



# OUTER CAPE ENVIRONMENTAL AWARENESS NEWSLETTER



In **OCEAN** 43, we are proud to share a fascinating idea from the Himalayas and another, “Close to Home” innovative idea for long term coastal erosion management, a hybrid system of living shoreline and ballasted coir fiber. We also find it difficult to imagine Northwest Seafood being able to contain everything they are discovering in them (see Opioids in Northwest Mussels, page 6) and from **OCEAN** 41 “81 types of drugs and chemicals found in Puget Sound Salmon”). **OCEAN** 44 will link this article with the micro-plastics being found in Mussels. Plastics are not going away and according to **OCEAN** Researcher Brigid McKenna, (page 6) when consumed by sea birds, they tragically cannot be digested. Oh, and now, micro plastics have been discovered in our drinking water. (page 3). **OCEAN** is the free environmental education publication of Safe Harbor. This is your newsletter, written for you our readers. It is Public Domain, so please feel free to share it.

Thank you, Gordon Peabody, Editor.

## TOO MANY FISH?

In **OCEAN** 41, researcher Rae Taylor-Burns wrote an article “Drugs Found in Seattle Salmon.” We were shocked by the list of 81 types of drugs and chemicals found in the wild Salmon of Puget Sound. Recently, it was found that there is another risk to wild Salmon in Washington, that risk is Atlantic Salmon. On August 19, 2017, a fish farm owned by Cooke Aquaculture near Cypress Island in Washington broke open releasing thousands of Atlantic Salmon into the wild. One major concern is that the released Atlantic Salmon will outcompete the local Pacific Salmon, additionally it has been noted that there are further dangers, “the Atlantic salmon bring with them pollution, virus and parasite amplification, and all that harms Pacific salmon and our waters of Washington” ([www.npr.org](http://www.npr.org)). These are all threats that could devastate the local Salmon populations. The State of Washington aims to protect local Pacific Salmon and has recently implemented a ban intended to mitigate any future similar threats.



Photo credit: Megan Farmer / KUOW  
(Atlantic Salmon right, Pacific Salmon left)

Although initially, the release was blamed on particularly high tides from the eclipse, after further investigation it was found that the Salmon were released due to the farm’s poor conditions. Public outrage over this occurrence has grown, particularly as it became known that as many as 250,000 fish were released and that they have spread from Puget Sound up the coast to Canada. This is not the first of such Salmon outbreaks with large escapes occurring in 1996, 1997, and 1999. Cooke Aquaculture owns all of the remaining Atlantic Salmon farms in Washington, as well as numerous additional Salmon farms on three continents.



Photo credit: Robert F. Bukaty/AP

## TOO MANY FISH? (Cont.)

This March, the state of Washington banned Atlantic Salmon farming due to this incident. This new ban was signed by Governor Jay Inslee and will result in the closure of all Atlantic Salmon farms in Washington state by 2022. This step was enacted to protect local wildlife and ecosystems and to help the Pacific Salmon thrive without fear of competition from Atlantic Salmon. This ban may have a slight impact on the Salmon industry but will ultimately help protect local Salmon in the future. To further mitigate the impact of this outbreak, Washington Department of Fish & Wildlife published a fishermen's guide to identify the escaped invasive Atlantic Salmon. Additionally, they encourage fishermen in marine waters to catch as many Atlantic Salmon as they can without limits.

More information in the links below:

<https://www.npr.org/sections/thesalt/2017/08/24/545619525/environmental-nightmare-after-thousands-of-atlantic-salmon-escape-fish-farm>, <https://wdfw.wa.gov/fishing/salmon/atlantic.html>, <https://www.seattletimes.com/seattle-news/fish-farm-caused-atlantic-salmon-spill-state-says-then-tried-to-hide-how-bad-it-was/>

