

## Postcard from the Atlantic Ocean

When the National Oceanic and Atmospheric Administration (*henceforth*, NOAA), a U. S. government agency, chose me to participate in a 16-day ecosystem-monitoring mission in the Atlantic Ocean, I was overjoyed but also a bit nervous. After all, I was a landlubber, having done almost all of my fieldwork, for the past 35 years, in terrestrial environments, often far removed from the ocean. Yet, the prospect of doing science with top marine biologists was alluring.

I was a Teacher at Sea (<https://www.swtimes.com/news/20190804/uafs-professor-to-survey-marine-life-in-research-cruise>), part of a NOAA programme that places teachers on research ships to work alongside scientists, with the goal of sharing the science and STEM careers with students back home. I boarded NOAA Ship *Gordon Gunter* on a bright September morning from Norfolk, Virginia (USA). We set sail on a zigzagging, predetermined, route across the Northeast U.S. Continental Shelf. Our mission was to sample plankton, measure physical and chemical components, and monitor ocean vertebrates. We stopped at about 130 randomly chosen sites covering depths ranging from 20–400 m.

I was the only teacher on board. The ship had about 15 scientists and students, and 15 crew. Our Chief Scientist, Harvey Walsh, gave me full flexibility to roam around the ship and learn various aspects of the research mission. Much of my time was spent on the flying bridge high above the main deck, scanning the waters for vertebrates, especially sea birds. From that vantage point, I had a 360-degree view of the horizon. As the ship lumbered through seas at a steady pace of about 16 km/h, I recorded all vertebrates seen. See an example (<https://ebird.org/view/checklist/S59604785>) of one of my eBird checklists.

Pelagic birding is a unique experience, especially from a research ship, where 'chumming', the practice of throwing food overboard to attract seabirds, is not done. Chumming is a common practice in commercial sea birding trips. Here, of course, our task was to scientifically estimate densities. That cannot be done when you lure dense aggregations of seabirds. See my previous article ([https://www.indianbirds.in/pdfs/Kannan\\_Pacific.pdf](https://www.indianbirds.in/pdfs/Kannan_Pacific.pdf)) about a commercial sea birding trip, from the Pacific Ocean. In this Atlantic research expedition, we often travelled miles without seeing a bird! One of my eBird checklists reported zero birds in a 7.56 km transect.

Aboard the *Gordon Gunter*, the most frequent bird we encountered was the Great Shearwater *Ardenna gravis* (<https://ebird.org/species/greshe>). This handsome and graceful pelagic bird was often seen flying at top speed, skimming the waves, then arcing into the air and swooping back down in quest of squid and other small prey. It nests only on a few islands in the South Atlantic and wanders far out north. It was good to see this globetrotter. It was a challenge to avoid double counts because they often circled and followed our ship, making it hard for us to discern new encounters from repeats.

The Wilson's Storm-Petrel *Oceanites oceanicus* (<https://ebird.org/species/wispet>) was another common bird seen. It reminded me vaguely of the Little Swift *Apus affinis*, fluttering on

or near the water surface, or floating perched in vast rafts along with shearwaters. Because of their habit of flying with feet just skimming the water surface, they are named after the biblical St. Peter, who is said to have walked on water. As we moved into cooler Canadian waters, we saw more Leach's Storm-Petrels *Oceanodroma leucorhoa* than Wilson's.

In order to estimate densities, we needed to know the distance the bird was from the ship. I used a specially calibrated pencil as range finder. The pencil had marks denoting the distance band (300–200 m, etc.) and some fancy trigonometry is involved for calibrating the pencil to my biometrics. I simply had to hold the pencil upright at arm's length, align the tip with the horizon, and read the distance band associated with the bird. The method ([https://www.oikonos.org/papers/taller/Heinemann\\_1981.pdf](https://www.oikonos.org/papers/taller/Heinemann_1981.pdf)) factors in the distance to the horizon from my height above water (15.85 m) and the distance from my eye to the pencil tip.

