

MARINE BIRD CHAPTER

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Abernathy, S.A., M.T. Baer, C.S. Benner, M.S. Brody, D.K. Francois, J.K. Gilliam, L.K. Good, C.J. Ohara, and J.V. Martin. 1989. Atlantic Outer Continental Shelf: Description of the Mid-Atlantic Environment. Abernathy, S. A. (ed.). U.S. Department of the Interior, Minerals Management Service, Atlantic OCS Region, Environmental Assessment Section. Herndon, VA. 167 p.

*This document discusses the major issues and areas of concern for the mid-Atlantic environment that are considered in the planning process for oil and gas leasing and operations on the Outer Continental Shelf (OCS). The issues are addressed with respect to the potential environmental consequences of mid Atlantic oil and gas exploration, development and production. A section discussing The Physical Environment (e.g., geology, non-petroleum minerals, physical oceanography, chemical oceanography and water quality, ocean dumping, meteorology, air quality), Biological resources (e.g., plankton, benthos, fishery resources, marine reptiles, marine mammals, marine and coastal birds, estuaries, wetlands, sensitive coastal habitats, canyon areas), Socioeconomic Environment, and other issues (e.g., archaeological resources, marine vessel traffic, National Aeronautics and Space Administration/ Department of Defense activities, oil and gas infrastructure, marine sanctuaries, and estuarine research reserves) is included. Most of the figures showing fisheries resource distribution are taken from fisheries data compiled for bottom-trawl and shellfish surveys of the National Marine Fisheries Service, Northeast Fisheries Center, Woods Hole, MA.

Blair, N. 1998. A Scientific Overview of the Region Surrounding Lease Blocks 467 and 510. pp. 14-17. In: Vigil, D.L. (ed.). North Carolina/Minerals Management Service Technical Workshop on Manteo Unit Exploration: February 4-5, 1998. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA.

*These are the proceedings from a workshop/meeting (conducted on February 4-5, 1998) between the North Carolina Department of Environment and Natural Resources, and the U.S. Department of the Interior's Minerals Management Service (MMS). The geographic area being discussed is approximately 45 miles east-northeast of Cape Hatteras, NC, referred to as the Manteo Unit. This workshop reviewed environmental and socioeconomic information known and needed on the Manteo Unit. The MMS's Gulf of Mexico OCS Regional Director gave an MMS perspective on history and status of the area. Chevron gave a presentation on how the exploratory well would be drilled. The scientific characterization was presented in greater detail by a number of scientific experts who spoke on the following disciplines physical environment, habitat and living resources, seabirds, marine mammals, sea turtles, and social and economic issues. Specific chapters are cited individually, when appropriate.

The continental margin offshore Cape Hatteras, NC has been the focus of numerous oceanographic studies. The objective of this report is to provide an overview of physical, biological, geological, and chemical processes that operate in the region so that the results from individual disciplinary studies can be placed in a system-wide context. This section discusses hydrocarbon potential, water column observations and processes, benthic observations and processes, summary and the future.

Brinkley, E.S. 1994a. Spring Migration of Seabirds off Central North Carolina: 22 May 1992, with Notes on two Skua (*Catharacta*) Taxa. The Chat 58: 94-101.

*The concentration of pelagic seabirds and other marine biota along frontal eddies of the western edge of the Gulf Stream in the northern summer is a well-documented phenomenon (Haney and McGillivray 1985, Haney 1986a-c) and is well-known to sports fishermen in the Southern Atlantic Bight. Less material has been published, however, on the concentration of migrants along this front in the northern spring. The timing of the spring migration varies over the three-week period extending from the second week in May through about the first week in June at these latitudes, with significant but lesser movement of terns, jaegers, skuas, shearwaters, and storm-petrels on either side of this period. An excursion of 22 May 1992 yielded a diversity and density of species that advances our assessment of spring migration off North Carolina.

———. 1994b. Evasive Maneuvers of Black-capped Petrel (*Pterodroma hasitata*). *The Chat* 58: 18-21.

*On 30 August 1992, H. Fenton Day III and I observed a group of 25 distant birds soaring at heights 50-80 meters over "The Point" (35°33' N, 74°53' W), east-southeast of Oregon Inlet, North Carolina. From a distance of roughly a half-kilometer, the birds seemed to be gulls soaring together in a tight, ascending column. The time of initial observation was 1245 EDT; it was a hot day with moderate winds (5-10 knots), with good conditions for the formation of thermals over the Gulf Stream, and soaring gulls, if a little out of place, seemed plausible.

Browne, M.M. 1980. External Parasites (Mallophaga and Acarina) of Wilson's Storm Petrel, *Oceanites oceanicus* Kuhl, off the North Carolina Coast. Ph.D. Dissertation. North Carolina State University, Department of Entomology. 84 p.

The ectoparasitic species (Mallophaga and Acarina) were examined from Wilson's storm petrels (*Oceanites oceanicus*) collected off the North Carolina coast--April to September, 1976-1978. Four species of Mallophaga from two suborders and two families were found: Amblycera, Menoponidae-*Ancistrona vagelli*; Ischnocera, Philopteridae-*Halipeurus pelagicus*, *Philoceanus robertsi*, and *Saemundssonina marina*. Three species in three families of feather mites (Analgoidea) were found: Proctophyllodidae, *Brephosceles* sp. Xolagidae, *Ingrassia* sp. and Avenzoariidae *Zachvatkinia hydrobatidii*. Birds were examined for location of ectoparasites, frequency of occurrence, age, and sex of adult ectoparasites. The age, sex, date of collection, and wing-molt of the petrels were recorded in relation to the ectoparasite load.

Buckley, P.A. 1973. A massive spring movement, including three species new to North Carolina, at Cape Hatteras National Seashore. *American Birds* 27(1): 8-10.

