Outer Cape Environmental Awareness Newsletter

This remarkable issue of **OCEAN 56** features our annual, **Environmental Initiative Awards**, this year going to two events, which we felt were profound, perhaps not in scope but with inspiration. We are also sharing Associate Editor Samantha's well researched, heartfelt article on the extraordinary losses of Porpoises from Sea of Cortez By-Catch. We also are introducing new researcher Catherine Urquhart, who suggests we take note of troubling recent cloud tops, breaking records for heights and temperatures. We have written this newsletter for you our readers, with no advertising or solicitation, it only has value to us when we share it. Thank you for your support.

Fair winds, Gordon Peabody, **OCEAN** Editor.

September, 2021 Issue No. 56

STAYING SAFE (Part 6)

COVID-19 has been impacting our lives for over a year now, and while many of us hoped this summer would be safe, it is still important to stay informed and stay safe. While 2021 has brought a lot of positive progress with the pandemic and many Americans are now fully vaccinated, COVID-19 is still impacting the Cape. The 4th of July was meant to be a big celebration with the goal of reaching 70% vaccination rates for adults. While that goal was not quite reached, 67% of American adults had at least one shot by the 4th of July and many were celebrating and happy to finally feel safe visiting loved ones and friends. Unfortunately, the Delta variant has increased the spread and Provincetown Cape Cod was heavily impacted by this. This July there have been 469 COVID-19 cases from summer gatherings on Cape Cod, despite 74% of positive cases being fully vaccinated.

It is important to learn from this and continue to follow local regulations and recommendations. While we all want things to get back to normal, there are still many things we can do to stay safe and healthy this summer. **OCEAN** will continue to share updates for Cape Cod to help share information and keep our community safe. To find recent data and information on COVID-19 we encourage our readers to visit the Massachusetts Department of Public Health COVID-19 Dashboard. It is also important to stay up to date on the COVID-19 updates for Cape Cod so be sure to check out the Barnstable County Department of Health website. While updates and recommendations are changing it is important to review any new recommendations or local updates. If any readers are looking to get vaccinated, be sure to check https://vaxfinder.mass.gov for your closest options. Additionally, if readers have any questions the Barnstable County Health Department has a COVID-19 help line that callers can reach at: (774) 330-3001. We hope this information will help our readers stay safe while continuing to enjoy Cape Cod this summer.

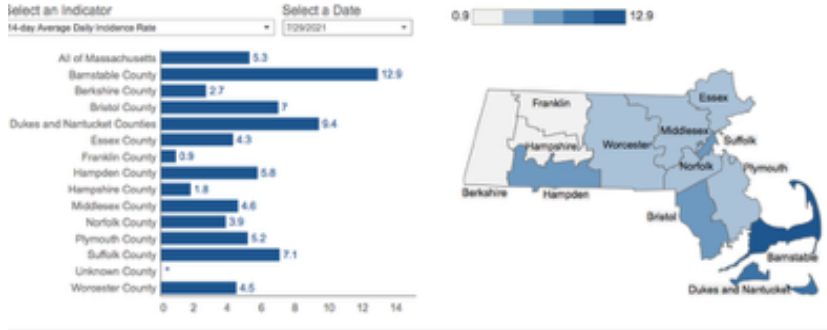

Photo credit: July 29, 2019 MADPH. Incident range by county

Further information:
https://www.cdc.gov/mmwr/volumes/70/wr/mm7031e2.htm
https://www.mass.gov/info-details/covid-19-response-reporting#covid-19-interactive-data-dashboard-
https://www.barnstablecountyhealth.org/newsroom/july-30-2021-update-covid-19-cluster-in-provincetown
https://www.provincetown-ma.gov/1364/COVID-19-Information-Page