Thank you to **OCEAN** Researcher Jessica Hillman

## “THE KING OF FISHES”, by Ruth Leeney

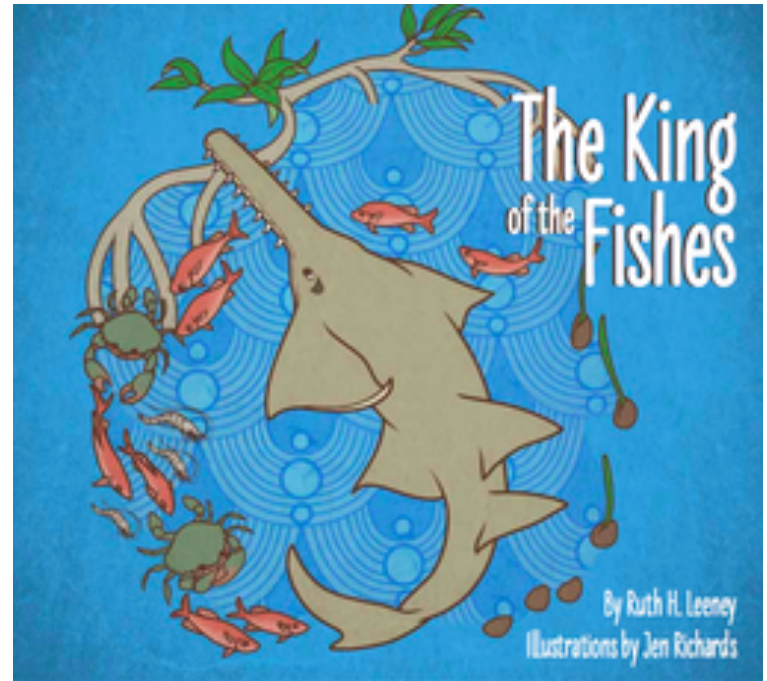
In **OCEAN** 33 Ruth Leeney received our 2016 Environmental Vision Grant for her inspiring work as the founder and Director of Protect Africa's Sawfishes. Ruth's work with local communities and groups in Africa to protect and conserve sawfish while researching them is remarkable. Recently, Ruth published a beautifully illustrated and educational children's book, “The King of the Fishes”. This book is available for free PDF download [here](#).

Ruth has made the book available in English, French, Malagasy, and Portuguese. You may also purchase a hardcopy of the book by contacting [women4oceans@gmail.com](mailto:women4oceans@gmail.com) to request one. We encourage you to support Ruth, her work protecting sawfish, and her beautiful new children's novel educating children about the many threats to sawfish and their importance.

More information in the links below:

<https://women4oceans.weebly.com/sawfish.html>

Thank you to **OCEAN** Researcher Jessica Hillman



## WHO WOULD THINK? Statement from Hawaii

Hawaii is known for its beautiful beaches, colorful reefs and pristine ocean. However, in an unexpected threat to the ecosystem, sunscreen chemicals have been identified as posing a threat to the coral reefs. Recent investigations identified two common sunscreen chemicals, oxybenzone and octinoxate, as harmful to coral reefs. Hawaii, quickly became the first state to ban these chemicals to protect coral reefs. Hawaii's Governor David Ige signed legislation to ban the sale of sunscreens containing the two on July 3, 2018, taking effect in 2021. Once this bill is enacted the only way to buy sunscreen with these chemicals on the island will be with a prescription. Hopefully this bill will help protect the coral reefs and incentivize sunscreen companies to sell more products without these chemicals.

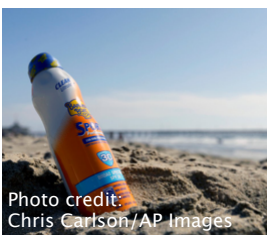


Photo credit:  
Chris Carlson/AP Images

Hawaii has made a statement to the rest of the world by taking this stand to protect coral reefs. While other states have not yet followed Hawaii's example, states like Florida have issued advisories asking that divers avoid these sunscreens in order to protect the Florida Reef Tract. Coral is a critical component of the ocean and must be protected for years to come. Although sunscreen is an essential tool to protect skin from burning, there are many alternative sunscreen options that will not have the same harmful effect on coral reef ecosystems.