Much remains to be learned about the distribution and abundance of seabirds off the Atlantic Coast of North America, where - unlike the Pacific Coast - observations have been few (although increasing, especially off the Maritime Provinces, New England and Long Island) or practically lacking (New Jersey south to Florida). The area of the Outer Banks of North Carolina in particular (marine waters of Cape Hatteras and Cape Lookout National Seashores) has almost never been surveyed for pelagic, by means of offshore boat trips, particularly surprising in view of the proximity of the Gulf Stream to Cape Hatteras (sometimes as close as 9-10 miles). Recently, in the summer and fall of 1972, trips out of Hatteras Village and Morehead City, NC into and beyond the Gulf Stream have given an indication of the wealth and diversity of seabirds there, recording, for example, hundreds of Audubon's Shearwaters (*Puffinus lherminieri*), several Black-capped Petrels (*Pterodroma hasitata*) at least two Black-browed Albatrosses (*Diomedea melanophris*) White-tailed Tropicbird (*Phaethon lepturus*),

Bridled Tern (*Sterna anaethetus*), and slightly further north a White-faced Storm Petrel (*Palagodroma marina*) -- in addition to the pair of the latter species seen at Oregon Inlet, N.C. after a hurricane in 1971.

This paper reports a seabird movement seen, from shore at Cape Hatteras National Seashore in late May 1970, of a magnitude possibly never before recorded on the Atlantic Coast of North America. Among the commoner species were three others never before recorded from the Carolinas, and in fact almost unknown south of New England waters. Observations were all by the writer and F. G. Buckley, and both observers were previously familiar with all species seen, from much pelagic bird work, especially ocean crossings.

Carter, J.H., III, and J.F. Parnell. 1974. Little Gulls at Cape Hatteras, N.C. *The Chat* 38: 40.

*On 10 March 1973, the authors observed three Little Gulls (*Larus minutus*) at the tip of Cape Hatteras, near Buxton, NC. The birds were feeding over the ocean with a large flock of Bonaparte's Gulls (*Larus philadelphia*). The Little Gulls appeared slightly smaller than the Bonaparte's Gulls in flight. Two of the Little Gulls were immatures, and the third was an adult in winter plumage. The distinctive field marks of the immatures (dark crown patch, tail band, and dark wing-stripe) were repeatedly noted at close range by both authors. The adult was easily distinguished in flight by the very dark underwing. Although the weather was foggy, Parnell obtained recognizable photographs of an immature Little Gull.

Clapp, R.B., D. Morgan-Jacobs, and R.C. Banks. 1982a. Marine birds of the Southeastern United States and Gulf of Mexico. Part II: Anseriformes. FWS/OBS-82/20. U.S. Fish and Wildlife Service, Office of Biological Services. Washington, DC. 492 p.

Information on the seasonal distribution and abundance of 41 species of waterfowl of the order Anseriformes that occur in the coastal southeastern United States has been compiled and mapped from the literature. In many instances this provides the first synthesis of knowledge about a species for this region. For the species we consider most important in coastal areas we also provide information on worldwide distribution, habitat, food, and various aspects of life history. This information was gathered in an attempt to assess the possible effects of offshore oil development on populations of marine birds in the southeast.

The susceptibility of birds to oil depends not only on their juxtaposition in time and space, but also on currents and climatic factors and on the stage of the life or annual cycle and the behavior of the species. Contamination by oil may result in matting of the feathers with death following from chilling, starvation, and the ingestion of oil during preening. Among the birds covered by this report, the sea ducks and diving ducks are considered the most susceptible to oil pollution in the southeast. Most of the other ducks, geese, and swans covered in the report are relatively unsusceptible to oil pollution because they are seldom found in areas where oiling is likely to occur.

One of the conclusions reached by this report is that we know very little about the status and populations of some of the anatids that occur in the southeast. Some of these species (e.g., the scoters) are among those that may be expected to be most detrimentally affected by development of oil resources. In general, most species that are widely hunted are relatively well studied, but much is unknown of those that are not game birds.

Clapp, R.B., D. Morgan-Jacobs, and R.C. Banks. 1983. Marine Birds of the Southeastern United States and Gulf of Mexico. Part III: Charadriiformes. FWS/OBS-83/30. U.S. Fish and Wildlife Service, Division of Biological Services. Washington, DC. 853p.

Information on the seasonal distribution and abundance of 22 species of marine birds of the order Charadriiformes that occur in the coastal southeastern United States has been compiled and mapped from the literature. In many instances this provides the first synthesis of knowledge about a species for this region. We also provide information on global distribution, habitat and food for all species, and include information on various aspects of life history for the 16 species that we consider most important in coastal areas. This information was gathered in an attempt to assess the possible effects of offshore oil development on populations of marine birds in the southeast.

The susceptibility of birds to oil depends not only on their juxtaposition in time and space, but also on currents, climatic factors, the stage of the life or annual cycle, and the behavior of the species. Contamination by oil may result in matted feathers with death following from chilling, starvation, and ingestion of oil during preening. Few of the species covered in this report are at great hazard from the direct effects of oiling, but populations of most of these species are highly susceptible to environmental change. Large concentrations of wintering, breeding, and migrant gulls and terns occur in the southeast and in some instances make up a large proportion of the global or North American population. Consequently, this report includes most of the marine birds that we believe most likely to be detrimentally affected by the development of oil resources.

One of the conclusions reached by this report is that we still know very little about the status and populations of some of the charadriiforms that occur in the southeast. Additional surveys of colonial marine birds in the southeast and nearby waters are badly needed to ensure that we know enough about them, to prevent their untimely loss from our coastal areas.

Clapp, R. B., R.C. Banks, D. Morgan-Jacobs, and W.A. Hoffman. 1982b. Marine birds of the Southeastern United States and Gulf of Mexico. Part I: Gaviiformes through Pelecaniformes. FWS/OBS-82/01. U.S. Fish and Wildlife Service. Office of Biological Services, Washington, D.C. 637p.

