Beached Bird Survey Project on the Atlantic and Gulf Coasts

December 1, 1975 to November 30, 1983

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THE FIRST EXTENSIVE beached bird survey in the United States was started in 1971 at the Point Reyes Bird Observatory. It covered sections of the California coast (Page *et al.* 1982). There had been no survey of comparable scope on either the Atlantic or Gulf coasts prior to the inception of the project here described, in 1974.

In the autumn of that year, observers began counting beach-cast carcasses at several Atlantic Coast localities between Long Island, New York, and Cape Romain, South Carolina. In 1975, the project was extended along the Atlantic Coast to southern Florida, and to parts of the Florida Gulf coast. In 1977, the Texas Gulf coast was added, and coverage was extended northward to Plum and Nantucket Islands, Massachusetts. In 1983, surveys were started in Nova Scotia.

The primary goal of this project was to determine the "normal" or average occurrence of dead marine birds on beaches. Deviations from this baseline could then be examined to determine regular seasonal or geographic patterns, or to detect unusual anomalies caused by natural or man-made disasters. Special attention was given to the problem of sea bird oiling. This sampling method might shed some light on the mortality of pelagic and offshore migrant species, which is difficult to measure by any means. Findings might also indicate changes in the abundance or distribution of some species.

METHODS

Volunteer observers were furnished instruction sheets and data reporting forms on which to report the date of each survey trip, species, age, sex, degree of oiling, degree of decomposition, and the cause of death for each specimen. Observers were instructed to report as much of the information as could be accurately determined. All trips were reported, even if no carcasses were found. Although the project was principally concerned with marine bird species, all species found were recorded. So they would not be counted again on subsequent trips, carcasses were removed to behind sand dunes or elsewhere, unless observers with appropriate permits wished to retain them for analysis or study.

About one-half of the observers comprised personnel in national wildlife refuges, national seashores or state parks, who patrolled their beaches regularly. The other one-half were professional ornithologists, members of bird clubs, students, or simply birders who enjoy walking the beaches through the changing seasons. These volunteers were asked to select a stretch of beach at least three kilometers long and to walk it on a weekly or bi-weekly basis. There was a considerable turnover in observers owing to personnel changes at the government facilities, residence changes and even the waxing and waning of enthusiasm among volunteers. Constant recruiting was necessary to maintain and expand the project.

Reports were submitted to me quarterly at the end of February, May, August and November, to correspond roughly with winter, spring, summer, and fall seasons. These periods corresponded closely to the reporting periods in *American Birds,* so that comparisons could be made with any unusual concentrations of living birds reported in the same areas A quarterly bulletin was sent to observers to keep them informed and as a reminder to submit their reports.

During the years covered by this paper I received quarterly reports from an average of 26 beach sites totalling 202 kilometers. Observers were listed for 32 beaches totalling 290 kilometers. Because the length of beach surveyed varied each reporting period, data were reduced to birds found per kilometer of beach surveyed per quarter. Results were analyzed for the 8-year period December 1, 1975, through November 30, 1983. Data from the first year of the project were excluded from the analysis owing to the small number of reports received, as were 1983 data from Nova Scotia. Atlantic Coast data were divided into North Atlantic and South Atlantic segments using Cape Hatteras, North Carolina, as the division point. There was a natural distinct break at that point in total mortality, degree of oiling, and species composition.

RESULTS

Figure 1 shows an overview of the number of beached birds per kilometer for the 8 years under review. In the North Atlantic region mortality was high during the first 4 years of the project, but gradually tapered off over the next 4 years. Mortality was consistently lower in the South Atlantic and Florida Gulf regions, but increased in the winter and spring of 1983. The results in these 2 regions showed a remarkable similarity. Results from the Texas Gulf coast were erratic, compounded by the small number of beach sites reporting (n = 1 or 2), the total absence of reports for some quarters, and heavy fall-out of spring migrants in 1980 and 1983. Average mortality for the 8-year period, by season and region, is shown in Table 1. No average was calculated for the Texas Gulf coast for the above reasons. These averages form a baseline for the 3 regions, to which subsequent quarters can be compared.

