



the weekly anthropocene

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

by Sam Matey

The Netherlands. In a fascinating union of conservation biology and water resource management, a water company in the Netherlands is using bison to ensure a constant supply of clean water. PWN supplies water to 1.5 million people and purifies their supplies by pumping river water through natural coastal dunes, using them as a giant, ecosystem-level filter. In 2007, PWN introduced three European bison (*Bison bonasus*), a species extinct in the Netherlands for hundreds of years, onto their land. The bison acted as ecosystem engineers,



eating shrubs and young trees to ensure that the area's ecosystem stayed dune-like and was not reclaimed by forest. As of 2018, the herd has grown to 22 bison, who join Konik horses, Galloway cattle, and fallow deer (pictured, bison and Konik horses) as large grazers keeping the dunes in top filtration condition. "It's about enjoying ... wildlife. Not to be against it, but to see it as an opportunity," said Yvonne Kemp, ecologist and bison supervisor for PWN. "We've [lost] a lot of nature around us because, of course, the human population is growing and [we've been] building a lot ... But now we really see that we can live together with [nature], but we have to do it sustainably, in a wise way — like in a 21st-century way. We cannot go back." This kind of project is exactly what humanity needs in the Anthropocene-animal conservation that has a direct benefit for human settlements in the area. Great work! For more information on this amazing initiative, check out goo.gl/24Nb9t.

Rhinos (1). The Sumatran rhino (*Dicerorhinus sumatrensis*) is one of the most imperiled large mammal species in the world, with 9 individuals in captivity (seven in Indonesia and two in Malaysia) and as few as 30 surviving in the wild. Iman, the last female Sumatran rhino in Malaysia, recently recovered from a critical illness and is again producing viable eggs. Indonesia has just agreed to send a vial of sperm from Andalas, a proven breeder, for Malaysia to use to fertilize Iman. If successful, this could bring vital genetic diversity to the population. For more info, check out goo.gl/ZTAwFK.

Rhinos (2). The Javan rhino (*Rhinoceros sondaicus*), another critically endangered rhino species, lives only in Ujung Kulon National Park, on the western tip of Java. On April 23rd, an adult male Javan rhino was found dead on the beach, apparently of natural causes. Fortunately, two newborn Javan rhino calves were spotted by camera traps, indicating that the population is still growing. From 67 at the last count in February, there are now 68 Javan rhinos left in the world: 24 adult females, 29 adult males, and 15 juveniles. Progress! For more information, see goo.gl/B3Kfev.



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USA (1). In a continuation of their unprecedented anti-environmental agenda, Trump's EPA has instituted two new rules with potentially far-reaching harmful consequences for the nation. On April 23rd, EPA Administrator and subject of six different investigations for improper conduct Scott Pruitt announced a rule defining wood as a carbon-neutral fuel. This is not backed by science and could potentially incentivize massive increases in logging in the name of climate action. However, that pales in comparison to the rule he announced on April 24th, which bans the EPA from referencing studies that use confidential data. This means that the nation's premier environmental agency cannot use any medical studies, which form the primary basis for air quality and pesticide regulations. For the full sickening story, see goo.gl/tdyGZL, goo.gl/wE6aua, goo.gl/wV1yNN, and goo.gl/9Po8DF.

USA (2). As the national government backtracks, states are leading the way towards a sustainable future. Hawaii is currently the national leader in renewable energy, with 33% of its electricity generated from rooftop solar and a state goal of reaching 100% renewable energy by 2045. On good days, Hawaii now gets 60% of its power from renewable sources. A new study from the National Renewable Energy Laboratory analyzed how Hawaii is transitioning towards a renewables-centric grid. They found several unexpected benefits. For example, "smart inverters," switches that automatically respond to power overloads, can help stabilize the uneven generation levels of rooftop solar. The study also noted that with renewable sources, the cost is nearly all up front; once a solar farm or wind turbine is built, it will provide cheap, clean fuel with little to no additional cost for years. In contrast, fossil fuels plants require expensive maintenance, with costs increasing over time. One big question is the pace at which battery technology will develop. If it develops quickly, utilities will be able to store renewable energy generated during extremely sunny and windy days for the future. If not, some coal or nuclear plants could still be required for backup. The study notes that electric car technology increases electricity demands, but also spurs battery development. Many states will be watching Hawaii for tips on how to increase renewable energy in their own grids. Great news! For more info, check out goo.gl/MKooVq.

Great Apes. A new study led by the Wildlife Conservation Society has compiled ten years of data to create the most comprehensive picture ever of the status of chimpanzee and western lowland gorilla populations in western equatorial Africa. The good news is that there are more great apes left than previously thought: an estimated 360,000 western lowland gorillas and 130,000 chimpanzees. The study also found that well-guarded protected areas and well-managed logging concessions offered excellent habitat for these species. The bad news is that 80% of these great apes currently live outside protected areas, where they are more vulnerable to threats ranging from poaching for the bushmeat trade to the Ebola virus. The study also found that gorilla numbers are declining by 2.7% per year. "A combination of responsible industrial practices, conservation policies, and a network of well-managed parks and corridors would provide wildlife managers with a winning formula for conserving great apes in Central Africa." said Dr. Liz Williamson, coauthor of the study. "Our study has revealed that it is not too late to secure a future for gorillas and chimpanzees." For more info, see goo.gl/xVnfHZ.