Information on the seasonal distribution and abundance of 39 species of marine birds of the Orders Gaviiformes, Podicipediformes, Procellariiformes, and Pelecaniformes that occur off the southeastern shores of the United States and in the Gulf of Mexico has been compiled and mapped from thousands of literature citations; in many instances this provides the first synthesis of knowledge about a species for this area. Information on worldwide distribution, habitat, food, and various aspects of life history is also summarized. This information was gathered to assess the possible effects of offshore oil development on populations of marine birds.

Susceptibility of birds to oil depends not only on their juxtaposition in time and space, but also on currents, climatic factors, the stage in the life or annual cycle, and the behavior of the species. Contamination by oil may result in matted feathers; death may soon follow from chilling or starvation, or from the toxic effects of oil ingested when the birds attempt to preen themselves. Oil from feathers may be transferred to eggs by incubating birds and may greatly reduce reproductive success.

Among the birds covered by this volume, loons and grebes are considered the most susceptible to oil pollution. Cormorants, pelicans, and boobies are moderately susceptible and the truly pelagic birds, including most of the Procellariiformes, are the least susceptible.

Little is known about the occurrence of seabirds off our shores, but our knowledge is increasing. Recent ornithological studies offshore have revealed concentrations of species previously thought to occur rarely, if at all. More than 63% of the Manx Shearwaters ever seen off the southeastern coast were sighted in the last 5 years (1975-1979) and 37% were seen during the last 2 years (1978-1979) covered by this report. Comparable figures for Wilson's Storm-petrel are 40% and 26%. Nonetheless, observations are limited. Future trips to locate or count birds should be scheduled when birds are expected to be present at periods when little previous information was obtained.

Additional research should be conducted on the distribution and status of birds that use the marine environment. More attention should be directed toward investigating the status and distribution of pelagic birds, toward learning the abundance and distribution of marine birds that nest in the southeastern states, and toward discovering the distribution and status of birds that are transients or winter visitors in the southeast. Research is also needed to determine the numbers and proportion of each species that are being oiled in the southeast so that the effects of oil pollution can be assessed more adequately.

Crawford, K. (ed.). 1989. Proceedings: 1989 Marine Expo: The Natural Resources Associated with Mobil's Proposed Drill Site. NC Outer Continental Shelf Office, NC Department of Administration. Raleigh, NC. 64 p.

*This report contains abstracts from each presenter. Chapter topics include: Mobil's Proposal, Geologic Overview -- Introduction and Potential for Oil and Gas Discovery, Oceanographic Conditions, Comments on Last MMS Modeling, Biological Production Near the Bottom (invertebrates), Fisheries Resources, Commercial and Recreational Marine Fisheries, Winter Storm Effects on Spawning and Larval Drift of Pelagic Fish, Marine Birds, Sea Turtles in North Carolina, Marine Mammals, Plenary Session, Summary. Each chapter also cited individually when appropriate.

Dittmann, D.L., R.M. Zink, and J.A. Gerwin. 1989. Evolutionary Genetics of Phalaropes. *Auk* 106: 326-331.

*The three species of phalaropes- Wilson's (*Phalaropus tricolor*), Red-necked (*P. lobatus*), and Red (*P. fulicaria*) have long been considered a natural group (Cramp, 1983), often equated with a monophyly; and they have been classified at the familial, subfamilial, or tribal rank. An early diagnosis (Ridgeway 1991) of the group read "Toes with a conspicuous lateral membrane, sometimes developed into broad scalloped lobes; tarsus excessively compressed, plumage of underparts very dense, gull-like." Several other characteristics, such as the distinctive whirling foraging behavior (Hayman et al. 1986), pronounced reverse sexual dimorphism in plumage coloration, and the lobed toes (and basal webbing) are characteristics often cited as support for naturalness (monophyly) of the group (Cramp 1983). It is unclear which of these traits qualify as synapomorphies (i.e. uniquely derived for phalaropes). For example, although each species possesses webbing on the toes, each has a distinctive pattern (illustrated in Coues [1972]). The distinctive whirling foraging behavior also differs in detail among species (Cramp 1983). Strauch (1978) analyzed 70 skeletal characteristics and found only one synapomorphy, namely a particular condition of the bill, which is apparently identical in each

species of phalarope. Thus, the monophyly of the phalaropes, although widely assumed, is not based on many traits that are shared by all species. The question of phalarope monophyly aside, based on plumage pattern, behavioral and vocal similarities, distribution, and habitat, most authors consider the Red and red-necked phalaropes to be sister taxa and the Wilson's most primitive (Cramp 1983, Jehl 1968). For example, although each phalarope species was once placed in a monotypic genus (e.g., Ridgeway 1919, Hellmayr and Conover 1948), the Wilson's Phalarope was retained in a monotypic genus long after the other two were made congeneric.

Haney, C., D.S. Lee, K.M. Fristrup, and M. Socci. 1991. Seabird attraction to ephemeral food sources: geometry of recruitment distance in experimentally-induced foraging flocks (abstract). Pacific Seabird Group Meeting. Victoria, BC.

*This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

Haney, C., D.S. Lee, and M. Socci. 1993. Air-sea heat flux, ocean wind fields, and offshore dispersal by gulls during winter (abstract). Pacific Seabird Group Annual Meeting. Seattle, WA.

*This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

Haney, J.C., and D.S. Lee. 1994. Air-sea Heat flux, Ocean Wind Fields, and Offshore Dispersal of Gulls. *The Auk* 111(2): 427-440.

