

GEORGES BANK AND MARINE BIRDS

by Kevin Powers, Manomet Bird Observatory

In 1976 the Manomet Bird Observatory (MBO) initiated a distribution and abundance survey of marine birds on Georges Bank and its adjacent waters. The survey was justified because of proposed petroleum development of the Georges Bank area and its probable impact on the bird resource. We knew very little about the seasonal and spatial distributions of marine birds off the New England coast, and this survey was to provide a baseline from which we could measure a change, natural or unnatural.

Georges Bank is a submarine bank which lies east and southeast of Massachusetts (Fig. 1). The bank is generally defined by the 100m isobath, a depth which also corresponds to dramatic bathymetric and oceanographic changes of its surroundings. Georges Bank provides fishing grounds of international economic importance, unnavigable shoals of historical importance, and unique marine habitats of biological importance.

The biological uniqueness of Georges Bank is due to its physical configuration. Georges Bank is surrounded on three sides by deeper waters ($>150\text{m}$). These deeper waters, which are below seasonal thermoclines and mixing effects from storms, accumulate nutrients (e.g. nitrates- NO_3). Due to surface circulation of the Gulf of Maine to its north and Gulf Stream influenced slope waters to its south, there is a net clockwise circulation pattern on Georges Bank. This gyre draws the surrounding deep nutrient rich waters onto the bank. Therefore, since Georges Bank is shallow enough to allow light to penetrate to the bottom (the photic zone) and receives a constant supply of nutrients which are mixed vertically by tides and wind, the rate of photosynthesis (growth of phytoplankton) is exceedingly large for such a relatively small parcel of ocean. Phytoplankton is the basis of a marine food web and upon which all other components of the ecosystem either directly or indirectly support themselves.

A survey of the birdlife of Georges Bank was challenging for several reasons: (1) Georges Bank may be a mere pinhead in the North Atlantic basin but it encompasses approximately $10,000\text{ mi}^2$; an area about the size of Massachusetts, Connecticut and Rhode Island combined. (2) The only way to survey the bank is by ocean-going vessels. And (3) observers are needed who can spend several weeks at-a-time at sea. To overcome these sampling problems large sums of money are needed, but such funds cannot be justified to granting agencies on the basis of the bird resource alone. Therefore, we improvised a ships-of-opportunity program(SOP) which allowed trained volunteer and staff personnel to participate on a "not to interfere with general operations" basis on oceanographic research and

