

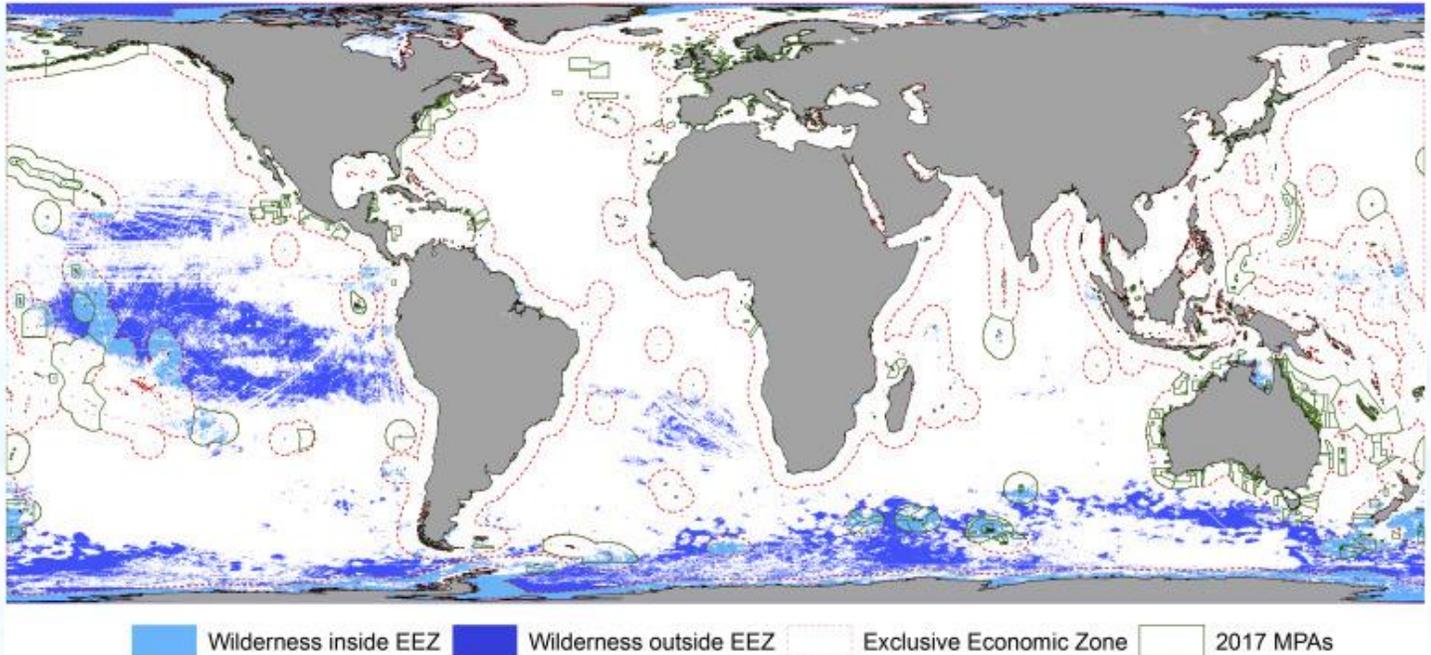


the weekly anthropocene



dispatches from the wild, weird world of humanity and its biosphere

By Sam Matey



The Ocean: Wilderness. A new study published in *Current Biology* offers a high-level overview of the protected status of Earth's oceans. An international research team analyzed the impact of 19 different human-influenced stressors, ranging from fishing to fertilizer runoff to ocean acidification. They then searched for and mapped (pictured) the remaining areas of "marine wilderness" in the ocean, areas that had experienced little or no human-caused disturbance. The researchers found that only 13% of the ocean is still marine wilderness, mostly in three major chunks in the Arctic Ocean, the Southern Ocean, and the Pacific Ocean. The researchers also found that only 5% of the remaining marine wilderness is within MPAs, or marine protected areas. The researchers urge international action to protect Earth's remaining areas of marine wilderness. Sobering news. For more, see goo.gl/xSpCDm.