Gull numbers in pelagic habitats off the southeastern United States were weakly associated with seasonal variability in mean wind speeds, but strongly associated with accumulated air-sea heat flux (a surrogate for temperature inversions; i.e. pre-thermal condition) and wind-speed variance (an energy source for flight, as well as a thermal inducement). Single meteorological variables accounted for as much as 59 to 93% of seasonal changes in gull abundance. Gulls (including nonbreeders) delayed dispersal to oceanic waters until onset of winter meteorological conditions, several months after cessation of breeding. Our findings support Woodcock's convective-soaring hypothesis, which ascribed gull dispersal in winter to boundary layering along eastern continental margins. We extend this model by linking gull morphology and flight to energy-efficient reliance on air-sea interactions and spatial patterns in seasonal wind fields. Summer meteorological conditions in much of the western North Atlantic Ocean facilitate coastal foraging by gulls, but act to preclude efficient foraging to and in offshore habitats. The presence or absence of coherence (meteorological consistency) in the aerial environment may have acted to select and maintain divergent life history strategies in gulls and certain other inshore feeders.

Haney, J.C., D.S. Lee, and R.D. Morris. 1999. Bridled Tern (*Sterna anaethetus*). *The Birds of North America* 468: 1-24.

*A discussion of distinguishing characteristics, distribution, systematics, migration, habitat, food habits, behavior, breeding and migratory distribution for the Bridled Tern (*Sterna anaethetus*) including the defined study area for The Point.

Hass, T. 1997. Distributions of pelagic seabirds in relation to dynamic features of the Gulf Stream. Ph.D. Dissertation. University of North Carolina, Chapel Hill. 181p.

While the boundaries that delimit terrestrial habitats are often clear, distinctions between habitats of the open ocean are usually subtle, and few examples of habitat selection by pelagic seabirds have been documented. Several long-term studies have demonstrated that pelagic seabirds associate with particular water masses, but none has examined whether the distributions of seabirds consistently shift in synchrony with real-time changes in the positions of oceanographic features. Furthermore, in most studies the processes that underlie the associations between seabirds and water masses have been unclear.

I studied seabirds off the coast of North Carolina during May-September of 1992-1995. Black-capped Petrels (*Pterodroma hasitata*) and Band-rumped Storm-Petrels (*Oceanodroma castro*) were most abundant in interior waters of the Gulf Stream and appeared to track these waters as the Gulf Stream shifted toward and away from the coast. In multivariate analyses both species showed significant associations with variables indicating interior waters of the Gulf Stream. In addition, Black-capped Petrels were almost twice as abundant on days in which the Gulf Stream moved offshore as on days in which its position remained stable or moved onshore.

Offshore movements of the Gulf Stream occurs when troughs of Gulf Stream meanders (100-km concave bends in the current) pass through a region. Near Cape Hatteras, where the continental slope is exceptionally steep, this process induces upwelling of deep water along the edge of the Gulf Stream, thereby concentrating prey for seabirds near the surface. Elevations in the abundance of Black-capped Petrels thus coincided with indications of upwelling. By focusing on movements of an oceanographic boundary current, this investigation has revealed an important pattern in the distribution of seabirds.

———. (in press). An additional record of Bulwer's Petrel, *Bulweria bulwerii*, of the southeastern United States of America. *Marine Ornithology*.

*This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

Helmuth, W.T. 1920. Extracts from notes made while in the Naval Service. *The Auk* 37(2): 255-261.

*In the fall of 1917 the ship on which I served as seaman was assigned to inspection duty on the Atlantic and Gulf coasts of the United States, under Rear-admiral C. McR. Winslow's flag. We left the navy yard at Brooklyn on October 20, 1917, and proceeded up the New England coast as far as Machiasport, Maine, which we reached on November first. We then journeyed south, close inshore, up the Delaware River to Philadelphia, thence to Norfolk, Va., arriving on Thanksgiving day. We left Norfolk on February 23, 1918, proceeding south to Key West, Fla. From here we went directly to Pensacola, Fla.; from Pensacola to New Orleans, up the south pass of the Mississippi; from New Orleans to Galveston, Texas; thence to Port Arthur, Texas, and across the Gulf of Mexico to Tampa, Fla., arriving on April 1, 1918. From Tampa our course took us again to Key West, up the east coast of Florida to Jacksonville, and thence north to Charleston, S.C., stopping at Brunswick and Savannah, Ga.

During this time I had excellent opportunities to study the birds met with offshore, and a few chances to watch land birds on our all too infrequent "liberties" in various places. Some of these notes may be of interest to readers of 'The Auk,' and I append them herewith.

Jones, H.L. 1967. Status of the Razorbill in the Carolinas. *The Chat* 31: 55-57.

*On the morning of 16 February 1964, Julian Meadows and I found a dead Razorbill (*Alca torda*) near the north end of Wrightsville Beach, North Carolina. The bird was slightly oiled on the head, but otherwise was in excellent condition. The specimen was prepared by James Parnell and placed in the bird collection at North Carolina State University.

The remainder of this note describes the status of this species in the Carolinas.

Lee, D.S. 1977. Occurrence of the Black-capped Petrel in North Carolina Waters. *The Chat* 41: 1-2.

*The Black-capped Petrel (*Pterodroma hasitata*) is the only species of gadfly petrel known to occur in the northwestern Atlantic with any regularity. Robbins et al. (1966) describe it as a casual summer visitor to eastern North America during storms. The AQU Checklist (1975) lists it as rare and occurring north of Florida only accidentally. Therefore, it is interesting to report that this species appears to be a regular, though uncommon, offshore summer and early fall resident of North Carolina.

The remainder of this note describes the status of this species offshore North Carolina.

———. 1979. Second Record of the South Trinidad Petrel (*Pterodroma arminjoniana*) for North America. *American Birds* 33: 138-139.

*On August 20, 1978 a field party from the North Carolina State Museum of Natural History collected a single dark phase South Trinidad Petrel (*Pterodroma arminjoniana*) 74 km ESE of Oregon Inlet, Dare County, NC. The only previous North American record is of a hurricane-driven specimen taken near Ithaca, New York, although there is another reported occurrence in the Northern Hemisphere an individual struck the rigging of a yacht December 31, 1905, in the mid-Atlantic, at 21°51'N, 43°35' W).

The remainder of this note describes the status of this species offshore North Carolina.