RED FLAG IN THE UPPER ATMOSPHERE

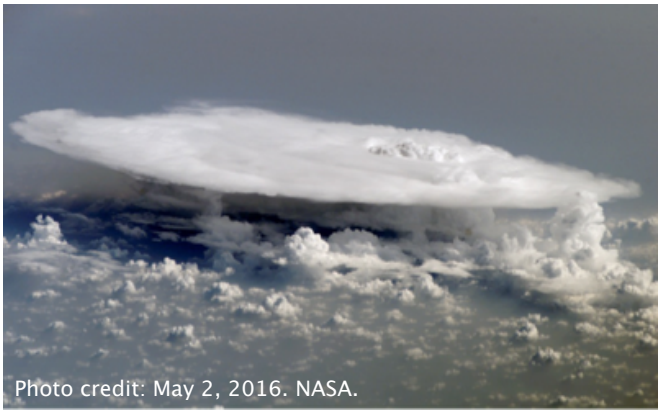
Photo credit: May 2, 2016. NASA.

A recently published study described what is likely to be the coldest tropical storm clouds on record. An orbiting satellite measured the lowest temperature at the top of the clouds to be -167.8 Fahrenheit in December of 2018. While the tops of storm clouds often reach temperatures well below freezing, the peak of this storm was 86 Fahrenheit colder than an average storm cloud. Typically, colder clouds lead to more intense storms, and this record-cold cloud formation accordingly resulted in a dangerous tropical storm in the Southwest Pacific. Thunderstorms like this occur when hot, moist air quickly enters the earth's atmosphere, often pushed upwards by strong winds over an ocean. When warm air hits the top of the atmosphere, known as the stratosphere, they are unable to enter it, and in turn flatten out into a cloud formation that looks somewhat like an atomic bomb explosion. However, when a storm has an excess of energy, it can penetrate the stratosphere and cause an uneven cloud formation that reaches higher altitudes with lower temperatures. The more a storm breaks through the stratosphere, the more extreme and dangerous the resulting weather events can be, leading to intense rains, hail, and lightning. Notably, the number of these record cold clouds and intense storms have been increasing in the past two decades. Scientists do not yet understand if or how this increase relates to climate change, but further research is beginning.

*Thank you to new **OCEAN** Researcher Catherine Urquhart*

Further information:
https://www.bbc.com/news/science-environment-56542408
http://www.nasa.gov/feature/langley/nasa-researchers-improve-hazardous-weather-forecasts
Record-Low Cloud Temperatures Associated With a Tropical Deep Convective Event
https://www.livescience.com/super-cold-thunderstorm-temperature.html

PAVING WITH BETTER INTENTIONS


Photo credit: TechniSoil

Creating roads out of waste plastic that is melted down and mixed with paving materials is becoming more common around the world. Experts say the roads could become one of many diverse uses for discarded plastic in the future. This innovation could yield tremendous environmental and cost benefits for California and the world.

A California based company, named TechniSoil Industrial, has come up with a breakthrough road recycling technology. Using as many as 150,000 plastic bottles per lane mile, and recycling 100% of the existing road already in place. This has resulted in a completely new category of plastic pavement that lasts at least two to three times longer than traditional asphalt pavement. In fact, several studies have indicated roads that contain waste plastic perform as well or even better than the traditional asphalt roads. Being overall stronger and lasting longer because they can tolerate big temperature changes. This temperature tolerance allows them to be more resistant to cracking, potholes, and water damage issues.

The process utilizes what the company calls a "recycling train." It is four large construction vehicles linked together. This 'train' scoops up the top 3 inches of asphalt on a lane then grinds that asphalt on a mill. The liquefied plastic is then mixed with the asphalt. The blended product is deposited back on the road, paved, and rolled over. There is no heat involved in this process as the more durable plastic composite replaces the traditional binder called bitumen, which is a byproduct of refining oil.

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PAVING WITH BETTER INTENTIONS (cont.)

Overall, some of the many benefits of this innovation would be a tremendous reduction of greenhouse gas emissions, no use of new materials, less energy used, reduction of truck hauling, and a reduction of paving time.