The Ocean: Oil Rig Habitats. Another new study, this one published in *Frontiers in Ecology and the Environment*, found that even parts of the ocean highly altered by humans can still be highly productive environments. Simply titled "Environmental benefits of leaving offshore infrastructure in the ocean," the study found that disused oil rigs are surprisingly vibrant marine habitats. (Pictured, cod around an oil rig in the North Sea). The rigs offer shelter for young fish and attachment points for shellfish, as well as protecting the area from trawling nets by acting as a physical barrier. As there are over 7,500 oil and gas platforms in the world's oceans, allowing them to grow into "artificial reefs" instead of being dismantled could offer valuable habitat for a plethora of marine species. Fascinating news! For more, check out goo.gl/5VbqCu. Thanks to JSTOR Daily for the picture.





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New Connections: Wolf Spiders and Climate Change.

In a fascinating new example of how animal behavior can change ecosystem-level processes, researchers have found that wolf spiders in the Arctic could be alleviating the effects of climate change. In the Arctic tundra, wolf spiders (pictured, a female with spiderlings) are a top predator. There are so many of them that they actually outweigh real (mammalian) wolves in the Alaskan Arctic! They hunt almost anything smaller than them, but especially like to eat *Collembola* arthropods, commonly known as springtails. Springtails eat fungus that causes decomposition of dead plants, so wolf spiders have an “indirect” effect on decomposition. The more springtails they eat, the more plants decompose. Decomposition in the Arctic is a big deal for the climate, as a vast amount of soil organic carbon is frozen in Arctic permafrost. If it melts due to climate change and is released into the air by decomposition, it would add a lot more carbon dioxide to the atmosphere, creating a feedback loop that would worsen climate change further. Dr. Amanda Koltz, of Washington University in St. Louis, was interested in how climate change was affecting the spider-springtail-soil system. She and her team set up several enclosures on the Alaskan tundra filled with high densities of wolf spiders, left some of them at currently normal temperatures, and warmed some of the others to simulate how climate change will warm the tundra ecosystem in the next few decades. They found that at normal temperatures, springtail numbers were unsurprisingly lower (the wolf spiders had eaten most of them) and decomposition had occurred quickly. However, at higher temperatures, more of the springtails were left, and there was less decomposition. It appears that under warmer temperatures, springtails are no longer wolf spiders’ favorite prey. This means that climate change could actually slow down decomposition in the Arctic. “Spiders are not going to save us from climate change, but we found that decomposition is slower under warming when there are more wolf spiders present,” said Dr. Koltz. “This suggests that under some circumstances, they could be alleviating some of the effects of warming on carbon losses from the tundra. It’s a good thing.” This amazing new “trophic cascade” is a reminder of how many of the Earth’s complex systems we have yet to understand. For more, see goo.gl/Yx6BnX. Thanks to Dr. Koltz for the awesome picture!



New Materials: Chitin/Cellulose Plastic Substitute.

Researchers at the Georgia Institute of Technology have created a new substitute for flexible plastic packaging, using only chitin from crab shells and cellulose from tree fibers. The chitin-cellulose film (pictured) could replace petroleum-based plastic packing, a boon for the environment. It’s also better at keeping food fresh: the film is up to 67% less permeable to oxygen than some forms of PET, a standard flexible plastic packaging material. Great work! For more, see goo.gl/dtwFuv. Thanks to Georgia Tech for the picture.





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New Crops: Heat-Resistant Rice. Scientists from the University of Sheffield have created a new strain of rice with fewer stomata (tiny pores that allow gas exchange between plants and the outside world). The low-stomata rice needs only 60% of the water used by normal rice! It's also more resistant to drought and high temperatures. This kind of ingenious innovation is exactly what we need to adapt to the new challenges of the Anthropocene. Spectacular work! For more, see goo.gl/v6zhNp.

