



Outer Cape Environmental Awareness Newsletter

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A word from OCEAN's Editor: GORDON PEABODY

Our readers often ask where **OCEAN** comes from? This is the environmental education publication of Safe Harbor Environmental Services, an interdisciplinary environmental consulting group on Cape Cod. OCEAN is your publication. Please share it with friends who share your interests. This issue has a few unusual articles, not the least of which documents a snake falling from the sky, onto a woman mowing her yard, after which, she was viciously attacked not only by the snake but also by the hawk which had been carrying the snake! And check out our "Wastewater To Beer" article!

-Gordon Peabody, Editor



A Cry for Kelp



THANK YOU TO **OCEAN**
RESEARCHER PARKER DAVENPORT

With a population that is rapidly growing and urbanizing, the utilization of resources is becoming insurmountable to the livelihood of humans. The most threatening consequence of this is the inability to sustainably cultivate enough food to feed these mouths. In recent decades, there has been heavy reliance on mass production of synthetic foods, at the expense of the environment's health. Now, each day seems to be a balancing act between vested interests amongst the public. This looming thought has pushed some to adapt to more creative alternatives for food.

One of these is a transition to kelp for food, energy, and even renewable packaging. Most importantly, it could even be used to reverse the effects of climate change. Kelp needs carbon to grow, which helps to reverse oceanic acidification. Moreover, coastal ecosystems can "sequester up to 20 times more carbon per acre than land forests" (The Food Institute). Kelp also reproduces by releasing billions of spores from its leaves, each of which can turn into a new kelp strand growing at around a foot a day. Needless to say, kelp is readily available and all it needs is an aquatic environment, carbon, and sunlight.

Moreover, it can be harvested at high rates. Companies such as Barnacle Foods are pushing for the integration of kelp into mainstream dieting in the form of chili crisp, mango habanero queso, hot sauces, and more. On top of all these benefits, kelp is also coined a "superfood." Rich in vitamins and minerals such as vitamin A, vitamin K, calcium, magnesium, and iron, it is hard to deny the benefits. Kelp also has been known to improve gut and digestive health, brain health, and improve weight management as it contains hormones that regulate metabolism. The only question that remains is why haven't you started eating kelp?



Further Information:

- <https://www.barnaclefoods.com/products/kelp-salsa-campfire?variant=31051767709719>
- <https://www.barnaclefoods.com/pages/kelp-climate-change>

Image Source:

<https://foodinstitute.com/consumerinsights/is-sustainable-superfood-kelp-about-to-make-waves/>

Migration Changes Create Stress

THANK YOU TO **OCEAN**
RESEARCHER PARKER DAVENPORT

The past decade has borne witness to some of the most extreme decline in bird populations in the United Kingdom. As the effects of climate change continue to take their toll, there seems to be competition amongst bird species for survival as they battle for resources. In the eyes of the public, they are enjoying the new variety of birds they are experiencing, such as the black-winged stilts and bee-eaters. However, it is a much more dire problem than meeting the eye.

If there are winners, there also must be losers, as seen in the steep decline in cuckoos populations along the British seashore. There also seems to be a third party that is attempting to take advantage of the effects of climate change. Warmer and longer summers mean that reed warblers, another type of native bird, can produce more offspring. Another species, called the Cetti's warbler, is taking these hotter temperatures to move north and expand their range.

Additionally, the change in season is interfering with some bird's internal clocks. This results in birds leaving at inopportune times to migrate. Bad timing along with heightened competition for fewer resources leaves some populations in "free fall" as they cannot make it across the Sahara due to less availability of food. Overall, between 2015 to 2020, almost half the species of birds in the UK experienced a sharp decline (Natural History Museum). Moreover, in 2021, 130 breeding species were on average 12% below their [population from] 1970 (Natural History Museum). As news of this is beginning to spread across Britain, people are beginning to take heed to what they see and hear, especially wintering species. With organizations such as the British Trust for Ornithology (BTO) taking a deeper dive into these fields, we can rest assured there will still be enough early birds to get their worms.



Further Information:

- <https://www.bbc.com/news/science-environment-66858850>
- <https://www.nhm.ac.uk/discover/news/2023/april/almost-half-of-all-uk-bird-species-in-decline.html>
- <https://www.bto.org/our-science/publications/research-reports/climate-change-and-uks-birds>

Image Source: Image: Animal Ecology in Focus, Reed Warbler

Unusual Item Report: Gravity Batteries

THANK YOU TO **OCEAN**
RESEARCHER LINDSEY STANTON



In recent years sustainable solutions to the energy crisis have been in the works including solar panels, wind turbines and different forms of energy generation. With some brilliant ideas to create power, one nagging question remains: How to store excess energy generated and what to do during periods of peak energy demand when enough energy cannot be quickly made. Some ideas already exist, primarily in the form of lithium batteries, hydrogen and water-based systems, but they all have various drawbacks.

