



the weekly anthropocene



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

By Sam Matey

Warm Arctic, Cold America: Maine's Cold and Snowy Winters' Connection to Climate Change.

Much of the eastern United States is currently experiencing a cold, snowy winter, and President Trump, with his usual malevolent ignorance, has seized on this as evidence that climate change is not real. The research says differently: the rash of unusually cold winters in America is in fact mostly due to a warming Arctic pushing a "jet stream" of freezing air southwards. For a fuller explanation, check out goo.gl/yzyjbQ. For a study on future winter trends, see goo.gl/C1gJ3j.

Marine Endangered Species. By the mid-20th century, overharvesting and pollution had driven an array of ocean megafauna, from leatherback sea turtles to humpback whales (*Megaptera novaeangliae*, pictured), to the brink of extinction. Then, a burst of US government action in the 1970s, including the passage of the Marine Mammal Protection Act in 1972 and the Endangered



Species Act (ESA) in 1973, finally gave these species some legal protection. Now, a new study published in famed journal PLOS ONE chronicles just how effective that protection has been. 62 marine mammal and sea turtle species are protected by the ESA, but only some of them have enough population data available for analysis. The researchers examined population data on 23 populations of 14 different marine mammal species, including beluga whales, humpback whales, and manatees, and 8 populations of 5 sea turtle species, including leatherback and green sea turtles. They found that 18 of the 23 (78%) marine mammal populations and 6 of the 8 (75%) sea turtle populations experienced substantial growth after ESA listing, while only 2 marine mammal populations, and no sea turtle populations, declined number. (The remaining populations experienced no significant change either way). This is spectacular news, indicating once more the importance and effectiveness of strong legal protections for at-risk wildlife. For more, see goo.gl/SVHGSE.

Germany. In a bold and much-needed step forward, a government commission announced on Saturday that Germany will entirely phase out the use of coal, the most carbon-intensive fossil fuel, by the year 2038. This will entail shutting down 84 coal power plants in the next 19 years, with 24 to be shut down in the next 3 years. The plan is to replace coal's share in German electricity generation (currently at 40%) with renewable energy (currently at 41%), with a goal set for renewables to provide 65% to 80% of Germany's power by 2040. This is absolutely spectacular news and is a model to the world of the rapid shifts necessary to avoid the worst climate change scenarios! For more, see goo.gl/vZWGpM.



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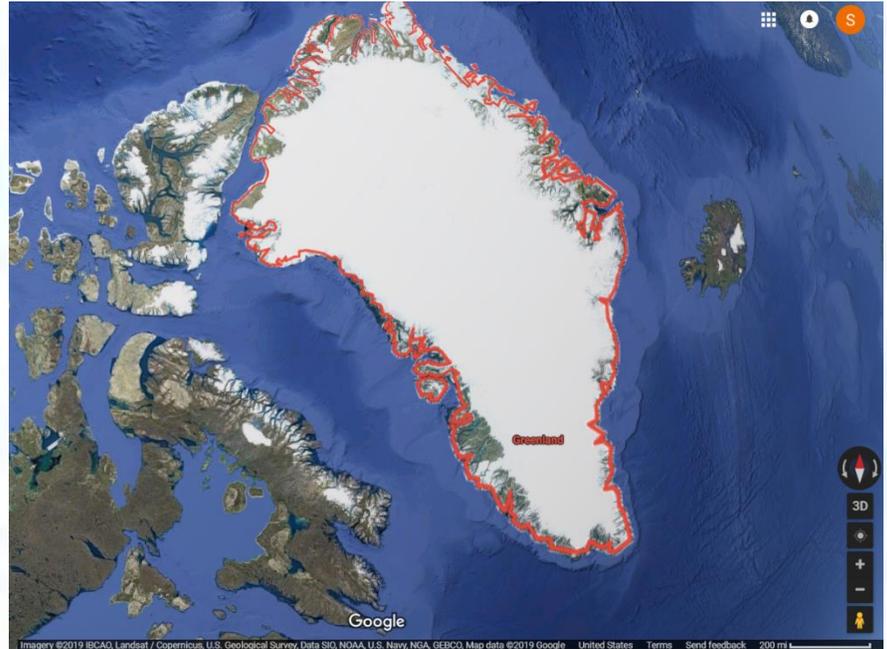


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Receding Ice & Melting Permafrost.