Apart from the pure joy of birding and getting 11 lifers, I was pleased to make a meaningful contribution to our knowledge of the distribution and abundance of pelagic birds in this continental shelf. Much of the scant information on pelagics from this area is from commercial pelagic tours. My 70 transects spanned an average of 14.16 km and 52 min. I recorded an average of 3.4 species and 28.1 birds in these surveys. The top five species encountered (in terms of numbers) were Great Shearwater, Wilson's Storm-Petrel, Cory's Shearwater *Calonectris diomedea*, Leach's Storm-petrel *Oceanodroma leucorhoa*, and Audubon's Shearwater *Puffinus lherminieri*. Significant rarities included South Polar- and Great Skuas *Stercorarius maccormicki* and *S. skua*. A solitary Red-necked Phalarope *Phalaropus lobatus*, seen spinning on the water in the middle of nowhere, was an added treat.

It was mid-August and thus time for fall migration, with Boreal birds en route to the neotropics. Some land birds, on migration, showed up in the ocean. Often they flew around the ship, sometimes perching momentarily before hurrying on. I did not expect to see Prairie Warblers *Setophaga discolor* (<https://ebird.org/view/checklist/S59492329>), Red-winged Blackbirds *Agelaius phoeniceus*, and three species of swallows in my voyage. In any case, they helped pad the rather anemic species lists!

One animal I was keen to see was the highly endangered North Atlantic right whale *Eubalaena glacialis* (<https://www.fisheries.noaa.gov/species/north-atlantic-right-whale>). Only about 400 are known to remain. At least nine died in 2019 due to accidental ship strikes or fishing net entanglements. One interesting study underway at NOAA is the size of a critical copepod crustacean called calfin *Calanus finmarchicus*. This lipid-rich plankton has apparently been shrinking in size and declining in nutrient value. Since it is critical food for many sea creatures like right whales and lobsters, scientists are concerned. Global warming is known to lead to a decrease in the size of shell-bearing organisms. We did not see any right whales, but the day our cruise ended, a pod was seen south of Nantucket Island, in the area we sampled days earlier. NOAA immediately declared a voluntary speed restriction

zone in that area. Other whales we saw were fin *Balaenoptera physalus*, minke *B. acutorostrata*, pilot *Globicephala* species, and humpbacks *Megaptera novaeangliae*.

We carefully monitored plankton, given their importance as energetic base of the oceanic ecosystem. We had a sophisticated device called Imaging Flow Cytobot, which was a combination of a microscope, camera, and computer. It automatically captured sharp images of plankton streaming through a column connected to the ship's water intake system. We also sampled plankton using bongo nets (named for their resemblance to bongo drums) affixed with flow meters measuring the volume sampled, and CTD sensors tracked conductivity, temperature, and depth in real time. Ocean acidity was measured by using Niskin bottles electronically rigged to open at various depths. The increasing ocean acidity caused by carbon emissions is raising alarms for the future of coral reefs and shell-building organisms. The most abundant zooplankton caught were salps, gelatinous tunicates unrelated to jellyfish but more allied to vertebrates. They play an important role in the ecosystem. At least 200 species eat them, and they capture carbon.

Among the more delightful creatures seen were molas (ocean sunfish *Mola mola*). We often saw these largest of the bony fishes, spanning an average dinner table, floating on their sides, lazily waving a massive fin as though in greeting. They often

float to attract birds to pick their ectoparasites. Pods of dolphins (three species) also kept us in good humour, often riding the bow apparently for the joy of it. Flocks of shearwaters attending a frothy spot often gave away the presence of these adorable mammals. Apparently, they chase schools of fish to the surface when they forage, which the birds pick. Other welcome sightings included a leatherback sea turtle *Dermochelys coriacea*, and a whale shark *Rhincodon typus*.

I blogged (<https://noaateacheratsea.blog/author/rkannan2019/>) about my experiences regularly from the ship and am now using the blogs in my classes. Life aboard was fast-paced and fascinating. I expected living conditions to be spartan, but they bordered on the luxurious! There was a full kitchen and galley with delicious food, a gym for working out, a library, and even a movie room with over 700 movies. All this, combined with daily spectacular views of sunrises and sunsets made for a memorable experience. The constant rocking and heaving (sometimes severe enough to make one sick or fall) was difficult to manage, but I am glad I got out of my comfort zone and did this. It has made me a more versatile biologist and teacher.

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