*Thank you to **OCEAN** Researcher Madeline Conley*

Further information:
https://www.usatoday.com/story/news/nation/2020/08/08/recycling-plastic-pet-bottles-repave-california-roads/3315815001/?fbclid=IwAR0_1WX7O7Dd8RaBR-V34oNaaQ1LchTj5M9E1AUI-5cuqfOJcXu_X8HG-pw

THE UPHILL BATTLE WITH MICROPLASTICS


Photo credit: Moment/ Getty Images

The news regarding the dangers of plastic waste has been circulating for decades, yet humans don't seem to realize the severity in which the natural world has been harmed by plastic. Every year there is nearly 350 million tons of plastic produced; 300 million tons of this plastic ends up as waste. Although more companies have recently started to employ and promote the use of recycled plastic, the high expense of doing so has resulted in many corporations regressing back to the use of new plastic. Thus, an underwhelming 9% of all plastic ever produced has been made into something new. With no end in sight to the excessive production of and use of plastic materials, scientists are looking into a new discovery that could potentially help decrease the amount of plastic waste that ends up in landfill or the ocean.

In 2016, a group of Japanese scientists discovered a strain of bacteria named *Ideonella sakainesis,* that thrived off polyethylene terephthalate (PET) plastics. When the bacteria come into contact with the PET plastic, they secrete enzymes that convert the plastic into a chemical that is then absorbed by the bacteria (or cell). The cell uses this chemical to create energy and carbon, effectively living off the plastic. Four years later in 2020, German scientists discovered other bacteria that can degrade polyurethane plastic. This strain has the remarkable ability to survive the carcinogens produced by the plastic when it is broken down, unlike other bacterium.

These recent exciting discoveries present a hopeful outlook on new possibilities to combat the plastic waste epidemic that has damaged ecosystems and all forms of life around the world. Professor John McGeehan, director of the Centre for Enzyme Innovation at the University of Portsmouth, England, explains that "While there is still much work to be done, this is exciting and necessary research that demonstrates the power of looking to nature to find valuable biocatalysts. Understanding and harnessing such natural processes will open the door for innovative recycling solutions".

*Thank you to **OCEAN** Researcher Tess Holland*

Further information:
https://www.youtube.com/watch?v=DDhPuyrSq3E
https://www.forbes.com/sites/scottcarpenter/2021/03/10/the-race-to-develop-plastic-eating-bacteria/?sh=4c8485ad7406
https://www.theguardian.com/environment/2020/mar/27/scientists-find-bug-that-feasts-on-toxic-plastic
https://www.prescouter.com/2016/03/scientists-discover-plastic-eating-bacteria-that-could-help-clean-oceans/

BREAKTHROUGH SCIENCE RESTORES SIGHT USING ALGAE

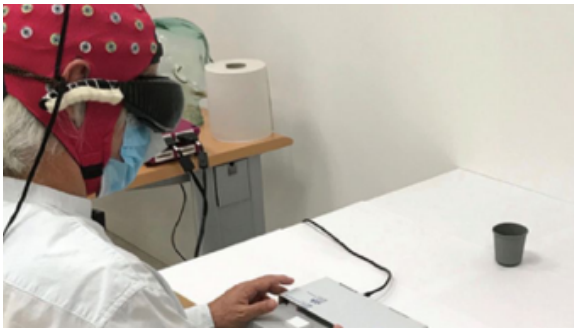

Photo credit: Jose-Alain Sahel & Botond Roska for Nature Medicine

Through optogenetics and the use of proteins found in algae, a new treatment to partially restore eyesight has recently proven successful. Optogenetics, a term that "broadly describes the technique of using light and genetic modification to control the activity of neurons" as stated by Lanese, is creating tremendous excitement in the medical profession, with the potential to turn a patient's life around for the better. The first step towards partially restoring a patient's eyesight is the adoption of a technique called gene therapy. Gene therapy is the transfer of genetic instructions to the damaged retina cells; specifically, the genetic instructions from channelrhodopsins found in algae were used. These proteins are light sensitive, so when light enters the retina cell with the genetic instructions, the retina's ability to send messages to the brain is effectuated.