More information in the links below:

<https://www.bbc.com/news/world-us-canada-43993407>, [https://www.washingtonpost.com/business/hawaii-bans-sale-of-sunscreens-with-coral-harming-chemicals/2018/07/03/ce9a2436-7f1e-11e8-a63f-7b5d2aba7ac5\\_story.html?utm\\_term=.5a5ce97fe2c5](https://www.washingtonpost.com/business/hawaii-bans-sale-of-sunscreens-with-coral-harming-chemicals/2018/07/03/ce9a2436-7f1e-11e8-a63f-7b5d2aba7ac5_story.html?utm_term=.5a5ce97fe2c5), <https://www.cnn.com/2018/07/09/health/hawaii-sunscreen-ban-questions/index.html>

Thank you to **OCEAN** Researcher Jessica Hillman

## A RIVER SHOULD NEVER KILL ITS FISH



Healthy Coastal Communities and healthy Coastal Resources need each other to survive. Safe Harbor supports restoration of Cape Cod's Natural Resources. The diked, 1,100 acre Herring River Estuary, in Wellfleet MA, is a location that is very close to home for us. Safe Harbor has been monitoring progress towards restoration closely. Slow improvements are ahead for the blocked river system. **OCEAN** 41 advised readers follow updates from: <http://myemail.constantcontact.com/News-about-the-Herring-River-Restoration.html?soid=1102298934525&aid=IDP-dqdatp0>. Recently, the USGS began publishing regular updates on the river. These updates include temperature, pH, and dissolved oxygen and can be viewed [here](#). We will continue to update our readers on any changes in the restoration.

More information in the links below:

<https://www.nps.gov/caco/learn/nature/herring-river-tidal-restoration-project.htm>  
Ecology V5 Video: <https://zygotedigitalfilms.wistia.com/medias/my3oakwfpr>

Thank you to **OCEAN** Researcher Jessica Hillman

## WHAT ARE WE DRINKING NOW?

A new study suggests that billions of people have been drinking water contaminated by plastic particles. These particles have been found in tap water all around the world, with the highest contamination percentage of 94% being in the United States. Some European nations had the lowest contamination rate of 72%, according to a recent study. The biggest questions that this study brings up is: how did this happen?

With plastic being produced at alarming rates it isn't surprising that water is being contaminated with these particles. It is estimated that every year 8 million metric tons of plastic enters the oceans. Eventually these plastics breakdown into tiny microscopic pieces that are no longer visible and end up contaminating water supplies all over the globe. It is possible that a lot of this plastic comes from clothing. It is believed that many of these plastic particles are released from washing machines and dryers. More research is underway, in order to see just how far this plastic contamination has gone.



More information in the links below:

<https://www.theguardian.com/environment/2017/sep/06/plastic-fibres-found-tap-water-around-world-study-reveals>,  
<https://oceanconservancy.org/trash-free-seas/>, <https://spoonuniversity.com/lifestyle/study-shows-there-are-plastic-fibers-in-tap-water>, <http://www.healthgoesup.com/articles/11124/1/plastic-tap-water-concerned-1.html>

Thank you to **OCEAN** Researcher Lindsey Stanton

## EATING THINGS WE CAN'T PRONOUNCE OR SPELL

A recent study suggests that dining out may increase your intake of phthalates, a group of chemicals that are added to plastic to make the material more flexible. Some studies suggest that the most common way that phthalates enter the body is through food consumption. This is because there are so many opportunities for phthalate exposure before it reaches you, whether it's during the processing, transportation or packaging phase. In some cases, phthalate exposure has occurred through food handling gloves. Phthalates seem to be more prevalent in food with animal protein such as hamburgers, which suggests that fat concentration may be a factor. The best way to avoid phthalates is to limit trip to restaurants and animal protein foods, however there is no way to completely eliminate phthalate intake.



**Editor's note:** In the past few years, researchers have [linked phthalates to asthma](#), attention-deficit hyperactivity disorder, breast cancer, obesity and type II diabetes, [low IQ](#), neurodevelopmental issues, behavioral issues, autism spectrum disorders, altered reproductive development and male fertility issues. <https://www.theguardian.com/lifeandstyle/2015/feb/10/phthalates-plastics-chemicals-research-analysis>

More information in the links below:

<https://ehp.niehs.nih.gov/124-a191/>, <https://www.webmd.com/diet/news/20180329/unhealthy-phthalates-found-in-restaurant-food#1>, <https://www.cbsnews.com/news/fast-food-may-come-with-a-side-of-phthalate-chemicals/>

Thank you to **OCEAN** Researcher Lindsey Stanton

## FEEDING SEAWEED TO COWS?

A common misconception about cows is that most of the methane they produce comes from flatulence, when in reality 90% of the methane they produce comes from burping. It is estimated that 14.5% of anthropogenic greenhouse gas emissions come from livestock, but there may be a way to help reduce the amount of methane emissions from cows and other ruminants. New research by Robert Kinley suggests seaweed, specifically *Asapargopsis taxiformis* may be able to reduce methane production by 99% when just 2% of the cow's diet was made up of this seaweed. This type of seaweed works so well due to the chemical bromoform which interferes with the enzymes that produce methane. Though this idea is promising the amount of seaweed it would take to feed all of the cattle in the United States alone would take about 450,000 acres of land to produce, so we have a long way to go.