With lithium batteries, though storage of power can be convenient, the storage capacity tends to decrease overtime. Additionally environmental concerns in relation to mining have become more of an issue in recent years. The other thought is the use of hydrogen power; in comparison to traditional forms of fuel there are no harmful by-products, and it is relatively easy to transport, however production of hydrogen can be very complicated.

Gravity battery systems are very similar to water-based gravity systems. They both use excess power to move and store something to release it during times of peak demand. In the case of water-based gravity systems, it relies heavily on certain geography to function and can be costly. In the case of gravity batteries, a heavy weight is lifted in the air or on top of a deep shaft, to be released/lowered when needed to produce energy. Due to this method, it is not dependent on certain geography to function and tends to be less costly than other gravity-based systems. Specifically in terms of upkeep, because the gravity system is generally cheaper to repair it may be a solution to one of the biggest drawbacks of renewable energy.



Further Information:

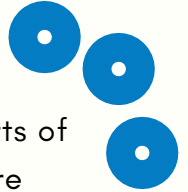
- <https://www.bbc.com/future/article/20220511-can-gravity-batteries-solve-our-energy-storage-problems>.
- www.bbc.com/future/article/20220511-can-gravity-batteries-solve-our-energy-storage-problems.
- www.weforum.org/agenda/2022/07/gravity-batteries-store-renewable-energy/.
- www.bbc.com/future/article/20190327-the-tiny-islands-leading-the-way-in-hydrogen-power.

Image Source: <https://www.bbc.com/future/article/20220511-can-gravity-batteries-solve-our-energy-storage-problems>. Accessed 15 Feb. 2024.



Giant Hailstones

THANK YOU TO **OCEAN**
RESEARCHER LINDSEY STANTON



Over the past several years, abnormalities have been reported regarding parts of the world where they have experienced incredibly large hail. As this becomes more frequent, the question arises whether this is an odd phenomenon (an anomaly), or whether it may mark a new trend, possibly related to climate change.

Hail is a type of precipitation that is formed inside thunderstorm updrafts. Raindrops are carried upward by strong updrafts into the colder upper atmosphere and subsequently freeze. The frozen raindrops, now heavier with ice, fall back through the updraft. With stronger updrafts, this process is repeated. The stronger the updraft, the larger the hailstones. Once the updraft can no longer support the weight of the hailstone, hail will fall.

Generally, in the Northeast, the size of hail is about $\frac{3}{4}$ of an inch in diameter or smaller, but in cases of these ginormous hailstorms, they have reached sizes of $4\frac{1}{2}$ inches in diameter. Storms resulting in larger than normal hail are becoming more frequent. One explanation could be as our climate begins to warm, the amount of moisture that the atmosphere can hold increases (warm air can hold more moisture). With more moisture in the air, it allows the hail itself to increase in size at a faster rate. In turn a changing climate can result in stronger updrafts, allowing hail to be able to accrue more ice. Subsequently this all results in larger overall hail size.

The changing climate may be expressed variably in different parts of Hailstone world. Some areas now receiving hail, when they may not have previously, and areas that previously received a lot of hail may receive less or none.



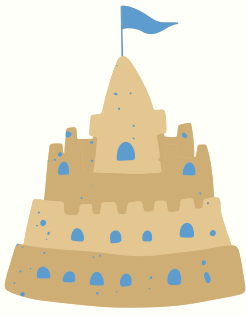
Further Information:

- <https://www.foxweather.com/weather-news/spring-storms-target-south-tuesday-wednesday-thursday>. Accessed 18 Feb. 2024.
- www.bbc.com/future/article/20220314-how-big-can-hailstones-grow#.
- www.weather.gov/btv/skywarn_hailwind#:~:text=Most%20hail%20reports%20in%20our,you%20in%20estimating%20hail%20size.
- gpm.nasa.gov/resources/faq/how-big-can-hail-get.
- www.nature.com/articles/s41612-019-0103-7.