This technique was tested on a resident of Brittany, France. The patient, whose name has not been published for confidentiality reasons, was diagnosed forty years ago with retinitis pigmentosa. This inherited genetic disorder is characterized by the deterioration, and eventual loss of retina cells, which are photoreceptors, or light-sensitive cells in eyes. When first introduced to light, the patient could only detect amber wavelengths, but with the help of specialized goggles that converted real world images into a wavelength that he could see, he was able to locate, count, and identify various objects. The patient also reported being able to see the white crossing lines on a street, a monumental moment for both the patient and medical professionals developing this treatment. The promising results of this treatment suggest that there may be other creative and innovative uses of nature to improve the quality of patient's lives.

*Thank you to **OCEAN** Researcher Tess Holland*

Further information:
https://www.bbc.com/news/health-57226572
https://www.livescience.com/man-partially-recovers-sight-after-gene-therapy.html.
https://www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/retinitis-pigmentosa

PIECING TOGETHER THE MICROPLASTICS PROBLEM

Photo credit: Vincenzo, A.D.

Microplastics have been a hot topic for some time, this term refers to plastics that are less than 5mm in size. As discussed in one or our previous articles from **OCEAN 53** microplastics have been associated with causing problems for lobster growth rates, as well as concerns of other animals ingesting the plastic. Though these issues are still taking place, new research by the University of Manchester has found the highest ever recorded amount of microplastics on the seafloor; the total amount equaling 1.9 million pieces per square meter. Based on their research scientists believe that microplastic smaller than 1mm in size have been concentrated in specific locations due to powerful currents. The concern with these microplastic moving to the bottom of the ocean; as well as these underwater currents, means that microplastics could be settling in areas with a large range of underwater sea creatures increasing the likelihood that marine life could be ingesting the plastics. As research has shown, ingestions of plastics can have dire unintended consequences.

When the issue of microplastics first arose most of the attention was placed on the microplastics in visible areas, floating on the surface of the ocean, or accumulations on beaches. It is now believed that microplastics have found their way into virtually every area of the earth. With more plastics found around the Earth the more other animals, and in turn humans begin to consume plastics resulting in an incredibly worrisome cycle. In order to combat this fate, the goal is to reduce the amount of plastic entering the plant and even remove the plastics already in place.

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PIECING TOGETHER THE MICROPLASTICS PROBLEM (cont.)

Though this is a daunting task; action has already begun. In a previous article **OCEAN 50** an emerging technology to combat plastic pollution was a bacteria capable of breaking down plastics. This research is still developing but it is one of many potential solutions to an enormous problem. Like many complex problems it is unlikely that one idea will entirely resolve the issue; rather it'll take a combination of innovations to solve our microplastic pollution problem.

*Thank you to **OCEAN** Researcher Lindsey Stanton*

Further information:
https://www.bbc.com/news/science-environment-52489126 https://static1.squarespace.com/static/58910d716a4963f35f8da04d/t/5e862a2911c0a43b10620886/1585850937933/OCEAN50.pdf https://static1.squarespace.com/static/58910d716a4963f35f8da04d/t/5fac6a9b24c06f537356ceec/1605135011848/O53.pdf https://www.nationalgeographic.com/science/article/microplastics-in-virtually-every-crevice-on-earth.

VAQUITA & THE SEA OF CORTEZ


Photo credit: NOAA West Coast Fisheries

The same story has played out countless times in recent history. There is a unique species that is thriving in their natural habitat, humans get involved and the species become endangered. In this case the species affected is the Vaquitas; a type of porpoise located only in the Sea of Cortez in Mexico. In a recent writing by **OCEAN *Associate Editor Samantha Thywissen,*** "*A Tale of Two Species"* she highlights the struggle that the Vaquitas have faced primarily due to pressure from the fishing industry. The worst part is that the Vaquitas are not the intended species being fished but are a product of bycatch when the targeted Totoaba fish are being captured.