———. 1984. Petrels and storm-petrels in North Carolina's offshore waters: including species previously unrecorded for North America. *American Birds* 38(2): 151-163.

Although there may have been various reported instances of the occurrence of Band-rumped Storm-Petrels (synonymous with Harcourt's and Madeiran Storm-Petrel) in the United States, particularly in the Southeast, all are associated with storms and the species has been assumed to be an accidental. Peterson (1980) lists it as accidental in Florida, North Carolina, Montana, Indiana, Delaware, Pennsylvania and the District of Columbia, Ontario, and Quebec. It is also known from South Carolina (Shuler 1973), Tennessee (USNM 526349), and Texas (Oberholser 1974); there are single records for Brazil and Cuba. The northern and inland records certainly result from storm-blown casualties. In fact, Murphy (1936) cites several of the above-mentioned records as classic examples of long-range transport of birds trapped in eyes of hurricanes. The species is recognized as being highly pelagic, staying well out at sea, generally rather solitary, and an inhabitant of tropical and subtropical seas, The

eleven coastal records for the Southeast are summarized by Clapp et al. (1982), and all appear to be storm-related. In order to present these records in perspective, a review of all the species of petrels found off the North Carolina coast is also provided.

- . 1985c. Results of a Ten-year Study of Marine Birds South of the Virginia Cape Region: Their Potential Impact with EMPRESS II. Appendix H. In: U.S. Department of the Navy. EMPRESS II: Supplemental Draft Environmental Impact Statement for the Proposed Operation of the Navy Electromagnetic Pulse Radiation Environment Simulator for Ships (Empress II) in the Chesapeake Bay and Atlantic Ocean. United States Navy. Environmental/ Intergovernmental Section. Atlantic Division. Naval Facilities Engineering and Command. Norfolk, VA.

*This report describes a 10-year survey of marine birds of North Carolina's offshore waters. The southern portion of the VACAPES EMPRESS II Area of North Carolina overlaps with the northern portion of the defined study area for the Data Inventory Related to the Hatteras Middle Slope (The Point) Area.

- . 1986a. Seasonal distribution of marine birds in North Carolina waters, 1975-1986. *American Birds* 40 (3): 409-412.

*In 1979, Lee and Booth (*American Birds* 33: 715-721) summarized information on the seasonal occurrence of pelagic birds off the North Carolina coast. Since that time a fair amount of additional information has become available, outdating that study. Major changes include the documentation of additional bird species, the extension of known seasonal occurrences for many, if not most species, changes in our knowledge about the relative abundance or recognized status of several species, and nomenclature.

The remainder of this note describes the status of pelagic bird species offshore North Carolina.

- . 1986c. Second Record of the Cape Petrel in the Western North Atlantic. *The Chat* 50: 118-119.

*On 26 July 1985 Captain Allen Foreman and his mate John Gallup saw a bird they identified as a Cape Petrel (*Daption capense*). It was flying 42 miles ENE of Oregon Inlet, Dare County, NC, and was over water 200 fathoms in depth. The bird was watched for a minute or more while near a Black Tern (*Chilodoniast niger*). The captain and mate each independently described the size, plumage, and behavior of the bird to me in late July of 1985 and again in June of 1986. Although neither was aware of the significance of the record, on both occasions they were able to recognize the species from illustrations in standard field and seabird guides. Because of the distinctive plumage of the species in question and their familiarity with local marine birds (Captain Foreman has been accompanying me during my seabird studies for the past 9 years), I have confidence in the authenticity of this record. For example, Foreman and his mate Dick Harris provided sight descriptions of Masked Boobies (*Sula dactylatra*) from off the North Carolina coast (Lee and Platania 1979) several years prior to the "official" recognition of their occurrence presented by bird watchers (Davis and Needham 1983). Likewise, they alerted me to the presence of two types of tropicbirds off the North Carolina coast prior to confirmation that Red-billed Tropicbirds (*Phaethon aethereus*) were in the North Atlantic off the Carolina coast. While there is always some question of the validity of records not documented by specimens or photographs, in this particular case, the fact that this sight record is not corroborated by

someone with formal background in bird study has little, if any, bearing on judging the validity of the identification.

The remainder of this note describes the sight records of Cape Petrel (*Daption capense*) offshore North America and worldwide.

———. 1987a. Common Loons wintering in Offshore Waters. *The Chat* 51(2): 40-42.

*Between 1975 and 1986 I have had the opportunity to observe Common Loons (*Gavia immer*) far at sea off the North Carolina coast. Many of my records are of spring migrants (N=98), but some additional individuals (N=35) found during the winter months were assumed to be winter residents. Although individuals were encountered regularly, at no time did the species appear to be common far offshore, except perhaps during spring migration. No Red-throated Loons (*G. stellata*) were seen offshore at any season during the 11-year study period. My sightings were made mostly at distances between 20 and 35 miles (32-56 km) from shore and in waters of 20 to 500 fathoms in depth. Regular occurrence far at sea was not expected. Cramp and Simmons (1977), for example, state that Common Loons remain within a few kilometers of shore throughout most of their winter range. Clapp et al. (1982) noted: "Common Loons in winter are normally marine but remain within a few kilometers of shore. They regularly use enclosed harbors and inlets. Bent (1919) referred to groups of wintering loons sometimes far out at sea; but this does not seem to agree with most recent observations." Most researchers studying offshore faunas in the southeastern United States to date have not discussed loons. Rowlett (1980), however, does indicate 0.1 to 1.0 Common Loons per hour in deep waters (40-500 fathoms) of the Northern Chesapeake Bight in February, April, and May. Studies on wintering Common Loons are few (e.g. McIntyre 1978) and were conducted in sounds along beach fronts.

The remainder of this note describes the status of this species offshore North Carolina.

———. 1987b. December records of seabirds off North Carolina. *Wilson Bulletin* 99(1): 116-121.