Image Source:

<https://www.foxweather.com/weather-news/spring-storms-target-south-tuesday-wednesday-thursday>





Battle of Beachfront Bureaucrats

THANK YOU TO **OCEAN**
RESEARCHER LIAM OHARA



Death, taxes climate change and governmental dysfunction. At least two of these certainties have been on the forefront of an inter-administrative battle being waged in North Wildwood, New Jersey over the erosion of Ocean beaches. North Wildwood Mayor Patrick Rosenello is fighting the good fight against climate change to protect his jurisdiction's seashore. But the situation seems to be getting far worse. Bulkheads installed by the city to guard against encroaching waters of the Atlantic Ocean are starkly visible against the sandy dunes, but their supposed ecosystem benefits are not so clear. Also, their installation has sparked legal action and nearly \$10 million in fines from the state of New Jersey.

Commissioner of the Department of Environmental Protection for the state of New Jersey, Shawn LaTourette, has seemingly served as Mayor Rosenello's counterpart in this head-to-head public servant standoff. According to LaTourette, no consensus among the North Wildwood community has stood in the way of modern state backed erosion efforts, not the offices in Trenton. Looking beyond semantics between their representatives, the community just wants the situation solved. Periodic imports of sand from surrounding town's beaches just aren't going to cut it, especially for extremely susceptible home and business owners on the water's edge.

Robert Del Monte, is the owner of Matador Oceanfront Resorts. Like many small business owners, Matador Resorts has been in his family for generations. He also mirrors the sentiment of others around him that the quibbling in the capitol is the least of his concerns. For Del Monte, preserving his family livelihood is in the forefront of his mind. "We can't wait. One bad storm and we could be in a lot of trouble." From small business owners, to politicians, to members of the community, North Wildwood is feeling the full-on effects of erosion due to big storms. Storms that, if not mitigated successfully, will most likely be exasperated as climate change marches forward. As a microcosm of the future of beach front communities, this quaint town on the southernmost tip of New Jersey is a harbinger of what is to come.



Further Information:

- https://www.washingtonpost.com/climate-environment/2023/08/18/new-jersey-beaches-erosion-fight/?fbclid=IwAR1fRbpQrsVU3dByDAeygqVux7dFrJ_V5JBwRURw04uID69jPEpgKenmMW8

Image Source:

<https://www.clickondetroit.com/news/national/2024/01/25/jersey-shore-town-trying-not-to-lose-the-man-vs-nature-fight-on-its-eroded-beaches/>

Snakes Falling From the Sky?

THANK YOU TO **OCEAN**
RESEARCHER LIAM OHARA

Imagine you're spending a beautiful Wednesday afternoon mowing the lawn in your backyard. A cool summer breeze on your face and aromas of freshly cut grass fill your nose when something slimy hits your arm. Suddenly, you feel a searing pain as fangs sink into your skin. A snake? Confused, you desperately try to rip it from your body, but its grip gets even tighter. You think to yourself between the bouts of agony, this situation couldn't possibly get any worse.

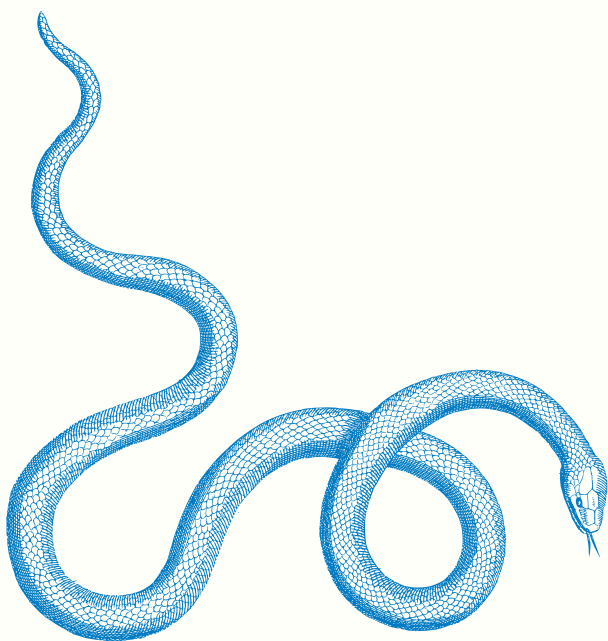
In that moment, a shadow passes overhead. In an instant, the misery is exponentially intensified as razor sharp talons rip through your skin as a Hawk attempts to grab the snake firmly wrapped around your forearm.

This story, though seemingly the plot of a poor science fiction novel, is exactly how Texas resident Peggy Jones spent her day on July 25th of last year. Escaping with severe emotional trauma and a bright pink cast over her mangled arm, Peggy is just happy to be alive. According to her husband and First Responders, "she appeared to be talking gibberish" when she attempted to explain what happened.

