



the weekly anthropocene



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

By Sam Matey, November 13 2019

Earth's Oceans: New Caledonia.

Nouméa, the capital city of the French Pacific island territory of New Caledonia, is home to a snorkelling club of seven women in their 60s and 70s (Geneviève Briançon, Aline Guémas, Monique Zannier, Monique Mazière, Sylvie Hébert, Cathy Le Bouteiller and Marilyn Sarocchi, pictured) known as the “Fantastic Grandmothers.” That’s pretty awesome already, but their recent discoveries are even cooler. The Grandmothers volunteered to assist a local researcher, Claire Goiran, studying



sea snakes populations in the Baie des Citrons, a popular local swimming and snorkeling spot. Surprisingly, by November 2018 the seven-woman squad had joined the researcher in taking nearly 300 underwater photographs of 140 different individuals of the lethally venomous greater sea snake (*Hydrophis major*) a species previously thought to be locally rare.

(Pictured: one of the snakes being photographed). Amazingly, despite the revelation that there are at least 140 highly toxic sea snakes in a major recreation area, no one has yet been bitten or harmed by them. That’s perhaps as surprising as finding a few hundred cobras living harmlessly in Central Park! The epic saga of the Fantastic Grandmothers illustrates how citizen scientists can not only contribute to ongoing research, but make amazing new discoveries of their own-especially in the mysterious realm of the sea! For more, see tinyurl.com/vrbw9fp!





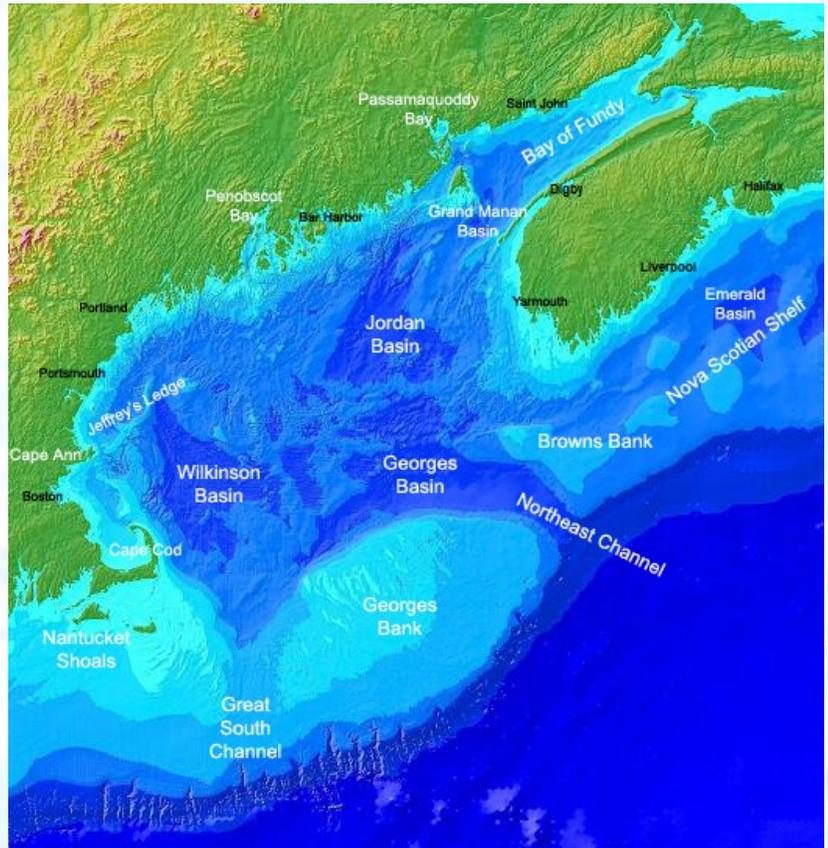
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Earth's Oceans: Maine. The state of Maine is one of the most important places in the world for those interested in how climate change is affecting Earth's oceans. The Gulf of Maine (pictured) is heating up three to four times faster than the rest of the oceans, at an average rate of 0.11 degrees Fahrenheit per year, faster than anywhere else in the world except a patch near Japan. This anomaly is because the Gulf of Maine normally hosts two interacting currents, the cold-water Labrador Current from the north and the warm-water Gulf Stream from the south. The mixing of the two makes the Gulf a highly diverse and active ecosystem. But in recent years, melting ice in the Arctic (due to climate change) has added a lot of freshwater into the North Atlantic mix, weakening the Labrador Current and leaving the Gulf



of Maine to be dominated by the warm-water Gulf Stream alone. This has led to massive, across-the-board shifts in the Gulf of Maine marine ecosystem. For example, northern shrimp (*Pandalus borealis*) fishery in the Gulf was closed in 2013 due to overharvesting. However, after six years, populations show no signs of recovering, and indeed may be getting worse, hammered by repeated heatwaves. (The two highest surface temperature records for the Gulf of Maine were set in 2012 and 2018). Four of the last eight years were the lowest on record for shrimp recruitment (new, young shrimp joining the population). This has already been extremely harmful for fishers, many of whom relied on shrimping to get through the lobster off-season. Furthermore, all-new species are arriving. Green crabs have devastated many of Casco Bay's biodiverse eelgrass beds, while "pancake batter"-like gelatinous sea squirts (aka tunicates) are spreading rapidly on docks and across the seabed. (Pictured: *Didemnum vexillum* tunicates on a pier piling in Eastport).