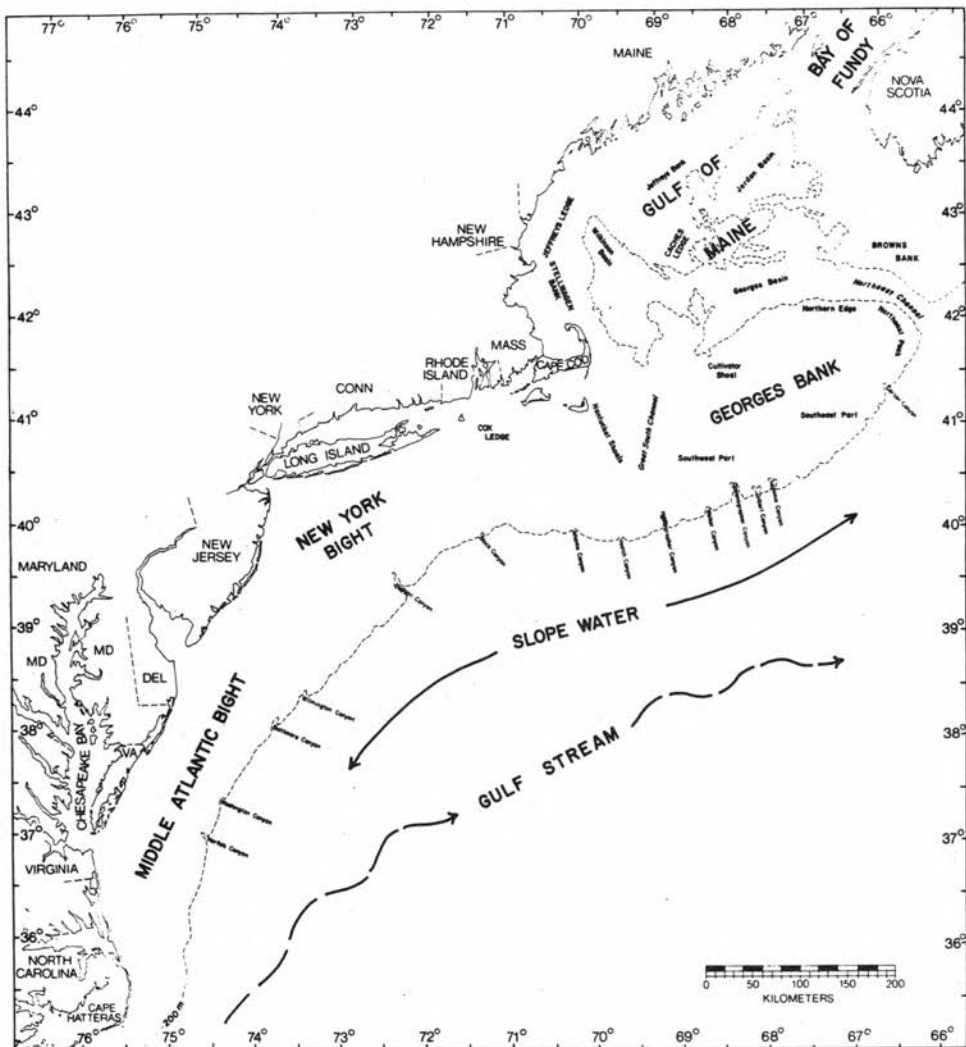


Figure 1. Location of Georges Bank

Coast Guard law enforcement cruises. SOP reduced financial and logistical problems enough to justify funding from the U.S. Fish and Wildlife Service (Office of Biological Services) in 1976-77, the U.S. Department of Energy (Marine Research Program) since 1978, and the National Marine Fisheries Service (Northeast Fisheries Center) since 1980. From 1976-1980, we have participated in 126 cruises, and 60 were made by volunteer observers.

The scope of the research has been a system study designed to investigate the general structure and function of the marine bird community. Goals within the study were: (1) to describe the species composition, distribution and abundance of the marine bird community; (2) to describe seasonal and regional patterns of species dominance; (3) to delineate areas of species and community importance; and (4) to identify physical oceanographic factors, fishing activities, and preferred prey resources that influence pelagic distributions of marine birds. Our findings will hopefully characterize the bird community in several ways, so that natural and man-caused environmental perturbations can be separated and evaluated in context of the birds.

Our most important finding has been that 10 species dominate the numbers, biomass, and energy flow of the bird community. Northern Fulmar, Cory's Shearwater, Greater Shearwater, Sooty Shearwater, Wilson's Storm-Petrel, Gannet, Red Phalarope, Great Black-backed Gull, Herring Gull, and Black-legged Kittiwake comprise 98 percent of the numbers and biomass annually. This means that by monitoring these 10 species, we can evaluate significant changes in bird populations. In addition to these common species, we have found 28 uncommon species and 18 rare species (includes waterfowl). Although most of these species were found on Georges Bank, the uncommon and rare birds pertain to waters from Cape Hatteras to the Bay of Fundy (our study area since 1979).

Distributions of birds are best described by maps. Figure 2 is an example distribution map of Northern Fulmars in winter. I have completed seasonal distribution maps for all species and a major manuscript summarizing much of the data is now being peer-reviewed. It will be an atlas "of sorts" but besides individual species accounts there will be a discussion of bird distribution and abundance in relation to seasonal changes in oceanographic conditions. It will be published in 1983 by the National Marine Fisheries Service as a special scientific report and it will include more than 110 figures.