*Little published information is available concerning offshore winter seabird fauna of the southeastern United States. The only overview of the local seasonal variation in seabirds is that by Lee and Booth (1979). Their summaries were based mostly on North Carolina field studies done from late spring through early fall, and provide little new information on the winter distribution of marine birds. Clapp et al. (1982, 1983) compiled records of all marine birds for the southeastern States, but offshore information was generally unavailable for the winter. During the last few winters I conducted 11 offshore survey trips into shelf and shelf-edge waters off North Carolina during December. All trips departed from Oregon Inlet, North Carolina (29 December 1977; 5 and 30 December 1978; 3 and 28 December 1982; 12, 20, 28, and 29 December 1984; 5 and 22 December 1985). Survey routes typically extended 35 to 55 miles offshore, transecting inshore, shelf, shelf-edge, and Gulf Stream waters.

———. 1988a. Biases in age and sex ratios of seabirds off the North Carolina Coast. *Progr. Meeting Colonial Waterbird Soci. and Pacific Seabird Gr.* p. 28.

*This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

———. 1988b. First record of Wilson's Storm-Petrels on a Christmas Bird Count. *American Birds* 41(4): 1331-1333.

*On December 20, 1986, The Continental Shelf North Carolina Count Participants recorded a minimum of 351 Wilson's Storm Petrels. The Wilson's Storm-Petrels. The Wilson's Storm-Petrel (*Oceanites oceanicus*) is such an abundant species in the North Atlantic Ocean during the warmer months, the significance of its occurrence in late December can easily be overlooked. Furthermore, the number of birds encountered is striking when one considers that nearly all new Christmas Bird Count records are of single vagrant birds.

The remainder of this note describes the status of this species offshore North Carolina.

———. 1988c. The Little Shearwater (*Puffinus assimilis*) in the western North Atlantic. *American Birds* 42(2): 213-216.

*A summary of the reported occurrence for the past century and an examination of at-sea identification of the cryptic black-and-white shearwaters found in North Atlantic waters.

———. 1989a. Marine Birds. Proceedings: 1989 Marine Expo: The Natural Resources Associated with Mobil's Proposed Drill Site. pp. 47-48. In: Crawford, K. (ed.). NC Outer Continental Shelf Office, NC Department of Administration. Raleigh, NC.

Although the current information on the biology, distribution, and season of occurrence of seabirds, marine mammals, and marine turtles in North Carolina is still incomplete, it is better than what is available for most other areas of the world. The 14-year extensive study conducted by the N.C. State Museum is perhaps the longest and most intensive ocean study conducted of seabirds and marine mammals conducted anywhere. North Carolina has the largest documented marine bird and marine mammal fauna of any geographic unit in the North Atlantic. It is primarily the location of the state in relation to tropical and subtropical areas, migration routes, and oceanic currents that accounts for the diversity of species.

Many of the species normally observed represent small populations that could be threatened by local oil spills and the follow-up use of dispersants. Large portions of the total populations of many of these species assemble regularly or seasonally in deep waters off the Outer Banks of North Carolina. At least eleven species could be heavily damaged by oil spills in North Carolina's offshore waters. Moreover, although many of the organisms, particularly birds, have not been regarded as endangered by the U.S. Fish and Wildlife Service, present data suggest possible oversights. Most birds have relatively protracted periods of occurrence off the state's shores. There are several factors that account for this, the more obvious of which include: (1) local oceanic currents and upwellings that provide important foraging areas for both low and high latitude species, (2) extended migratory periods for particular species because of the staggered schedules of various age groups, and (3) a typically long adolescence in some species during which sub-adults may linger in local waters for extended periods before returning to nesting areas.

———. 1989b. Jaegers and skuas in the Western North Atlantic: some historical misconceptions. *American Birds* 43(1): 18-20.

*For many decades long-tailed Jaegers (*Stercorarius longicaudus*) were considered very rare spring and fall transients over the western North Atlantic. This paper discusses sightings and distribution offshore North Carolina, USA.

———. 1991a. Offshore Research of NC State Museum in Area of the Point. pp. 2-3. In: Shepard, A. (ed.). NURC--UNCW 1991 Undersea Research: Informational Meeting. National Undersea Research Center, University of North Carolina at Wilmington. Wilmington, NC.

Although the current information on the biology, distribution, and season of occurrence of seabirds, marine mammals, and marine turtles in North Carolina is still incomplete, it is better than what is available for most other areas of the world. A 15- year extensive study conducted by the NC State Museum (NCSM) is perhaps the longest and most intensive ocean study of seabirds and marine mammals conducted anywhere. The Hatteras area has long been regarded as a biological "Mason-Dixon Line" between boreal and tropical maritime elements. North Carolina is at a latitude usually associated with temperate seas; however, boreal, temperate, and tropical species are transported, or follow prey items transported by converging oceanic currents to the outer continental shelf area at Hatteras. This, in part, explains the diversity. North Carolina has the largest documented marine bird (over 50 species) and marine mammal (28 species) fauna of any geographic unit in the North Atlantic. Much of what has been added to fauna of the state is the result of studies in the area known as "The Point." It is primarily the location of the state in general, and "The Point" in particular, in relation to tropical and subtropical areas, migration routes and oceanic currents that account for the diversity of species. The relatively rich diversity is offset by comparatively low densities, but many of the species found here are tropical ones with small populations, so densities are naturally low. For a tropical - subtropical environment the densities are really quite high. The *Sargassum* community is also discussed.

———. 1991b. Pelagic seabirds off the North Carolina coast: An overview of 16 years of surveys. pp. 77-86. In: Proceedings of Fourth Atlantic Outer Continental Shelf Region Informational Transfer Meetings. MMS/OCS Study 92-0001.

*This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

———. 1992a. Manx Shearwaters off the Southeastern U.S. Coast. Wilson Ornithological Society Meeting 1992. p. 14.