Things happen....

Further Information:

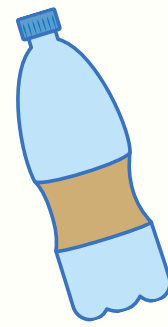
- <https://www.bbc.com/news/world-us-canada-66446697>





Nature Finds Use for Plastic Trash

THANK YOU TO **OCEAN**
RESEARCHER ABIGAIL EILAR



If you have taken trips to the beach or taken a dip in the shallows to see what's underneath the surface, you have likely seen trash and debris littering the area commonly in the form of plastics. Plastic pollution and its impact on marine life has been a growing concern as we see debris causing entanglement, the ingestion of plastics, and the increasing amount of trash and plastic in our oceans and coastal areas. Researchers are now looking at a new phenomenon of marine creatures such as hermit crabs beneficially utilizing trash as a shell.

As the use of social media platforms and collaborative sites like iNaturalist increases, researchers were able to use in addition to others to quantitatively determine how much hermit crabs are utilizing trash and if they have material preference. During the study, 386 hermit crab individuals, belonging to 10 of the 16 terrestrial hermit crab species, were identified using artificial shells, 85% of which were plastic (Jagiello et al., 2024) possibly showing a preference to plastic. The utilization of plastic for shelter does raise interesting questions about traditional shell availability, what impacts individual shell choice, and how it may impact male selection in terms of female choice for reproduction.

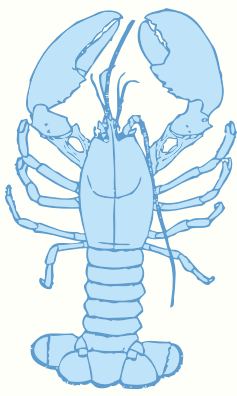
Hermit crabs are just a small piece of recognizing how their environments are changing across the world and how trash has impacts on even the tiniest of creatures. As we continue to try and find solutions to waste across the world, observing how species respond to waste like plastics will be interesting to track over time to gain insight into lack of traditional shells and impacts of waste.



Further Information:

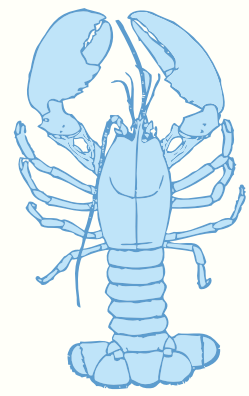
- <https://www.bbc.com/news/science-environment-68071695>
- <https://doi.org/10.1016/j.scitotenv.2023.168959>

Image Source:
<https://roaring.earth/one-mans-trash/>



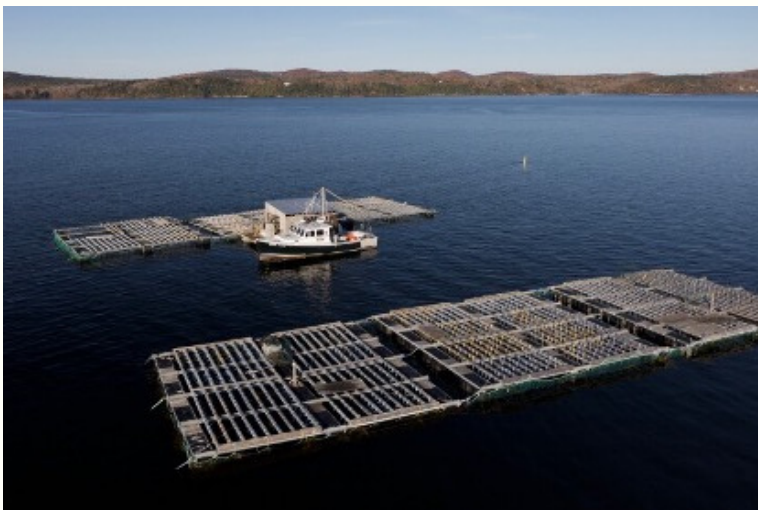
Can Seaweed Replace Lobsters in Maine?

