to slow and weaken the tree's growth. When the larvae hatch in the sapwood they start to eat it away, killing the host tree. When the larvae become adults they chew their way out through the bark and fly to the next closest tree to lay eggs, repeating the cycle. The female mountain pine beetle is the first one to start the attack. She finds her way to a tree normally at least 10 inches in diameter but down to 4 inches when populations are high. When she chews her way into the bark, pheromones are released; this is a chemical that tells other beetles that there are already some present. The pheromones that the female leaves behind attract both genders of beetle to the same tree.

These little beetles can actually destroy entire forests at a rather fast pace. Nature normally helps keep the numbers of pine beetles down by killing them off through the winter when temperatures lower, but since global warming has increased the temperatures of winter there are not as many fatalities of the mountain pine beetles. This has become an issue in the effort to stop or slow global warming because, even though the beetles have needed global warming to grow in populations, they are now speeding it up by killing forests that hold carbon dioxide; without the forests to hold carbon dioxide global warming will increase at a faster rate.

# Keystone Sea Stars By Stefanie Colliton

They're here, they're there, and they are everywhere…on the pier, at the beach, near Salt Creek, in the aquarium. Some are big, some are small. Some are purple, some are red, and some are white. There are small ones and big ones, with five legs, 10 legs, or 20 legs.

Now that I've gotten my Doctor Seuss-ian parallel structure sentences out of the way, let me tell you about sea stars! You're probably wondering why I consider "sea star" over "starfish"; they are not fish, so it is scientifically incorrect to use the latter term. Sea stars are very interesting creatures. They belong to the phylum *Echinodermata,* which means "spiny skin", along with sea urchins, sand dollars, sea daisies, and sea cucumbers. There are over 2,000 species of sea stars in the world, with a residential range of tropical climates to the cold ocean floor.

In 1969, University of Washington zoology professor Robert T. Paine coined the *Pisaster ochraces* (a specific species of sea star) as a "keystone species", meaning that it is the fundamental species which governs the biological diversity of its entire surroundings. Paine wrote a paper which furthered the conclusions of a field experiment published three years earlier; the research that resulted in this concept was done on Makah Tribal lands, involving the prolonged removal of a single predatory species over a span of three years

With a purple *Pisaster ochraceus* at the Feiro Marine Life Center

(the sea star), and documentation of the changes. In this case, the *Pisaster ochraces* is that species and without its presence, mussels would take over and the diversity of organisms in the intertidal zone would dramatically reduce. Paine is considered the first to publish work on this concept and therefore, the *Pisaster ochraces* can be considered the pilot species of the theory of keystone species. Other types of keystone species include the sea otter, freshwater bass, and whelks.

Another great demonstration of the keystone species concept is presented by the sea otter, which used to inhabit a range extending from the northern Japanese archipelago through the Aleutian Islands, down the coast of North America and as far south as Baja, California. The return of the otter to southern California is restoring the kelp beds and associated marine life because the otter eats the large sea urchin, which feeds on the kelp forests.

Paine's work has been cited by hundreds of researchers over the years, and has been proposed as a foundation for the management efforts to protect the diversity of the world's ecosystems.

Says Paine, "Its importance is that it convinced managers and conservationists alike that the ecological impact of single species matters. That is, in order to manage, understand, and restore ecological assemblages, the roles of individual species have to be understood and considered."

So the next time you see a sea star, don't just think of it as a dime-a-dozen freeloading creature that eats the mussels and clams you want to eat. It HAS a purpose; without it, marine biological diversity is in jeopardy!

To delve deeper into the unique story of keystone species and sea stars, visit Salt Creek or the Feiro Marine Life Center, or check out http://www.washington.edu/research/pathbreakers/1969g.html or

http://animals.nationalgeographic.com/animals/invertebrates/starfish/

# Skills Center Natural Resources

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**Skills Center Natural Resources offers a variety of hands-on skills training options for students 16-21 who do not have a high school diploma. Enrollment is open now.**



Poster by NR Student Chace Souza

**Join the Adventure!**
Enroll in Natural Resources Program Today!

## Summer Options for Students

### Natural Resources Options

Participate in service learning projects at the Feiro Marine Life Center and Olympic National Park Visitor Center, document your work for the community, and earn 0.5 English, science or CTE credits. This class meets in-person some days and is otherwise independent online work. Call the Skills Center at 565-1533 to enroll today.

### Summer Elwha Field Course

Students will have the opportunity to get some hands-on experience with the Elwha Dam removal project. This class runs June 24 - July 12. Call the Skills Center at 565-1533 to get on the wait list.

*Elwha Summer Field Course*

*NR Options English with Feiro Marine Life Center*

## Fall 2013 Options for Students

### Port Angeles

* Streamkeepers (Mondays)
* Oly. Coast Nat. Marine Sanctuary (Tuesdays)
* Feiro Marine Life Center (Thursdays)
* Oly. Nat. Park Visitor Center (Sundays)

### Sequim

* North Olympic Salmon Coalition (Tuesdays)
* Dungeness River Audubon Center (Thursdays)

### Forks

* Oly. Nat. Park Marine Debris (Wednesdays)
* Pacific Coast Salmon Coalition (Wednesdays)

## Student Work Published in Streamkeepers Newsletter

Natural Resources students Chace Souza, Stefanie Colliton and Savannah Kays had their work published. You will find it on pages 5, 6 and 7 of the most recent Streamkeepers newsletter. Check it out online at this website:

http://websrv7.clallam.net/forms/uploads/Streamkeepers20130501143815.pdf

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