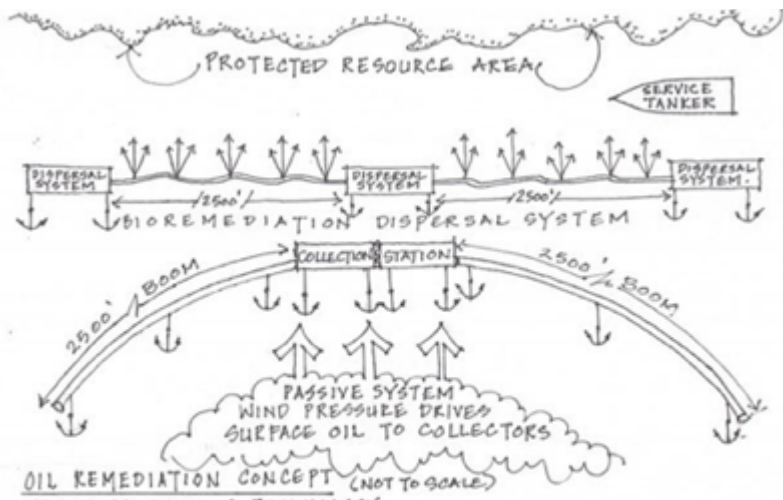
More information in the links below:

<https://blog.csiro.au/seaweed-hold-key-cutting-methane-emissions-cow-burps/>, <https://link.springer.com/article/10.1007/s10811-015-0639-9>, <https://www.nationalgeographic.com/people-and-culture/food/the-plate/2016/11/seaweed-may-be-the-solution-for-burping-cows/>

Thank you to **OCEAN** Researcher Lindsey Stanton



## OIL WAS EVERYWHERE



OIL REMEDIATION CONCEPT (NOT TO SCALE)  
UTILIZING EXISTING TECHNOLOGY  
AVAILABLE MATERIALS & SUSTAINABLE ENERGY MAY 1ST 2010  
CONCEPT BY: GORDON PEABODY, SAFE HARBOR [www.safeharborenv.com](http://www.safeharborenv.com)  
ASSISTED BY: AUSTIN BECKER, PHD CANDIDATE, STANFORD UNIVERSITY  
JOY CUMING, SUSTAINABLE ARCHITECT, [www.alineararchitects.com](http://www.alineararchitects.com)

**Editor's note:** Britton Ward, Naval Architect, was also a member of this team.

In a world where oil is retrieved from beneath the water's surface, inevitably there are spills, therefore in addition to figuring out ways to prevent oil spills, figuring out the best ways to clean up the mess is also important. Back in 2010, 200 million gallons of crude oil were pumped into the Gulf of Mexico during the BP oil spill. Fortunately, various groups of people came with ideas/technologies to help clean up the mess. Safe Harbor, an environmental consulting group, based in Wellfleet Massachusetts led by Gordon Peabody, responded to the crisis by convening an inter disciplinary group to respond by reconfiguring existing technologies in the Gulf to recover oil. This involved an innovative, passive system, utilizing collection barges with anchored booms on either end. Prevailing wind pressure would drive surface oil along the curved booms to the collectors. Once the reclaimed oil is stored and separated, it can be transferred for re-used on shore. A backup, bioremediation system used solar heated barges to culture and maximize reproductive rates of oil digesting

bacteria, which would be bled into waters behind the collection system, through used, perforated fire hoses.

Every private and government group contacted us with an interest in the system. Safe Harbor responded by making our design Public Domain.

Other groups responded to the crisis with other technologies such as, Absorb-It a filtered fabric that can collect 1.5 gallons of oil per square yard, or Gold Crew dispersant which breaks down oil into small particles that float on the surface, and can then be eaten by bacteria. There is also a nanowire paper towel that is able to absorb oil but does not absorb water. Others argues that the best thing to do is just let the oil rise, and once it is on the surface use giant skimmer to collect it. A combination of all of these technologies is likely going to make the largest impact and help return areas effected by oil spills to what they once were.