The severe winter of 1976-1977 stands out in the Northeast, where Brant (*Branta bernicla*), made up 48% of the casualties. Black Ducks (*Anas rubripies*), constituted 13%; scoters (*Melanitta* spp.) 5.5%; and gulls (*Larus* spp.) 18%. Because of the severe weather and the difficulty of extracting ice covered carcasses, many specimens were not identified as to species. Of those reported by age, nearly all were in adult plumage. Statistics tell only part of the story. Graphic accounts accompanying the reports told of birds coated with ice spray, literally frozen to the beach. Starvation took a heavy toll, with normal feeding areas covered by heavy ice.

Effects were less severe on more southern beaches. Common Loons (*Gavia immer*), made up 41% of the losses on the Atlantic beaches south of Cape Hatteras, and mortality on the Florida Gulf coast was evenly divided among about one dozen species.

The winter of 1977-1978, while less severe than the previous one, was still abnormally cold. Mortality for the North Atlantic region was only about one-third that of the previous winter, with Brant casualties dropping from 230 to 30 birds. But both the Atlantic Coast south of Cape Hatteras and the Florida Gulf coast showed marked increases over the previous year. Common Loons, Herring Gulls (*L. argentatus*) and Laughing Gulls (*L. atricilla*) suffered the heaviest mortality. These reports also helped document the increasing abundance of the Herring Gull in the southern part of its wintering range.

The first hurricane to affect the reporting areas was *Belle* of 1976. It moved up the Atlantic Coast the last week of July, remaining far enough offshore to have little effect until it reached New Jersey, where it dealt a devastating blow. Observer Jim Akers reported "a windrow of dead birds 500 feet long and one-two feet high" containing 675 Clapper Rails (*Rallus longirostris*), largely young of the hatching year, 25 Laughing Gulls, 10 Common Terns (*Sterna hirundo*), and two Great Blue Herons (*Ardea herodias*). On Cape Cod seven Roseate Terns (*S. dougallii*) were reported, but there were no reports of tropical terns, which are frequently brought north by hurricanes.

In 1979, hurricane *David* first began to affect the Florida coast on September 3. It came ashore over Charleston, South Carolina, September 4, and continued on an island course well away from the coast for the next 3 days, before dissipating over the Gulf of St. Lawrence. Sightings of live tropical terns were widespread (DeBenedictus, 1980), but the numbers found dead on the beaches were surprisingly low. Sooty Terns (*S. fuscata*) predominated—one at Ft. Myers Beach, and 13 at Canaveral National Seashore, Florida; one at Cumberland Island, Georgia; one at Assateague Island, Maryland; one at Trustom Pond, Rhode Island; and two on Nantucket Island, Massachusetts. Canaveral National Seashore also had one Brown Noddy Tern (*Anous stolidus*) and one Audubon's Shearwater (*Pufinis lherminieri*).