Around the world, human-caused climate change has resulted in ice cover melting at a rate not seen for thousands of years. Several new studies published in January 2019 shed new light on this disturbing trend. A new study published on January 21st found that Greenland (pictured) is losing a vast amount of ice, and, most disturbingly, that most of the ice loss between 2003 and 2013 came from the massive land ice sheet, with the water running off the top as rivers of



meltwater, as opposed to the glaciers that naturally flow into the sea. Greenland is now losing enough ice every year to cover the states of Florida and New York in hip-deep water. Another study, published on January 25th, radiocarbon-dated ancient, frozen plants exposed by the melting ice caps of Baffin Island, in the Canadian Arctic just across the Davis Strait from Greenland. They found that all of those plants had been covered by ice for at least the last 40,000 years, and that the last century has likely been the warmest for Baffin Island in the last 115,000 years. Lead author Simon Pendleton noted that the uniformity of the results told its own sobering story. "You'd normally expect to see different plant ages in different topographical conditions... A high elevation location might hold onto its ice longer, for example. But the magnitude of warming is so high that everything is melting everywhere now." Finally, a new global comparative study published on January 16th found that the world's permafrost (the permanently frozen soils girdling many of Earth's polar and mountainous regions) is also melting rapidly. Data from 123 permafrost-measuring boreholes found that 71 of them had warmed over the last decade (with 5 of them already thawing), 40 had seen no significant change, and 12 had slightly cooled. The world average permafrost warming was 0.3 degrees Celsius, with some sites in Siberia warming by over 0.9 degrees Celsius. This is extremely disturbing, as melting permafrost releases greenhouse gases such as carbon dioxide and methane that can further exacerbate global warming. In addition to these three case studies, other studies published this month revealed that Antarctica and North American glaciers are also melting at unprecedented rates. It is now widely accepted that a substantial degree of sea level rise in the 21st century is inevitable, and this new research makes that even more conclusive. For more on the Greenland study, see goo.gl/CcpyKQ. For more on the Baffin Island study, see goo.gl/4jT7aT. For more on the permafrost study, see goo.gl/ZQyxXp and goo.gl/dmZ6SQ.



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Oceans of Jellyfish. For years, it has been well known that jellyfish (the gelatinous creatures comprising the phylum Cnidaria) will benefit greatly from the Anthropocene, as they prefer warmer waters and are resistant to many pollutants. Now, a new review published in *Trends in Ecology and Evolution* has found that this could actually be a positive thing, as many more animals eat jellyfish than previously thought. The researchers gathered data from isotope analysis of animal tissues, analysis of the DNA in stomach contents, and footage from cameras attached to penguins and turtles. They found that jellyfish are an important foodstuff for far more than the few species (especially sea turtles) previously known for eating jellyfish, with tuna, albatross, penguins, crabs, fish, ducks, and even seafloor microorganisms relying on jellyfish as an essential part of their diet. The jellyfish boom could even help replace other oceanic prey species, such as krill, who are being harmed by the trends of the Anthropocene, ensuring the continued stability of the ocean food web. This transition may even already be occurring for four penguin species. Great news! For more, see goo.gl/jQNzB6.

Monarch Butterflies. In a groundbreaking new conservation initiative, scientists in Mexico are trying to save monarch butterflies (*Danaus plexippus*) from climate change by moving trees up a mountainside. The beloved and colorful North American insects are under threat from rising temperatures, extreme weather events, and habitat destruction, with one assessment by the Center for Biological Diversity finding that monarch populations have declined by 80% in the last 20 years.



The US is currently considering listing the species under the Endangered Species Act. One ecosystem serves as a linchpin for their survival: a few small oyamel fir tree forests (*Abies religiosa*) in the mountains of Mexico's Monarch Butterfly Biosphere Reserve serve as critical winter habitat for monarchs from across eastern North America. (Pictured above, monarchs on an oyamel fir branch). However, they too are under threat from climate change. Forest geneticist Dr. Cuauhtémoc Sáenz-Romero estimates that 70% of the oyamel fir's current habitat will be too warm for them by 2035. Fortunately for the monarchs, Dr. Sáenz-Romero is unwilling to simply accept this situation. Over the past few years, he and his research team have physically transplanted over 750 oyamel fir seedlings 350 to 400 meters up the mountain, where cooler temperatures will ensure that they survive longer. The seedlings were planted in the protective shade of bushes, and results so far are encouraging. This kind of "assisted migration" is a cutting-edge conservation strategy that will likely be increasing necessary as the world warms. Great news! For the full story, see goo.gl/opQu39.