More information in the links below:

<https://www.thedailybeast.com/oil-cleanup?ref=scroll>

Thank you to **OCEAN** Researcher Lindsey Stanton

## THE PERILS OF STAYING HOME

When people think about air pollution, they typically imagine a city shrouded in smog. Laws are frequently passed and amended with the goal of protecting human health and the environment from outdoor air pollution. Indoor air pollution, however, is a much less talked about and yet equally hazardous threat to human health. What people don't realize is that it is also one that can be easily addressed.

Volatile organic compounds, or VOCs, are carbon-containing compounds that are easily converted from a solid or a liquid to a gas. While VOCs are released from the burning of fuel and are known to be hazardous outdoor air pollutants, VOCs have been found indoors as well. In some cases, concentrations have been found to be up to ten times higher indoors than they are outdoors. VOCs are commonly found in everyday household items including paints and paint thinners, air fresheners, fabric softeners, aerosol sprays, cleansers and disinfectants, hobby supplies, and automotive products. These products can release harmful chemicals into the home environment during and after use, as well as into the areas in which they are stored.

Depending on the type of VOC, the effect on human health can range from no effect to fatal and cancer-causing. In addition, effects can be immediate, or they can show up long after the exposure occurred. The extent of symptoms depends on level of exposure and length of time exposed, but common immediate symptoms include headaches, dizziness, and eye and respiratory tract irritation. Long-term effects can include respiratory and cardiovascular diseases, as well as damage to the liver, kidneys, and central nervous system.

In order to reduce exposure to VOCs and other sources of indoor air pollution, it is suggested to buy limited quantities and follow the manufacturer's instructions when using products known to contain VOCs. Increase ventilation when using these products. Buy unscented household and cosmetic products and use an air filter to help remove harmful chemicals from your home.

More information in the links below:

<https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality>, <https://www.cpsc.gov/Safety-Education/Safety-Guides/Home/The-Inside-Story-A-Guide-to-Indoor-Air-Quality>, [https://toxtown.nlm.nih.gov/text\\_version/chemicals.php?id=31](https://toxtown.nlm.nih.gov/text_version/chemicals.php?id=31)

Thank you to **OCEAN** Researcher Lauri Leach



Photo credit: precisionnutrition.com

## IS SEAWEED TAKING A SEAT AT THE TABLE?

Is seaweed the new superfood? Globally, 145 different species of seaweed are utilized as a source of food, and its consumption is especially popular in Chinese, Japanese and Korean cultures. It is an important source of fiber, vitamins, minerals, essential fatty acids, and even protein in some species. Additionally, research suggests that there may potentially be a link between seaweed consumption and obesity management. Seaweed even has the power to transform the digestive tract, and research has shown that some Japanese people have the ability to digest porphyrin, a compound in seaweed that is indigestible to most Westerners. While not a common part of the American diet, seaweed has been growing in popularity due to its health benefits. Dulse, for example, is a type of red algae currently receiving attention for its potential to be used as a substitute for bacon.

Think beyond sushi... Try making miso soup by simmering kelp in water. Combine chickpeas and seaweed to create seaweed hummus. You can even combine cut-up seaweed with your favorite tea ingredients and sip on your own seaweed tea. From cheese and dulse sandwiches to smoothies, there are endless options. For those that are still squeamish at the idea of adding seaweed to their dinner plates, the key may be simply adding a delicious dressing or sauce. This summer, try cooling off with a seaweed and watermelon salad. Or perhaps toss together seaweed, some tofu, and a homemade lime-sesame dressing.