*This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

———. 1992b. Pelagic Seabirds off the North Carolina Coast: An Overview of 16 Years of Surveys. pp. 78-86. In: Department of the Interior, Minerals Management Service. Proceedings of the Fourth Atlantic OCS Region Information Transfer Meeting, September 1991. U.S. Department of the Interior, Minerals Management Service. Herndon, VA.

The Fourth Atlantic Outer Continental Shelf (OCS) Regional Information Transfer Meeting (ITM) was held on 24-25 September, 1991, in Wilmington, NC. The focus of the meeting was on the OCS off

North Carolina, specifically on activities related to a proposed exploratory well for oil and gas by Mobil on Block 467 a site 40 miles off the coast of North Carolina. The area of industry interest is known as the Manteo Prospect, while the activities surrounding the proposed drilling are referred to collectively as the Manteo Project. It is also near a fishing ground known locally as "The Point." The area is believed to be gas prone rather than oil prone. The estimated size of the resource could be as high as 5 trillion cubic feet of gas.

The purpose of the meeting was to exchange information on the leasing background, legislative activities, scientific results, and socioeconomic studies. Legislative-related reports include descriptions of the Oil Pollution Act of 1990, the Outer Banks Protection Act, the Environmental Studies Review Panel, and the North Carolina Physical Oceanography Panel. Reports of studies on marine life include benthic diatoms, benthic fauna, pelagic seabirds, sea turtles, and right whales. One report describes the use of airships (blimps) for ocean research a capability relevant to North Carolina because of the east coast airship facility is located in the state. Local marine science facilities described include NOAA's National Undersea Research Center at the University of North Carolina at Wilmington (NURC/UNCW) and the National Marine Fisheries Service laboratory in Beaufort.

Developments in oil spill cleanup technology and capabilities are described by both the Coast Guard and the industry. A socioeconomic report describes the effects of the oil and gas activities on the tourist industry. Lastly, research on the restoration of salt marshes indicates that rehabilitation of an area is possible when development or an accident has occurred. While the emphasis of the meeting was on oil and gas, two reports described the results of projects related to offshore sand mining. The appendix lists the names and addresses of speakers. Individual chapters are cited individually when appropriate.

*This section provides a brief overview of pelagic seabirds off the North Carolina coast with an overview of 16 years of surveys. Figure 14, An Example of Seabird Sightings Compiled by the North Carolina State Museum, is on page 78. The role of sargassum patches as bird habitat is described.

———. 1995a. Marine Birds off the Coast of North Carolina. *The Chat* 59(4): 113-188.

Records of 71 species of sea birds occurring along and off the North Carolina coast are summarized from published literature sources and from fifteen years (1975-1989) of offshore observations. At least 15 species of birds not previously established as occurring off North Carolina were documented with specimens or photographs during this study, and an additional 7 have been reported based on sightings.

The relatively rich foraging grounds off the Outer Banks of North Carolina account for such a diversity of species of marine birds that assigning the status of accidental or vagrant to even the rarer species might not be appropriate. The local marine micro-environments, are highly variable and account for the area's ability to provide a large species diversity. Seabirds are often simultaneously represented by temperate, boreal, and subtropical species all within a small geographical area. During the spring and fall, migrant species also contribute to the diversity. Although the Hatteras offshore area does not have the predictable large biomass of the Grand Banks during the summer months, it has the largest documented species diversity of pelagic seabirds (Lee 1986) and marine mammals (see Lee et al. 1982) in the western North Atlantic.

The distribution of seabirds in North Carolina's offshore waters is neither even nor random. Clear preferences for certain zones and seasons exist and are discussed in the individual species accounts.

———. 1995b. The Pelagic Ecology of Manx Shearwaters *Puffinus puffinus* off the Southeastern United States of America. *Marine Ornithology* 23: 107-119.

Knowledge of the biology of Manx Shearwaters *Puffinus puffinus* is largely based on data obtained in and around breeding colonies. In this paper I provide information on various aspects of the marine ecology of this shearwater. The information presented here on age and sex ratios, masses, moult sequence and food habits is the first recorded away from the species' breeding grounds. Whereas not common, Manx Shearwaters occur regularly in pelagic zones off the southeastern United States of America and the number of birds appears to be increasing. As expected, most occurrences are from migration periods and 38% of the total records and reports (n=121) are from the northern spring (March-May). The timing of migration is masked by the presence of birds throughout the northern winter and a small number of summer records. The local occurrence of moulting adults and immatures indicates that at least some segment of the population does not undergo transequatorial migration. Based on banding records and other information it appears that summer birds are largely, and perhaps exclusively, immatures that need not return to their nesting areas in northern latitudes.

———. 1999a. A closer look: Manx Shearwater. *Birding* 31(6): 522-531.

*This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

———. 1999b. Pelagic Seabirds and the Proposed Exploration for Fossil Fuels off North Carolina: A Test for Conservation Efforts of a Vulnerable International Resource. *The Journal of the Elisha Mitchell Scientific Society* 115(4): 294-315.

Exploratory drilling is an issue of importance to international conservation because of the regular occurrence of a number of species of rare and globally endangered seabirds occurring in the immediate vicinity of a proposed oil/gas drill site on the Outer Continental Shelf of North Carolina. Species of primary concern include: Black-capped Petrel (*Pterodroma hasitata*), Bermuda Petrel (*P. cahow*), Herald Petrel (*P. arminjoniana*), Fea's Petrel (*P. feae*), and Roseate Tern (*Sterna dougallii*). The area also supports a high diversity of seabirds (49 species) and has been nominated as a globally Important Bird Area. Various factors attract birds to the site making them vulnerable to potential man-made catastrophic events. Lighting associated with the drilling operation is expected to have a major negative impact on several rare species. A secondary concern of disrupting the local marine system and the further depletion of existing stocks of rare seabirds is economic. A growing recreational seabird watching industry has developed on North Carolina's Outer Banks. Educational aspects alone of this industry are an important resource for the understanding of international conservation ethics. Offshore gas/oil exploration potentially jeopardizes both the fauna and the existing educational/ecotourism dependent on the Outer Continental Shelf. Despite these concerns, current conservation strategies and existing regulations do not appear to address the situation, and an internationally important faunal assemblage is in danger.