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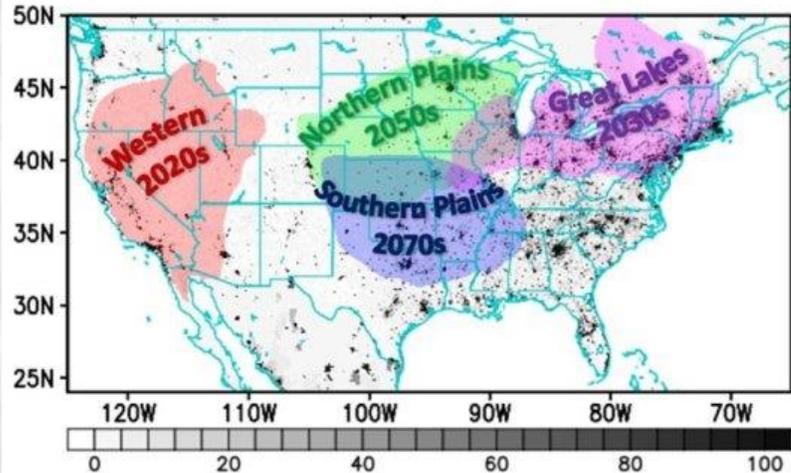
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Long-Term Climate Predictions.

Researchers from the Cooperative Institute for Marine and Atmospheric Studies (CIMAS) have used climate models to project future heat wave patterns in the continental United States. The study defined “heat waves” as three or more days of record high temperatures per summer (June through August). “These are the years that the human contributions to climate change will become as important as natural variability in causing heat waves,” said Dr.

Hosmay Lopez, lead author of the study and a meteorologist from NOAA's Atlantic Oceanographic Meteorological Laboratory. “Without human influence, half of the extreme heat waves projected to occur during this century wouldn't happen.” The map (pictured) shows these projected heat wave patterns over a population map of the United States. One interesting finding in the model is that a natural pattern of fast air circulation over the Great Plains will delay the onset of these heat waves, while the western US is set to experience extreme heat waves in less than a decade. For more information, see <https://goo.gl/XA925Z>. Map credit: Hosmay Lopez.



Oman. Researchers have found an enormous dead zone (an area devoid of oxygen) in the Arabian Sea, using robots known as Seagliders to map oceanic oxygen concentrations. They found that a region of the ocean the size of Scotland had almost no oxygen, a shockingly large area. “The Arabian Sea is the largest and thickest dead zone in the world. But until now, no-one really knew how bad the situation was because piracy and conflicts in the area have made it too dangerous to collect data.” said Dr. Bastian Queste, leader of the research team. “Our research shows that the situation is actually worse than feared -- and that the area of dead zone is vast and growing. The ocean is suffocating.” For more info, see goo.gl/nG5Yt9.

Polymers. Chemists working at Colorado State University have created an “infinitely” recyclable polymer with the potential to replace petroleum-based plastics. The new polymer is light, strong, heat-resistant, and durable like plastic, but can be completely broken down into its monomer building blocks with a simple catalyst. These can then be re-polymerized, opening the door to endlessly recyclable plastic-like products. “It would be our dream to see this chemically recyclable polymer technology materialize in the marketplace,” said Professor Eugene Chen, leader of the development team. Spectacular work! For more information, check out goo.gl/NfjM15.



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Gorham, Maine. During this semester, this student has spent considerable time in the Frazier Preserve wetland, conducting projects in partial fulfillment of the requirements for Wetlands Ecology and Ecology Lab classes. What follows is a (very abbreviated) summary of what I encountered there.

The Frazier Preserve wetland is an 11.66-acre freshwater palustrine deciduous forested wetland, coded as

PFO1Ed (pictured). The wetland is seasonally flooded and partially ditched. This wetland is specifically known as a "red maple swamp," as red maple is the dominant tree in the wetland. Gully Brook forms in the Frazier Preserve wetland. The preserve itself is open to the public, and step-by-step directions are available at <https://goo.gl/maps/LNrSPsZz3mw>. The predominant source of water outflow for the Frazier Preserve wetland is Gully Brook, a first-order stream that forms in the wetland and flows into the Stroudwater River. The Stroudwater itself flows into the Fore River Estuary, which flows into Casco Bay. Thus, the water quality of this wetland's outflows have the potential to directly impact several Maine ecosystems.

One notable life-form I encountered in the Frazier Preserve was a male mallard, or a drake (*Anas platyrhynchos*, pictured). He displayed no fear of human presence and continued feeding behavior while I photographed him. Later, I noticed a female duck feeding in a nearby area of wetland. As mallards live in mated pairs, these two are likely a mated pair.

Another extremely noticeable sign of life in the wetland was the extraordinarily high density of snow fleas (*Hypogastrura nivicola*, pictured). These springtails were seemingly omnipresent during my visit, covering sticks and leaf litter to the extent that they obscured the normal coloration of these objects. This abundant population of invertebrates likely provides a vital food source for a variety of wetland organisms, potentially including the mallards I saw earlier.

In conclusion, I greatly enjoyed my time in the Frazier Preserve wetland. It is an easily accessible oasis of wildlife in the midst of suburban Gorham and provides a fascinating microcosm of ecological concepts such as species diversity, food webs, and landscape ecology. I highly recommend it as a destination. For my full wetlands ecology report, check out <https://goo.gl/21vuXh>. For my full ecology lab report (on the diversity and composition of the plant community) see the post S.T.R.E.A.M. #1.