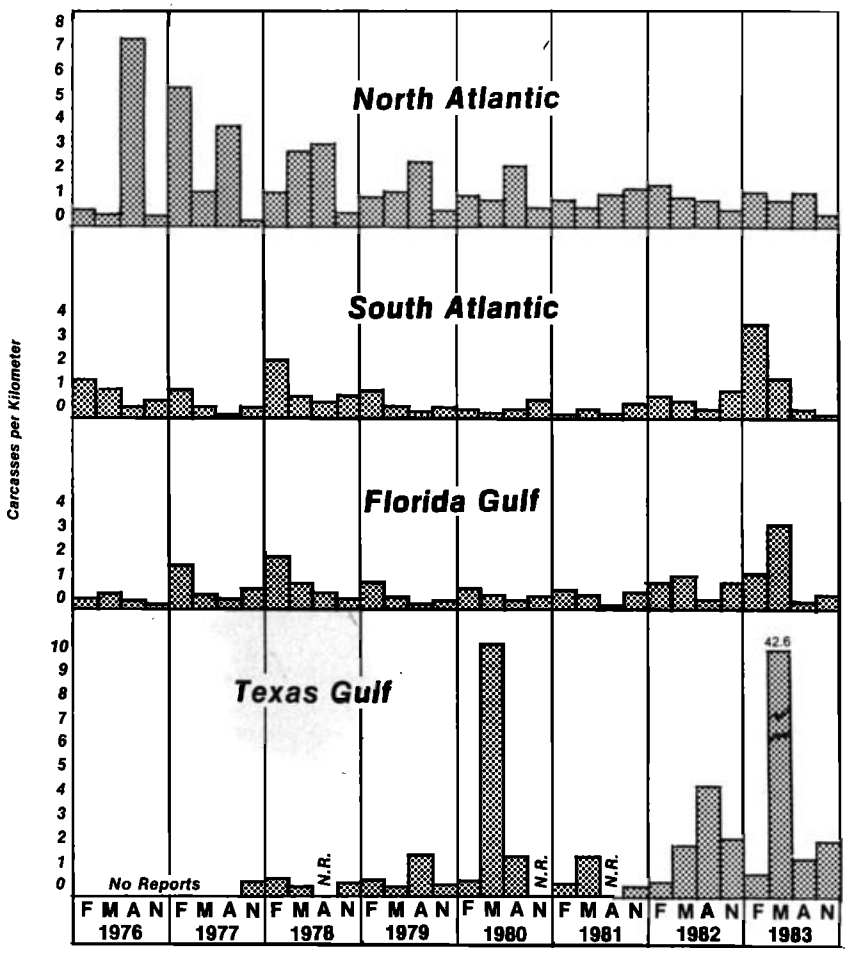

Figure 1. Carcasses found per kilometer of beach surveyed; quarters ending last day of February, May, August, November.

SEABIRD OILING IS A problem of special significance. Comparing the percentages of carcasses oiled during the first 4 years of the survey with those oiled during the second 4 years, Table 2 shows that the rate of oiling was remarkably constant within each region. Oiling was much more frequent north of Cape Hatteras. It was almost nonexistent on the Florida Gulf coast, and was similarly low on the Texas Gulf coast. Overall, the rate of oiling was 6.6%.

The heaviest oil-related mortality on the North Atlantic coast arose from an oil spill in the Chesapeake Bay in spring 1978. This took many carcasses ashore on nearby coastal and island beaches. In the quarter ending May 31, 1979, oiling from an unknown source brought many dead birds ashore on Assateague Island, Maryland. The Coast Guard flew aerial surveys offshore, but could not locate the oil source.

Another increase in oiled specimens occurred in the winter of 1976-1977, following the Argo Merchant disaster in December, 1976. Unfortunately, we were not yet surveying Nantucket Island beaches at that time, but carcasses collected there by Powers and Rumage (1978) gave a clear picture of that occurrence.

Twenty-nine species were reported as oiled over the 8-year period. Those showing the highest percentage of oiling are shown in Table 3. By family, those most susceptible to oiling were: auks (*Alcidea*), 61.3%; grebes (Podicipedidae), 59 1%; loons (*Gavidae*), 17.5%; and sea ducks (*Anatidae*, subfamily *Aythyinae*), 15 3%.

OUR REPORTS HAVE shown very high mortality among Common Loons throughout their coastal migration and wintering ranges; 789 carcasses were recorded in the 8 years, a number exceeded only by the ubiquitous Herring Gull. Mortality was reported in every quarter, although one might expect that few of the species would be present in coastal waters during the summer. Two loons were reported as shot and one was entangled in a piece of gill net. One team of observers saw fishermen removing two loons from gill nets. Two were listed as mangled by sharks or other fish predators. These were suspected of being too weakened by disease to escape attack. The majority of reports mention starvation, dessication and evidence of gastroenteritis; however, these are often terminal phases rather than primary causes of death. Heavy die-offs in the winter and spring of 1983 were probably related to high levels of mercury contaminants in the carcasses and heavy loads of intestinal parasites.