**Editor's note:** Sugar kelp may become our most prolific and versatile sea green. A previous article described ice cream and beer made from Sugar Kelp! "Planting takes place in the fall and by late winter we have our first crop. It grows through the winter and as winter turns to spring there is rapid growth, forming clean golden brown blades and stipes (stems). We are happy to say that sea farming produces tender, mild flavored, and nutritious sugar kelp that lends itself to any number of recipes and dishes. For those interested in some excellent recipes, we highly recommend Barton Seaver's new book, SuperFood Sea Greens, from Sterling Publishing." <https://maineseafarms.com/what-we-grow/>

(continued on the next page)

## IS SEAWEED TAKING A SEAT AT THE TABLE? (cont.)

[www.americastestkitchen.com/kids](http://www.americastestkitchen.com/kids) <https://www.bostonglobe.com/lifestyle/food-dining/2018/08/06/atk-welcomes-kids-into-kitchen/1to6J4ykwzRUof8eBH9MJL/story.html>

More information in the links below:

<http://nhpr.org/post/foodstuffs-turning-foraged-nh-seaweed-haute-cuisine#stream/0>, <https://www.theguardian.com/lifeandstyle/2013/jul/12/seaweed-recipes-yotam-ottolenghi-wakame>

Thank you to **OCEAN** Researcher *Isabella Backman*

## **EDITOR'S CHOICE: WHY MARINE ANIMALS EAT PLASTICS**



Photo credit: Chris Jordan

In recent years many cities and states worldwide have been leading the charge to reduce single use plastic through bans of plastic grocery bags, straws, and balloons. These bans are becoming more prevalent and accepted- and with good reason. Much of these materials end up in our oceans. So much in fact, that in 2015 there were an estimated 5.25 trillion pieces of plastic debris present in the marine environment, and since plastic doesn't disintegrate (it only breaks down into microplastics) the pollution has potential to affect the ecosystems extremely long term.

The main threat of plastics in the oceans is harming the marine life that live in and depend on the aquatic environment. Marine plastic has been attributed as the cause of deaths to seabirds, turtles, fish, and marine mammals in nearly every ocean. Not only can animals become entangled in it (and die through injury, drowning, and/or starvation), but if ingested they can perish because of toxicity, perforation, suffocation, and/or gastrointestinal blockage. Unfortunately, plastic bags look similar to jellyfish and squid, and many turtles and whales have been found deceased with these in their stomachs (presumably a case of mistaken identity of prey). Just earlier this year a juvenile sperm whale was found dead on a Spanish beach with over 60 pounds of trash discovered in its digestive tract upon necropsy, and it likely died of peritonitis because of plastic perforating its intestine.

Citizens can become environmental stewards by limiting their plastic usage, because every little bit helps. *An estimated 32% of plastic packaging does not end up in trash* (Editor's highlighting) collection, so if individuals do their parts by reducing their plastic usage and being conscientious with recycling hopefully the amount will decline and less will end up in our oceans.

More information in the links below:

<https://www.smithsonianmag.com/smart-news/dead-sperm-whale-had-64-pounds-trash-its-digestive-system-180968776/>, <https://www.nature.com/articles/s41598-018-22939-w>, <https://news.nationalgeographic.com/news/2015/01/150109-oceans-plastic-sea-trash-science-marine-debris/?beta=true>, <http://time.com/4186250/ocean-plastic-fish/>

Thank you to **OCEAN** Researcher *Brigid McKenna*

## **OPIOIDS IN MUSSELS**

It has been known for several years that high concentrations of pharmaceuticals are ending up in Puget Sound water and accumulating in sea life, such as salmon. This has been studied since 2016, and research shows it is because these types of chemicals are not monitored in wastewater treatment.

This spring researchers showed that this same effect is taking place with opioids in Puget Sound. The Washington State Department of Fish and Wildlife found that mussels in water off the coast of Seattle test positive for opioids, in particular, oxycodone. Mussels, like many shellfish, are filter feeders – they take in seawater and use the nutrients in the water as food. However, as they intake seawater, their body tissues accumulate pollutants. This spring, researchers distributed clean mussels to 18 different locations throughout Puget Sound, and collected the mussels several months later to test for chemical concentrations. They found that at three of the 18 locations, the mussels contained trace amounts of oxycodone, indicating high levels of the drug in surrounding waters. This study indicates that oxycodone use in the Seattle region is high, a trend supported by data on opioid related deaths and overdoses in the region.