THANK YOU TO **OCEAN**
RESEARCHER ABIGAIL EILAR



Downeast Maine is known for its many beautiful coastlines, water views, and of course the seafood. Maine has a long history and abundance of fishing communities along its coast, many of who have been fishing for generations. Aquaculture in Maine has also operated in the state for over 100 years bringing more opportunities to the state. But with the increased interest in building more aquaculture facilities in the state, there has been disagreement and ill feeling from those of local fishing communities to those proposing new aquaculture facilities. Coastal towns such as Jonesport, Gouldsboro, and Belfast, municipalities have issued moratoriums on proposals for large scale aquaculture projects with the help of a group called Protect Maine's Fishing Heritage Foundation. A major concern about new facilities has been from a regulatory standpoint which Sebastian Belle, the Executive Director of the Maine Aquaculture Association, explains that Maine is one of strictest states with regulations changing being amended every year since 1977. Paired with Maine being a delegated state under the Clean Water Act means that aquaculture facilities would have quantitative requirements they must meet and therefore would have strict regulations for operation.

As the debate over aquaculture seemingly continues there is difficulty in finding a place in the middle amongst people where commercial fishing and aquaculture can coexist. Belle refers to aquaculture being "just another tool in a fisherman's toolbox", referring to aquaculture not trying to outcompete or replace commercial fishing, but rather another resource for fisherman. As the environment and coastal areas are changing, commercial fishing has been impacted and therefore other resources for seafood and harvesting are real concerns for commercial fisherman and those wanting to produce seafood on a larger scale.



Further Information:

- <https://themainemonitor.org/aquaculture-debate-reignited-as-towns-consider-moratoriums/>
- <https://www.nationalfisherman.com/better-connecting-the-fishing-and-aquaculture-communities-in-maine-and-beyond>

Image Source:

<https://www.nationalfisherman.com/better-connecting-the-fishing-and-aquaculture-communities-in-maine-and-beyond>.



Waste Water to Beer?

THANK YOU TO **OCEAN**
RESEARCHER ABIGAIL EILAR



Think about a weekend evening; maybe you are out with friends or a significant other enjoying a cold one at your local brewery. It might be crisp, hoppy, or even a fruity enjoyment, but could it also be recycled wastewater? Innovators from Epic Cleantec partnered with Devil's Canyon Brewing Company to reimagine the beer making process and how we look at water use in our daily life to reimagine the possibilities of reuse. The Kölsch named Epic OneWater Brew is one of the beers created using recycled water to brew craft beer sourced from a high-rise apartment building in San Francisco using treated shower and laundry water. If we look back on history, brewing beer is not the first act of using wastewater for our benefit. Reusing water is great for irrigation of crops, playing fields and golf courses and in places like Scottsdale, Arizona, treated wastewater has been used to water golf courses dating back to the 90s.

States like Arizona, Idaho, and California are following suite in finding ways to reuse water to combat water availability and droughts that the western United States is experiencing. To help with low water supplies. California has approved rules to help turn sewage into drinking water in a multi-step filtration process outlined on calmatters.org. The State of Oregon Department of Environmental Quality (DEQ) has also released fact sheets on reusing water to help provide information recycled water uses in the state, benefits, and questions about the risks. Of course, when enjoying a cold beer, you may not want to think where the water it was made with came from, but with modern technology and facilities that treat water, we are able to look at the reuse of water differently today.

As it seems that the biggest hurdle in marketing these new products and ideas of reusing water is the "ick factor" (Fahy, 2023). So the question is, would you a beer made with recycled wastewater like the Epic OneWater Brew?



Further Information:

- <https://calmatters.org/environment/2023/12/california-rules-turn-sewage-into-drinking-water/>
- <https://www.oregon.gov/deq/wq/programs/Pages/Water-Reuse-Recycled-Water.aspx>

Image Source: USA Today. (2023). A can of Epic OneWater Brew. Courtesy of Epic Cleantec. [usatoday](https://www.usatoday.com/story/money/2023/08/02/epic-onewater-brew-recycled-wastewater/70511937007/). Retrieved March 5, 2024, from <https://www.usatoday.com/story/money/2023/08/02/epic-onewater-brew-recycled-wastewater/70511937007/>.

Thank you!

A New Face at OCEAN: Abigail Eilar

Abigail Eilar has joined the OCEAN team as our new Research Coordinator. She will be responsible for assigning research topics provided by the Editor and tracking our far flung Researchers. Abigail will be keeping in touch with Jessica, who coordinated our research for nearly 8 years. Welcome aboard Abigail and endless thanks to Jess. Serious gratitude also goes out to OCEAN Associate Editor Catie Urquhart for professionally formatting each issue.

Check out our website for other free publications:
www.safeharborenv.com/ocean-newsletter

Thank you for your support!



Gordon Peabody,
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WELCOME



Abigail Eilar,
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Catherine Urquhart,
*Associate
Editor*

www.safeharborenv.com