It is estimated that in 1957 there were 567 Vaquita present, and since then that number has dwindled to an estimated 19 Vaquita as of the summer of 2018. In her writing Samantha delves into what the Mexican government has done to stop the decline of the Vaquita and the uphill battle that has been faced. She highlights how no solution is one sided showing the struggle of the individuals living along the Sea of Cortez and how putting practices in place to help the Vaquita can negatively affect the local population. There is also a struggle between policies put in place and actually enforcing those policies, which is not always possible. To read her full-article, *A Tale of Two Species*, click the link below:
https://storymaps.arcgis.com/stories/0430d8600cb74de6b253eb6c2c017463


Photo credit: Save The Whales

*Thank you to **OCEAN** Researcher Lindsey Stanton*

Further information:
https://www.cbsnews.com/news/vaquitas-endangered-battle-sea-of-cortez-mexico-baja-california-sea-shepherd/
https://blueocean.net/vaquita-countdown/

ENDOCRINE DISRUPTOR USED IN ANTIMICROBIAL PRODUCTS

Triclosan is an antimicrobial agent found in consumer products to prevent bacterial contamination including toothpaste, antibacterial soaps, hand sanitizers, and even kitchenware and toys. Research has shown triclosan can disrupt the endocrine system increasing the risk of osteoporosis. It may be at fault for inflammation from increased stimulation of gut microbiota in addition to other negative impacts.

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ENDOCRINE DISRUPTOR USED IN ANTIMICROBIAL PRODUCTS (cont.)

Photo credit: Jim Mone for the Associated Press

But triclosan is not all harmful and has been shown to reduce surgical site infection, reduce inflammation, and help prevent gingivitis. Triclosan is a complex compound proven to have positive and negative implications on human health and, therefore the center of debate when it comes to use and application.

In 2016, the FDA requested more data on active ingredients used in over the counter (OTC) antiseptic rubs, which are not intended to be rinsed off after use, to better understand safety and effectiveness. As a result, the FDA's final rule declared triclosan as one of twenty-eight active ingredients ineligible for the evaluation under the FDA's OTC Drug Review for use in antiseptic rubs. In a time of increased use of antiseptic rub products, this is good news and will affect less than 3 percent of the market as ethyl alcohol is typically the active ingredient. Further, the FDA is acquiring more extensive data on other common active ingredients to ensure reoccurring use is safe and effective for consumers.

As consumers, this complex understanding, and knowledge of ingredients used in products can be overwhelming and challenging to conclude. Increased research and awareness of triclosan amongst similar cases can promote consumers to be aware of ingredients we use in our beauty, hygiene, and OTC products we use daily. Transparency can encourage research and educated decisions on products we use as consumers and to ask questions about safety and effectiveness to those that we rely on for regulation like the FDA.

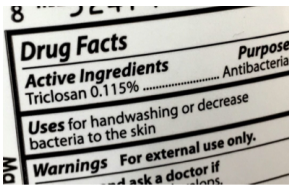

Photo credit: Lara Alder

*Thank you to **OCEAN** Researcher Abigail Eilar*

Further information:
https://cen.acs.org/safety/consumer-safety/US-FDA-finalizes-hand-sanitizer/97/web/2019/04#:~:text=Manufacturers%20can%20no%20longer%20use,Drug%20Administration%20on%20April%2011
https://www.fda.gov/news-events/press-announcements/fda-issues-final-rule-safety-and-effectiveness-consumer-hand-sanitizers
https://www.mayoclinic.org/healthy-lifestyle/adult-health/expert-answers/triclosan/faq-20057861?reDate=08072021

JAPANESE CHERRY BLOSSOM BLOOM IS EARLIEST IN 1,200 YEARS


Photo credit: Tomoko Ishigaki

Cherry blossoms, *sakura*, are celebrated in Japanese culture each year by signifying the welcome of spring. In addition, each year, cherry blossoms are celebrated by people worldwide in parties and gatherings to enjoy the blooms in a custom called *hanami*. However, their life is short, with bloom peaks around two-weeks before falling shortly after, signifying the "fleeting nature of life". Cherry blossom season is closely monitored, with temperatures being the main factor in blooming season which historically occurs in mid-April. Researcher Yasuyuki Aono from Osaka Prefecture University has ***bloom day data tracing back to 812*** and has created trends showing transitions to earlier blooming seasons.