Red-throated Loons (*G. stellata*) did not share the fate of their Common relatives. Only 33 specimens of *stellata* were reported in the 8-year period. This might represent a lower mortality rate for the Red-throateds, or could simply reflect a smaller population of this species wintering in the surveyed areas.

Table 1. Average number of carcasses per km. of beach
(December 1, 1975–November 30, 1983)

	Quarter Ending			
	February 28	*May 31*	*August 31*	*November 30*
North Atlantic	1.93	1.42	3.10	0.68
South Atlantic	1.51	0.81	0.33	0.71
Florida Gulf	1.27	1.15	0.39	0.69

Table 2. Numbers and percentages of oiled carcasses

Time Period	*N. Atlantic*			*S. Atlantic*			*Fla. Gulf*		
	D	*O*	*%*	*D*	*O*	*%*	*D*	*O*	*%*
Dec. 1, 1975 to Nov. 30, 1979	3433	291	8.5	780	13	1.7	215	1	0 5
Dec. 1, 1979 to Nov. 30, 1983	2607	218	8.4	814	13	1.6	279	1	0 4

D = Dead birds. O = Oiled birds.

Table 3. Species showing the highest percentage of oiling

Species	*# Dead*	*# Oiled*	*% Oiled*
Razorbill (*Alca torda*)	55	47	85.5
Masked Booby (*Sula dactylatra*)	5	4	80.0
Common Murre (*Uria aalge*)	25	18	72.0
Horned Grebe (*Podiceps auritas*)	67	48	71.6
Oldsquaw (*Clangula hyemalis*)	125	85	68.0
Thick-billed Murre (*Uria lomvia*)	16	6	37.5
Scaup, spp.	69	22	31.9
Surf Scoter (*Melanitta perspicillata*)	56	11	19.6
Common Loon (*Gavia immer*)	789	140	17.7

Common Eiders (*Somateria mollissima*), suffered a substantial mortality along the Massachusetts coast in June, 1978. Age distribution among the specimens was: adult—41; subadult—14; juvenile—0. As this area is south of the breeding range of the species, the absence of juveniles is not surprising. What took the adult and first-year birds there at that time of year and caused so many deaths is not clear.

A FINDING OF SOME importance was the appearance of dead Black-legged Kittiwakes (*Rissa tridactyla*) on Cape Cod National Seashore at a time when they might normally be expected to be on their breeding grounds farther north. Most carcasses were recorded May 20—August 20 each year and were, almost without exception, first-year birds. Numbers showed dramatic fluctuations:

1976	1977	1978	1979
7	13	25	47
1980	1981	1982	1983
194	12	19	23

Most of these birds were found on a 16 kilometer stretch of beach. No one has been able to explain their presence so far south of their normal range. Autopsies by D. Minsky, tern warden (*pers. comm*), showed the cause of death to be Aspergillosis (*Aspergillus fumigatus*). All birds autopsied were female.

In the winter of 1981-1982, 66 Black Scoters (*Melanitta nigra*) were found dead on the 27 kilometer beach of Cumberland Island, Georgia, followed by 56 in the winter of 1982-1983. The earliest were found November 4, and the latest July 6, long after they should have departed for northern breeding grounds

They were predominantly females It is not known what stress was causing die-offs of this species near the southern edge of its wintering range.

Due to the small numbers found, attempts to evaluate mortality of pelagics has met with limited success. Tubenoses came ashore at the rate of only 13.1/year on the entire Atlantic Coast. But a "wreck" of 22 Greater Shearwaters (*Puffinus gravis*) and one Manx Shearwater (*P puffinis*) was reported at Back Bay, Virginia, June 28-July 1, 1975. Cause of death was diagnosed by the U.S. Fish & Wildlife Service as renal coccidiosis. The summer quarter of 1978 found 19 Greater Shearwaters and six Audubon's Shearwaters (*P. lherminieri*) at Cumberland Island, Georgia, while Nantucket Island and Cape Cod, Massachusetts, had eight Greater and two Sooty shearwaters (*P griseus*) plus one Wilson's Storm-Petrel (*Oceanites oceanicus*). Cause of death was not reported.