Photo credit: bigoven.com

More information in the links below:

<https://www.bbc.com/news/world-us-canada-44256765>, **[OCEAN 41](#)**

Thank you to **OCEAN** Researcher *Rae Taylor-Burns*

# **OCEAN ENVIRONMENTAL INNOVATION AWARD** **UNIQUE CLIMATE CHANGE MANAGEMENT SYSTEM**



Photo credit: icescupda.org

In Ladakh region of the Tibetan Plateau near the border of India, Pakistan, and China harsh winters and an arid desert climate have historically presented water and food supply challenges to communities. Faced with the impacts of climate change, which have already begun to exacerbate water shortages, the people in the region have developed a strategy to create more reliable and continuous water supply through the creation of manmade glaciers. This innovative approach uses gravity to pump water from high elevation streams down to villages, where the water is sprayed into the air during freezing cold nights. When the cold air comes in contact with the stream water, it freezes. This freezing is done in geometric cone shaped formations, which minimize the surface area of the ice, and cause it to melt later in the year. This practice effectively banks water throughout the winter, until the cones melt in late spring, when water shortages typically occur. The water from melting ice cones, or “ice stupa” will enable trees and crops to grow in this arid region, greening deserts that have never been greened before. This type of water banking is not new in concept – it has the same impact as the manmade reservoirs on mountain streams. However, the use of ice is novel. Perhaps the future development of this technology will pave the way for other high desert communities to adapt to the impacts of climate change.

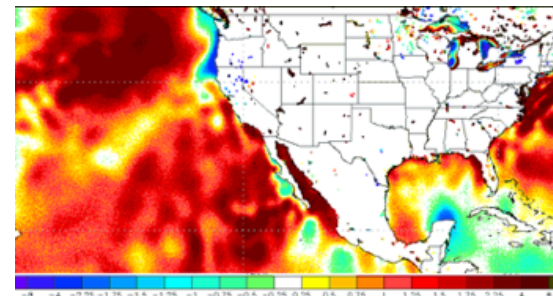
More information in the links below:

<http://www.bbc.co.uk/news/blogs-news-from-elsewhere-42904044>, <https://www.motherjones.com/environment/2015/03/bark-pine-beetles-climate-change-diana-six/>, <http://www.sciencemag.org/news/2012/03/climate-change-sends-beetles-overdrive>

Thank you to **OCEAN** Researcher Rae Taylor-Burns

## **HOW THE OCEAN MANAGES EXTRA HEAT**

Several recent scientific papers have found that the extent of warming in our planet’s oceans is more significant than previously understood. Specifically, these articles explain the ocean “heat waves” that have occurred in recent years, and that these heat waves are getting longer and hotter than such events have historically been. A study published in Nature Communications, found that since 1925 there has been a 54% increase in the number of days that heat waves have taken place in the ocean. In addition to the rise in ocean heat waves, it has been found that the total heat content in the ocean is currently the highest in recorded history. These measurements consider heat in the ocean down to a mile deep. This means that a huge mass of water is gaining heat, and the effects of these heat waves in the ocean are relatively understudied, compared to land heat waves.



Studies show that these ocean heat waves contribute to coral reef bleaching, which in turn can cause entire reefs to die. The first heat induced bleaching was observed in 1983, and since then these events have become increasingly frequent. These ocean heat waves are also causing marine species ranges to shift. As warmer water encroaches towards the poles, warm water plants and animals also shift their ranges poleward. This results in “outsider species” appearing in places they have previously not lived. Warm water in the Pacific Ocean during 2014, which was termed “the blob”, resulted in warm water species moving as far north as the Gulf of Alaska.

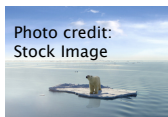


Photo credit: Stock Image

Ocean currents also play an important role in the heat buildup in the ocean. Ocean circulation works like a conveyor belt, in which warm water moves on the surface to the North Atlantic, where it cools, gains density, and sinks. This ocean circulation has been slowing down in recent years, causing a heat buildup in different parts of the ocean. Scientists believe the weakening of the circulation is due to glacial melt in the North Atlantic. Melting glaciers cause freshwater to enter the ocean, and since freshwater is less dense than salt water, glacial melt water stops the ocean current circulation from sinking in the North Atlantic. The impacts of this circulation pattern shutting down could be severe. This ocean circulation drives much of the climate and weather patterns on our planet, as well as the nutrient and larval distribution patterns in the ocean.