Australia. The northern quoll (*Dasyurus hallucatus*, pictured) is an endangered Australian marsupial carnivore, sometimes thought of as an Australian “native cat.” It's under threat from invasive cane toads (*Rhinella marina*), which seem like a good source of food to the quolls but are highly poisonous. Now, ecologists from the University of Melbourne are trying to save the species with “targeted gene flow,” an innovative new conservation technique. They discovered that a few “toad-smart” quoll populations in the state of Queensland were avoiding cane toads. Then, they bred quolls from those populations with “toad-naïve” quolls from an island that cane



toads had not reached. They found that most of the offspring avoided toads, indicating that being toad-savvy was a genetic trait, not a learned behavior. In May 2017, they released 54 quolls on toad-infested Indian Island in the Northern Territory, a mix of “toad-smart”, “toad-naïve”, and hybrid quolls. The researchers were testing whether the toad-avoidance trait would spread throughout a wild quoll population. In April 2018, they checked in again, and found that although only about 16 quolls had survived, the group included young quolls that did indeed appear to be toad-smart. The researchers are now working to introduce toad-smart quolls into still naïve populations, hoping that the advantageous toad-avoidance trait spreads throughout the population and protects the quolls from cane toad poisoning. This is the first real-world test of targeted gene flow as a conservation method, and if it works, it could be a major new tool in the fight to save endangered species. Great Barrier reef corals and Tasmanian devils are among the threatened species being considered for this new technique of proactively spreading genes that will help wild species survive the Anthropocene. Excellent work! For more, see goo.gl/Azf9q4.



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USA: California. California is still burning. As of Monday, July 30th, fourteen wildfires of various sizes are raging across the Golden State. The Carr Fire, the largest, has so far burned 98,724 acres, destroyed 966 structures, and killed six people. It has also caused the evacuation of the entire small town of Lewiston and 38,000 residents of the city of Redding. It's currently 20% contained. The Ferguson Fire (pictured), the second largest, has burned 56,659 acres, killed two firefighters, and forced the closure of Yosemite Valley on July 25th. Thanks to smoke and soot from the Ferguson fire, the air quality in the Valley is now worse than in Beijing. For an overview of the California wildfires as of July 30th, see goo.gl/wSG38y. For more on the Yosemite situation, see goo.gl/ty5haP. For a look at the relationship between extreme weather events like these and climate change, see goo.gl/2hjFxK.



USA: New Jersey. In a harbinger of things to come, the small town of Woodbridge, New Jersey, is moving inland to escape the effects of climate change. The coastal Watson-Crampton neighborhood of Woodbridge Township was flooded out by a nor'easter in 2010, by Hurricane Irene in 2011, and then worst of all by Superstorm Sandy in 2012. Understandably fed up, the residents applied for New Jersey's innovative Blue Acres program, which offers to compensate homeowners for repeatedly flooded houses, knocks them down, and blocks redevelopment on that site. This, Blue Acres' biggest-ever buyout project, has already arranged buyouts for 142 homeowners and removed 115 houses in the Watson-Crampton neighborhood. The land is now slated to be restored to a floodplain that will buffer the rest of Woodbridge from sea level rise. This kind of proactive action to adapt to climate change has the potential to save thousands of lives around the world. For the full story, check out goo.gl/5cRWVd.

Auburn, Maine. On Saturday, August 11th, Maine Conservation Voters is joining the Androscoggin Land Trust in organizing an Androscoggin River Cleanup and BioBlitz. We'll be meeting at Little Andy Park in New Auburn, and the event will run from 10 AM to 1 PM. This will be the Land Trust's seventh annual cleanup, but the first ever to include a BioBlitz. A BioBlitz is a short, citizen-led biological survey of a given area in an effort to learn more about the local wildlife. It can be thought of as a "scientific treasure hunt," a group effort to catalog as many of the life-forms in a given area as possible. For our BioBlitz, we'll be using the citizen science app iNaturalist to take pictures of the local wildlife. To download iNaturalist, check out www.iNaturalist.org. For our BioBlitz page, check out www.inaturalist.org/projects/androscoggin-river-bioblitz. This event will be a fun, community endeavor that will both help the participants learn more about the natural world and contribute to scientific research. If you can, please join us on the 11th! For more information, text 207-572-7937 or email Samuel.matey@maine.edu.



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