Northern Gannets were reported at an average 12.9/year. Laboratory analysis failed to reveal cause of death. Alcids average 14.9/year, with the majority reported from Nantucket Island.

Two heavy fallouts of spring migrants were reported from Mustang Island, Texas. In spring 1980, reports totalled 127 specimens on 12 kilometers of beach, of which 34 were Passerines. In spring 1983, an incredible 511 dead birds representing 69 species came ashore on this same beach; 274 of these were Passerines.

Cause of death was reported for about one-third of the specimens. In addition to causes discussed above, beach vehicles and predators took a heavy toll, principally on the young of beach-nesting species. Those reported shot were principally game species, during or shortly after hunting seasons. But the presence of Common Loon, Killdeer (*Charadrius vociferous*), Willet (*Catoptrophorous semipalmatus*), and several species of gulls on the list indicated that there are still people who will shoot at anything that flies.

A bonus arising from this project was the recovery of 56 bands from beached birds, some of which would never have been recovered had it not been for the regular beach patrols. An analysis of these recoveries will be discussed elsewhere.

DISCUSSION

The project achieved its primary goal of establishing a baseline on a seasonal basis for the two Atlantic Coast regions and the Florida Gulf coast, although no significant trend in total mortality emerges over the 8 years. Data from more beaches are needed before the same can be said for the Texas Gulf coast.

Efforts have so far not been made to assess meteorological or oceanographic factors which might influence the percentage of birds dying at sea, that are actually found on the beaches. My data will function only as an indicator of a relationship to true mortality.

Three experiments conducted in the Irish Sea (Bibby and Lloyd 1977) by dropping dead gulls at various points off-shore and charting points of recovery provided rates of 59%, 11% and 44%. Similar experiments in the North Sea showed much lower rates of recovery. As one might expect, wind strength and direction were the primary factors in the movement of carcasses to shore. Tides were of some influence in bays and estuaries. Experiments along the California coast (Page *et al., op. cit*) with drift bottles and the carcasses of several species of birds indicated that results from one area could not be used to predict results in another with any degree of accuracy, owing to too great a number of variables. More bouyant species (e.g., gulls) produced a higher recovery rate than less bouyant ones (e.g., murres, cormorants or loons). Also, recovery rates diminished in proportion to the distance of drops from shore.

In view of the range of results in these experiments, it did not seem worthwhile to undertake a similar project. The wide range of geographic and climatological factors occurring over the large extent of the surveys would limit the applicability of the results from one area to another.

THE STRENGTH AND weakness of beach surveys as indicators of mortality is readily apparent in their response to hurricanes. The mortality among marsh-and beach-nesting birds caused by hurricane *Belle* went unreported elsewhere. On the other hand, the number of dead birds reported from hurricane *David* was low, despite the presence of large numbers of storm-borne birds indicated by sight records. This may show that surprisingly small numbers of storm-driven waifs are killed, or merely that they do not reach the beach under these conditions. My only census site in the path of hurricane *Fredric*, the Florida section of Gulf Islands National Seashore, reported no mortality attributable to that storm.

Interpretation of data regarding oiled birds presents some sticky problems Beach surveys have been used to estimate the effect of major oil spills on sea birds (Bourne *et al.*, 1967; Hope-Jones *et al* , 1970). But surveys taken at sea and ashore in connection with the Argo Merchant oil spill, December, 1976-January, 1977, showed that beach surveys may indicate only a tiny fraction of the birds affected (Powers and Rumage 1978) The species composition is also quite different. Reports from observers on Cape Cod at this time showed only 14 out of 114 specimens oiled.