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The leading organization researching these changing waters is without doubt the Gulf of Maine Research Institute (GMRI) headquartered in Portland. From November 4th to 8th, GMRI assembled over 100 scientists, conservationists and policy leaders from New England and the Canadian Maritimes for the Gulf of Maine 2050 International Symposium. On the fourth day of the conference, GMRI discussed new, ongoing research about projected trends in major fisheries. Disturbingly, the top six species currently fished out of Portland, Maine (lobster, herring, pollock, cod, white hake, and hagfish) are all expected to decline as the Gulf warms.

The shift of lobster populations to the north has been notable for many years-the species has already all but abandoned Long Island Sound (leading to booming Maine lobster catches in the last few decades) and the epicenter of the lobster catch is slowly but surely moving up the Maine coast. GMRI researchers estimate that by 2050, there will be healthy populations in the Downeast region and the Bay of Fundy, but few lobsters caught in southern Maine. (Recently, the Maine government announced that 2019 lobster landings were down 40% from 2018 and 38% from the five-year average. Pictured: a Maine lobster.). On the plus side, GMRI researchers have found that existing populations of mackerel and scallops are set to become more plentiful, while new harvestable warm-water species will start to arrive from the south in greater numbers, such as squid, summer flounder, and black sea bass (pictured). For the next few decades, the Gulf of Maine

will be changing in every respect, with the waters warming, the species community in the ocean shifting in response, and the Mainers on shore reacting in their turn. Hopefully, with a lot of adaptation and community support, the Gulf of Maine can weather the changes of the Anthropocene and continue to be the center of a vibrant waterfront economy for generations to come.

For more, see tinyurl.com/vcgrgx6, tinyurl.com/ur6dwkm, tinyurl.com/wxncgfk, tinyurl.com/rtn68ts and gmri.org.





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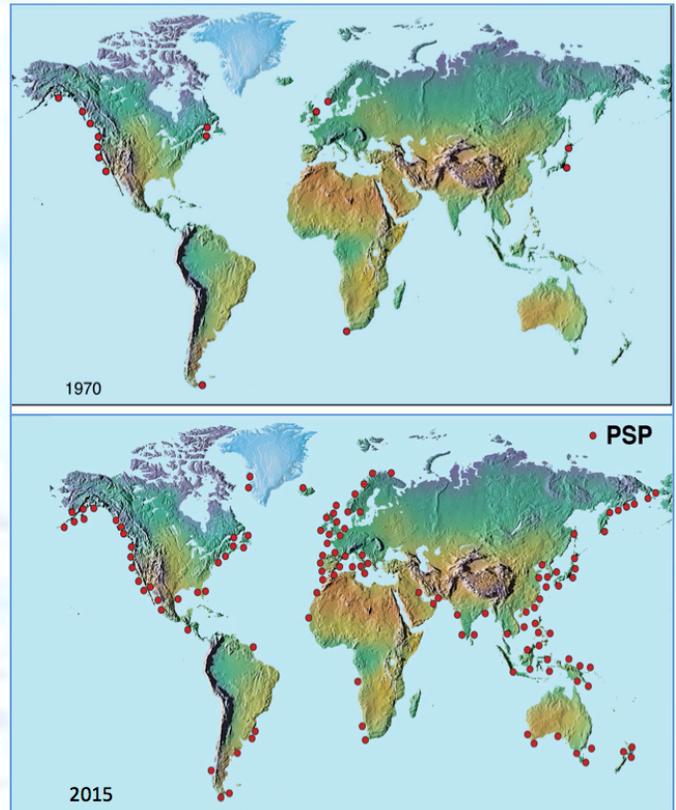


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Earth's Oceans: Attack of the Algal Blooms.

Harmful algal blooms are becoming more common across the world's oceans, as warming waters join nutrients from human pollution (like fertilizer runoff) to create supercharged growth. Many species of algae produce deadly toxins that can be absorbed by small fish and shellfish and bioaccumulate up the food chain, creating marine die-offs and human health threats. In 2015, a bloom of *Pseudonitzschia* diatom algae off California led to levels of domoic acid (a toxin produced by the algae) in Monterey Bay 10 to 30 times higher than what was previously considered high, as well as fishery closures, sea lion strandings, and possibly also the death of 30 gray whales that washed up on beaches (it seems probable that this big ecological shift was related to the high whale mortality event, but there is no clear-cut evidence for this as of yet). In 2018,



Florida's algal "red tide," caused by neurotoxin-producing *Karenia brevis* dinoflagellates, left millions of pounds of dead sea life on beaches and led the governor to declare a statewide emergency. Now, algae in the *Alexandrium* genus are spreading rapidly across the previously-too-cold coasts of Alaska. *Alexandrium* algae produce saxitoxin, a deadly neurotoxin once used by the CIA (it was the poison given to crashed U-2 pilot Francis Gary Powers in case he needed to commit suicide). A mussel population at one point registered toxin levels 200 times the safe limit, a study found that 13 marine mammal species had high levels of algal toxins, and many Alaskans have reported (fortunately nonlethal) paralytic shellfish poisoning from pursuing their traditional shellfish harvesting practices. This isn't just an American problem, either—algal blooms are releasing toxins worldwide. Pictured above is a Woods Hole Oceanographic Institute map of paralytic shellfish poisoning outbreaks in 1970 versus 2015.

It appears that toxic algae blooms have now joined giant wildfires, water shortages, heat waves, super-storms, erratic precipitation and flooding, the spread of disease-carrying mosquitos and ticks, melting ice caps, sea level rise, shifting fish stocks, and much more as a chaos agent born from climate change, and a new challenge for humanity to face in the Anthropocene. For more on the California bloom, see tinyurl.com/velyfga. For more on the Florida bloom, see tinyurl.com/twbodzn. For more on the Alaska one, see tinyurl.com/v2f5wwy. For the Woods Hole Oceanographic Institute map, see tinyurl.com/tnkz4vp.