More information in the links below:

<https://www.bbc.com/news/science-environment-43713719>, [https://www.washingtonpost.com/news/capital-weather-gang/wp/2018/04/11/heat-waves-over-the-ocean-have-ballooned-and-are-wreaking-havoc-for-marine-life/?noredirect=on&utm\\_term=.67b55b5bf95f](https://www.washingtonpost.com/news/capital-weather-gang/wp/2018/04/11/heat-waves-over-the-ocean-have-ballooned-and-are-wreaking-havoc-for-marine-life/?noredirect=on&utm_term=.67b55b5bf95f)

Thank you to **OCEAN** Researcher Rae Taylor-Burns

## CLOSE TO HOME Hybrid Coastal Erosion System

Safe Harbor is a small, interdisciplinary environmental consulting group on Cape Cod. For about 15 years, their “Living Shoreline” erosion management systems performed successfully and they seemed to make good sense socially, financially and environmentally. A Chatham site had originally been approved for Coir some years ago but we convinced the owner to go with just the living shoreline. The project was successful and remained so for a period of time but now, the Town of Chatham has become a “Climate Change Interface”. “Things” have been changing at a rate which is challenging to meet with existing systems. Special circumstance cofactors have come into play, such as recent barrier beach breaks combined with long duration, “Multi-Tidal Surge Fetch”. We wanted to re-think Coir. Chatham has been a poster child of “redistributed” Coir rolls. Anchors can only do so much when exposed to hydrostatic pressure. It seemed a logical solution to ballast the coir. *This innovative ballasted Coir, as a hybrid system, buried beneath our “Living Shoreline”, could provide additional time delay, protecting property from continuing, possibly catastrophic damages. The Coir would also be anchored but ballast would prevent migration during exceptional storms.* a wire rectangle is depicted but could just as easily use a tube. The Coir mats are wrapped around limited ballast, enough to keep them in place without sacrificing the energy absorption of the Coir. Our living shoreline would be placed above the ballasted Coir. By Gordon Peabody, Safe Harbor Director.

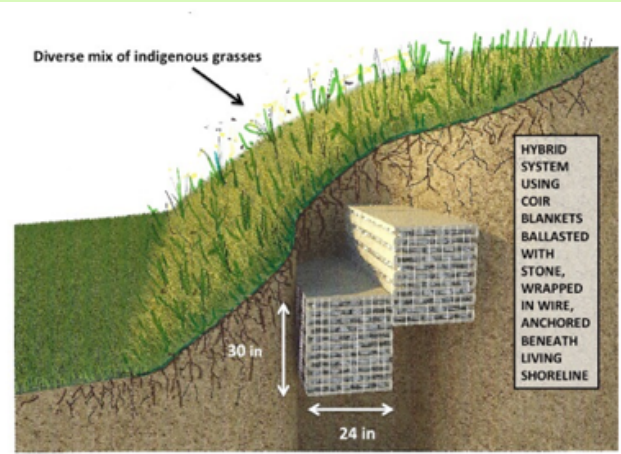
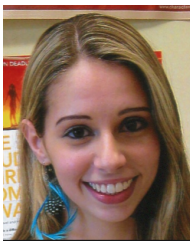
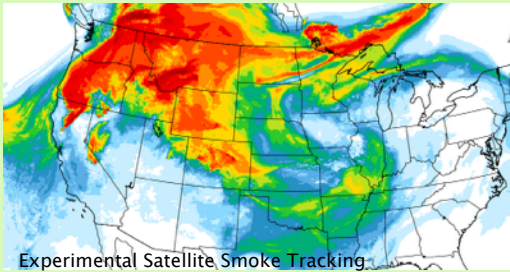


Image by Aline Architects, Orleans, MA

## DISPATCH FROM ROGUE RIVER, OREGON

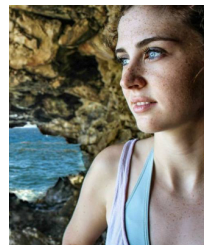
Previous Safe Harbor Summer Intern Addie Drinkwater has joined a Forest Fire Fighting Team in the Northwest. Communications are understandably limited but here is a pic her Mom provided. We are glad to see she is drinking water. Please stay safe.

-Editor



A special thank you to Samantha Thywissen, for her continuing creativity and hard work as **Associate Editor** to make **OCEAN 43** a publication we are all proud of.

To Jess Hillman,  
for her hard work as **Research Coordinator**  
for our far flung Researchers, on **OCEAN 43**.



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