The oil spill in Chesapeake Bay February 27, 1978, produced a situation which was the reverse of the typical off-shore spill. Observers covering Fishermen's Island at the mouth of the Chesapeake Bay for the project, recorded 152 oiled birds March 9-11; but the total number of oiled birds, alive and dead, was estimated by state and federal wildlife service employees at 22,000.

Thus, the major value of regular surveys of beached birds may be to monitor normal "background" oiling. They are also useful to spot small outbreaks, such as the 1979 incidents off Assateague Island and Cumberland Island, which might otherwise have gone unreported

The reported incidence of oiling may overstate mortality from this cause, for it is not always possible to be sure whether oiling of the carcass occurred before or after death. Also, some of the birds reported as oiled may have already been weakened by injury or disease, and were more susceptible to oiling because they spent more time on the surface of the water. Table 3 shows that the species most likely to encounter trouble on oiled waters are habitual surface feeders in contrast to those species which feed by diving.

The documentation of widespread Common Loon mortality in coastal waters is an important result of this research Periodic die-offs have been reported previously in limited areas (Stevenson 1970, 1971, 1972, 1974, 1977), but our data are the first to quantify the widespread temporal and geographic extent of the problem. The status of the species on its breeding grounds is being widely studied (Sutcliffe, 1979), but little attention has been given to losses on its wintering grounds as a contributing factor to the decline of the species. McIntyre (1978) described the feeding and flocking behavior of Common Loons, but with only

limited reference as to how this behavior might be related to attempts to avoid possible predation. The heavy die-off in 1983 provided an opportunity for examination of carcasses by the National Wildlife Health Laboratory and other agencies. The final information summary indicated a complex interaction of factors, rather than a single and primary cause of death. A more detailed analysis of Common Loon mortality will be published elsewhere.

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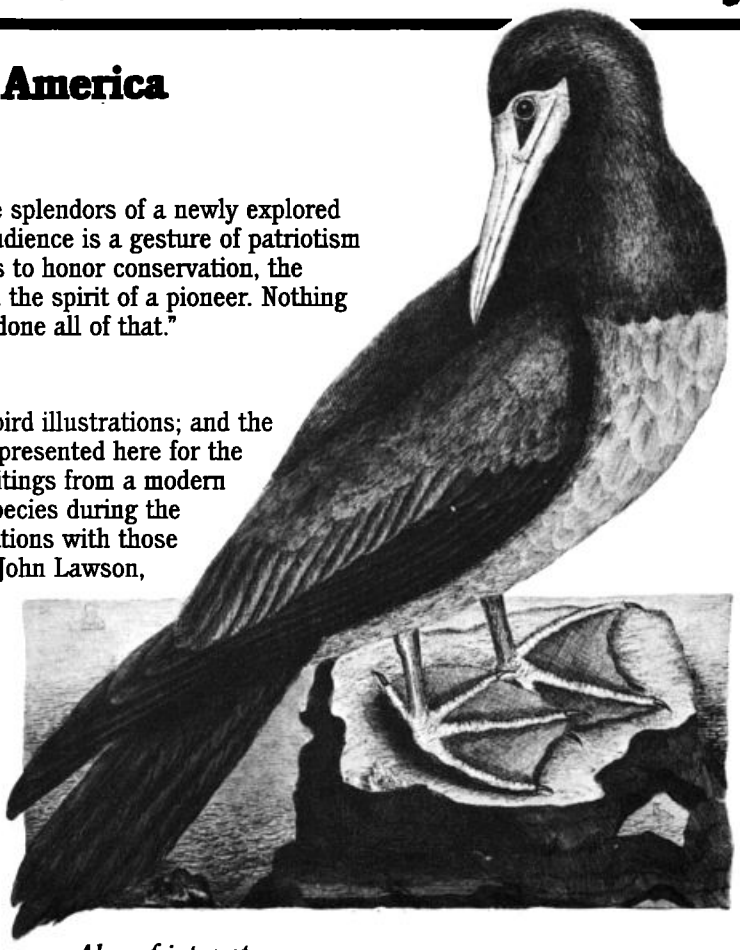

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