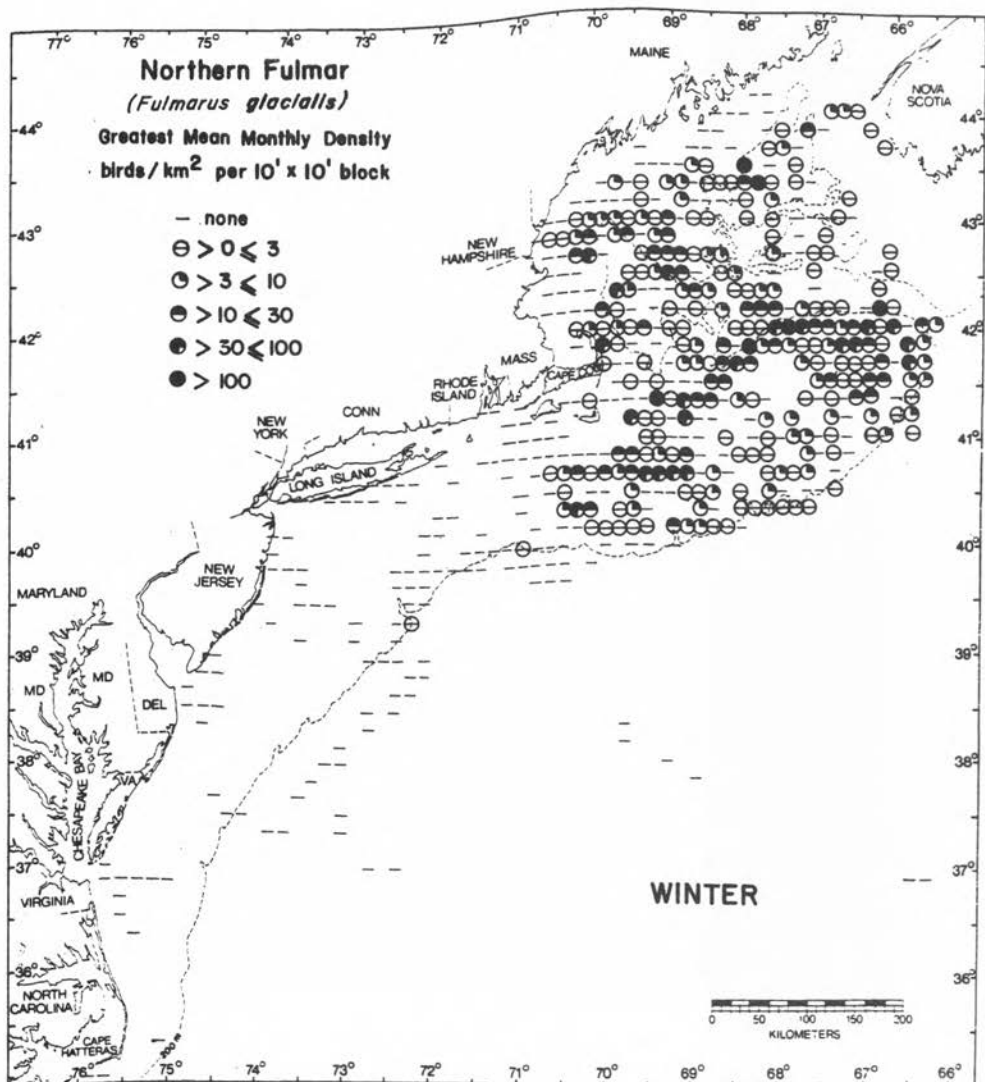


Figure 2. Distribution Map of Northern Fulmar in Winter

Seabirds spend more than half their lives at sea away from breeding colonies, where nesting space and predation are not significant regulators on population size. The distribution and availability of prey are probably the crucial determinants of pelagic distributions of marine birds. We have identified two important features in the Georges Bank area that influence and concentrate birds, fronts and fishing activities.

Fronts are narrow bands of water marked by sharp differences in temperature and salinity. Frontal areas directly or indirectly concentrate zooplankton, squid, and fishes. A front on the southern edge of Georges Bank at the boundary of cool shelf water and warm slope water appears to influence Red Phalarope spring migration in April and May, where flocks from 100's - 1,000's are recorded. A second front caused by tidal upwelling and surface currents exists from Nantucket Shoals east across the northern edge of Georges Bank. We find fulmars, Greater Shearwaters, Sooty Shearwaters, Wilson's Storm-Petrels and kittiwakes in greatest abundance in this frontal region.

We hypothesize that preferred prey is available in greater concentrations at or near the surface in the frontal areas. The birds can therefore forage more efficiently in these areas where food is concentrated. However, several important fishing grounds also exist near these fronts and we must separate the attraction from offal from naturally available food.

In summary, Georges Bank is an important feeding area for marine birds. I have identified the scope of the marine bird research at MBO and some of the significant findings to date. A major manuscript summarizing much of the research is in preparation, while new information is being collected and analyzed.

KEVIN POWERS graduated from the University of Connecticut with a BA in biology and earned his MS in wildlife biology at Louisiana State University. Following a year working for the U.S. Fish and Wildlife Service in Anchorage, assessing marine bird populations at their breeding sites, he joined the Manomet Bird Observatory staff in 1977, where he is the staff scientist supervising MBO's research in marine birds and mammals.

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