Transitions to earlier blooming seasons increase concerns about climate change due to cherry blossom's sensitivity to temperature. In Kyoto, March 26th marked the peak of cherry blossoms which is the earliest date recorded in the last 1200 years, beating out the previous record of March 27th in 1409. Although an earlier bloom season may not initially seem of concern, their earlier bloom may have negative trickle-down effects on other organisms and ecosystems. Organisms adapt to climate changes at different paces, causing various responses to change in temperature, breeding and flowering season, etc. If flowering plant season begins to change drastically, pollinators such as bees and butterflies may miss their chance at pollination negatively impacting plants.

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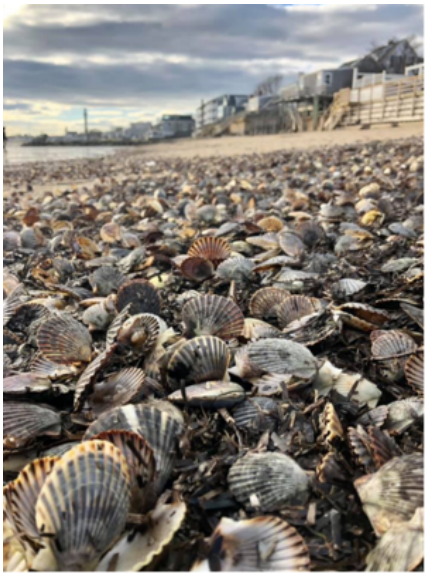
JAPANESE CHERRY BLOSSOM BLOOM IS EARLIEST IN 1,200 YEARS (cont.)

As climate change increasingly becomes a hot topic, we must understand the negative implications on species culturally important like the cherry blossom. Cherry blossoms' early bloom season means much more than early spring and could inform how ecosystem dynamics change. Understanding climate change and taking steps to prevent further disruptions will promote a future of cherry blossom celebration and the brightly colored indication of spring.

*Thank you to **OCEAN** Researcher Abigail Eilar*

Further information:
https://www.scientificamerican.com/article/iconic-cherry-blossoms-are-blooming-earlier-than-ever-in-washington-d-c/
https://www.bbc.com/news/world-asia-56574142#:%7E:text=The%20cherry%20blossom%20season%2C%20Japan%E2%80%99s,data%20collected%20by%20Osaka%20University
https://festival.si.edu/blog/2014/significance-of-sakura-cherry-blossom-traditions-in-japan/

2021 OCEAN ENVIRONMENTAL INITIATIVE AWARDS



"CLOSE TO HOME"
A most remarkable story from Cape Cod: Two Provincetown Fishermen came to the rescue of tens of thousands of storm stranded, baby Blue Eyed Scallops. 3 Minute video.
https://youtu.be/q-PQJb6xqKs

"WILDLIFE CONSERVATION IN ACTION"
An informative website and short inspirational video about a conservation project that brings together scientists, teachers, and students who work together, in oder to restore a nearly vanished species of tiny fish in Colorado.

https://www.redbellydacerecovery.org/

https://www.youtube.com/watch?v=xikHE_AvkQ4

NOTE FROM THE EDITOR

OCEAN Environmental Newsletter supports restoration of healthy natural resources in Coastal Communities.

Cape Cod National Seashore Superintendent George Price and Massachusetts Senator Ted Kennedy took their time reviewing the Herring River restoration plan and approved it. Senator Kennedy told Safe Harbor Director Gordon Peabody, we needed to "get our Herring back".

BE BETTER INFORMED: If you have questions about the Herring River Estuary Restoration here are some links to find answers.

http://www.friendsofherringriver.org/Fact-Sheets

Videos:
https://zygotedigitalfilms.wistia.com/medias/my3oakwfpr
Includes past Chair of the Herring River Technical Committee, **OCEAN** Editor Gordon Peabody
http://www.friendsofherringriver.org/

Thank you to **OCEAN** Research Coordinator Jessica Hillman (right). Her continuing efforts in support of our endless curiosity are appreciated.

Thank you to **OCEAN** Associated Editor Samantha (left). Her creative efforts in support of our educational goals are most appreciated.

Gordon Peabody, **OCEAN** Editor.

Check out our website for previous Newsletter content or other free publications:
https://www.safeharborenv.com/ocean-newsletter