

The adventure continues, for 3 previous study abroad students

For some students, embarking on a study abroad course represents the first time they have left the United States (or even, the first time they have left New York). A trip abroad often sparks a lifelong love of travel. Three previous students that attended the Introduction to Tropical Ecology study abroad course have been invited to help collect data on an NSF-funded trip to the Southern Ocean, with professors Dick Veit and Lisa Manne. The students are Anthony Ciancimino (who went to Trinidad and Tobago with Profs Veit and Manne in 2019), Danielle Fibikar (St. John, US Virgin Islands, 2012) and Bridget McGuire (St. John, USVI, 2016).

Now, Professors Manne and Veit have received a grant to census top predators (birds and mammals) in the sea around South Georgia, an island in the Southern Ocean about 1600 km northeast of the Antarctic Peninsula. (The project summary of the grant is below.) The point of the study is to compare current bird and mammal species abundances and locations (where they are found) to similar studies from the 1980s and 1990s, to assess the degree of change in bird communities over that time period. Climate is changing in the Southern Ocean too. As well, Professors Veit and Manne and the rest of the team will be quantifying food resources available to the foraging birds by sampling krill. Krill look like small shrimp, and are a really important resource for animals in the ocean. Antarctic krill are the largest of all the krill species, and whales migrate thousands of miles to come and eat them during the Southern hemisphere summer. An interesting factoid about krill (all krill species, not just Antarctic krill) is that they can molt for life. This means that in periods of low food resources (for them), they can molt to a *smaller* size. By molting to a smaller size, they can use extra body resources to fuel themselves in times of food scarcity.

The study starts with a 14-day quarantine in Chile (thanks, Coronavirus!) before the students and professors board the boat on May 17 2022. The ship is the R/V (Research vessel) Nathaniel Palmer (<https://www.nsf.gov/geo/opp/support/nathpalm.jsp>). What will they be doing while on the ship? During the daylight hours, the researchers will take it in shifts to monitor with binoculars from the pilot house (the bridge). They will be watching for flocks of birds, and noting every species that they see, along with abundances, location, and the temperature of the water where the individual bird (or group of birds) was found. Krill sampling will occur periodically while the boat is in motion, and processing of krill (noting numbers and species identities) will primarily be done after dark.

Because of Covid restrictions, the research vessel is requiring several research groups to go together on a single cruise. That means that Manne & Veit's team also get to go where the other researchers are going: south to the Antarctic Peninsula, into the pack ice. Thus, everyone should get to see several species of penguins.



NSF Project summary

Overview:

We will test the novel idea that changes in abundance of seabirds and marine mammals can trigger large and unexpected further declines due to deterioration of positive linkages due to Local Enhancement and Facilitation (e.g., if fur seals decline in abundance, then species that use fur seals as foraging cues may decline disproportionately). We have already tested our method against data from the 1980s and 1990s and found results that support our Hypotheses. We will survey box transects for krill, seabirds and mammals off both ends of South Georgia during winter, repeating methodology from 1985, 1991 and 1993. Our objectives are to 1.) identify changes in krill, bird and mammal abundance that have transpired, 2.) identify pairings of species that benefit each other in searching for prey using Local Enhancement, quantify how such relationships have changed since 1985, and 3.) make predictions about how these changes might continue given predicted future changes in climate. Ocean warming in the western Antarctic peninsula and Scotia Sea winter is predicted to be among the highest worldwide; we want to quantify the impact on seabirds.

Intellectual Merit:

We have one of the very few datasets on winter bird abundance for South Georgia, an area known for substantial change in temperature in recent years. We emphasize that we are not testing whether it is changing climate, changing prey base, changing ice cover or some other factor that is affecting birds.

What we are testing is whether positive associations among species have decreased over a period of clearly identified environmental change. Our previous work showed that the eastern and western extremities of South Georgia provide rich feeding areas for birds and mammals, in part due to the ocean circulation in those locations. South Georgia contains one of the largest and most diverse seabird colonies in the world. Substantial climate-related changes have already occurred, and are likely to continue into the future, and it is therefore important to quantify climate-related changes in top predator abundance and changes in the linkage among these organisms due to positive interactions. We will quantify positive foraging associations due to Local Enhancement and Facilitation using spatial statistics of association, and through behavioral observations of seabird flocks. We will construct spatial models of predator distributions. Assessment of upper trophic level predator abundance is a critical component of ecosystem evaluation. Our basic argument will be supported if changes in the number of positive interactions between the 1990s and present reflect the documented magnitude of recent environmental changes.

Broader Impacts:

Data will be collected by two graduate and 5 undergraduate students in conjunction with by Veit, Santora and Manne, who are experienced with sampling of seabirds, plankton and oceanography. This arrangement has worked well on previous cruises. We will prepare a documentary video depicting flying birds converging upon aggregations of penguins, fur seals and other birds that have themselves aggregated to a krill swarm. We will show how fewer flying birds locate krill when penguins or seals are reduced. The documentary will also feature interviews with personnel on the cruise. The film will be incorporated into a one hour presentation on the importance of science and the impact of environmental change on wildlife, which will tour a collection of educational facilities. We will also develop a new course to be taught at CUNY once a year on Climate Change and Its Impacts on Seabirds and Marine Ecosystems. This course will include at-sea field trips off Long Island and a lecture series open to the public.

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Here's a CSI Today article from November 2021 -

<https://csitoday.com/2021/11/professors-veit-and-manne-receive-two-nsf-grants-for-ornithology-research/>