———. 2000. Color morph bias and conservation concerns for a tropical *Pterodroma*. *Chat* 64(1): 15-20.

*This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document when requested. The document was not available from University of North Carolina - Wilmington library or via their interlibrary services (J. Ott, pers. comm. 7 March 2000).

Lee, D.S., D.B. Wingate, and H.W. Kale. 1981. Records of Tropicbirds in the North Atlantic and upper Gulf of Mexico, with comments on field identification. *American Birds* 35(6): 887-890.

*Despite its seemingly accidental occurrence, recent records of the Red-billed Tropicbird, *Phaethon aethereus*, in the North Atlantic suggest that it may occur more frequently than is generally believed.

On October 9, 1975, an individual was found sick on a beach near Jacksonville, Florida. On May 16, 1979, Lee collected two specimens *ca.* 40 miles east of Oregon Inlet, Dare County, North Carolina, and on September 1, 1979, a sick Red-billed Tropicbird was found beached near Stuart, Martin County, Florida. These birds represent the third through sixth documented records of the species for eastern North America. Additionally a photo record at the North Carolina State Museum of Natural History is available for May 1981.

Lee, D. S., and E.W. Irvin. 1983. Tropicbirds in the Carolinas: Status and Period of Occurrence of Two Tropical Pelagic Species. *The Chat* 47(1): 1-13.

*The recent documentation of a second species of tropicbird in the northwest Atlantic Ocean makes it desirable to summarize and evaluate the current knowledge of the status and the season of occurrence for the two tropicbirds in the offshore waters of the Carolinas. The records presented here provide a needed base against which future records can be tallied. They come from a widely diverse body of published sight reports, unpublished records maintained at the North Carolina State Museum, and personal field experience. Few specimens, photographic records, or literature reports provide enough details to separate the two species of Atlantic tropicbirds. This is understandable because prior to 1964 there was little reason to suspect that any tropicbird seen off the coast of North America was anything other than a White-tailed (*Phaethon lepturus*). The reported occurrence of the Red-billed Tropicbird (*P. aethereus*) off the southeastern coast makes the specific identification of previous sight reports suspect. It is our purpose to alert readers to this problem as well as to evaluate the status of these two species based on the fragmentary information presently available.

Lee, D.S., and J. Booth Jr. 1979. Seasonal distribution of offshore and pelagic birds in North Carolina waters. *American Birds* 33(5): 715-721.

Until recently the geographical and seasonal distribution of offshore and pelagic birds has constituted one of the weakest areas in our knowledge of North American avifauna. While the distribution of seabirds on the West Coast is now relatively well known (eg. Sanger 1970, Ainley 1977), along the eastern seaboard only the North Atlantic region has been surveyed (Wynne- Edwards 1951, Murphy 1967, Finch et al. 1978), although Richard Rowlett is currently surveying Maryland's offshore waters. There is little need to elaborate on the problems of observing, identifying, photographing, or collecting birds at sea. Much of the published information available on seabirds of the central Atlantic states is based on storm casualties, which do not necessarily reflect normal patterns of distribution, and on widely scattered reports from oceanic trips. Special mention of Paul DuMont's and Robert Ake's

offshore excursions should be made since observations from their trips have not only allowed a large number of bird students the opportunity to see unusual pelagic species, but also have contributed significantly to our knowledge of seasonal occurrence. Compiling of these reports, literature records, museum specimens and data obtained from our observations provides a fairly complete summary of the fragmentary knowledge of these birds in local offshore waters.

Lee, D.S., and J.C. Haney. 1984. The Genus *Sula* in the Carolinas: An Overview of the Phenology and Distribution of Gannets and Boobies in the South Atlantic Bight. *The Chat* 48(2): 29-45.

*Five of the eight recognized species of the genus *Sula* are known from the southeastern United States. Of these only the Northern Gannet (*Sula bassana*) occurs regularly in the Carolinas, but both the Masked Booby (*S. dactylatra*), formerly Blue-faced, and the Brown Booby (*S. leucogaster*) have been reported from North and South Carolina. Of the two remaining species, the Red-footed Booby (*S. sula*) is generally restricted to the Caribbean and disperses northward into the Florida Keys and Gulf of Mexico, whereas the Blue-footed Booby (*S. nebouxii*) is an eastern Pacific species with one accidental and astonishing record from south Padre Island, Texas (5 October 1976, photograph *Amer. Birds* 31: 349-351).

———. 1996. Manx Shearwater (*Puffinus puffinus*). *The Birds of North America* 257: 1-28.

*A discussion of distinguishing characteristics, distribution, systematics, migration, habitat, food habits, behavior, breeding and migratory distribution for the Manx Shearwater (*Puffinus puffinus*) including the defined study area for The Point.

Lee, D.S., and K.O. Horner. 1989. Movements of Land-based Birds off the Carolina Coast. *Brimleyana* 15: 111-121.

Although the occurrence of land-based birds at sea during migration periods is well known, relatively little information is available on the species composition of the flocks detected by radar. This paper lists 96 species documented from the offshore waters of North and South Carolina, offer evidence for offshore movements by groups of birds other than nocturnal migrants, and suggest temporal changes in flock composition.

Lee, D. S., and M.C. Socci . 1989. Potential Effects of Oil Spills on Seabirds and Selected Other Oceanic Vertebrates Off the North Carolina Coast. North Carolina Biological Survey and the North Carolina State Museum of Natural Sciences. Occasional Papers of the NC Biological Survey. 1989-1. Raleigh, NC. 64p.

*The primary purpose of this report is to delineate the possible detrimental effects of an offshore oil spill' on the marine fauna of North Carolina. Understandably, there is much concern about oil reaching North Carolina's beaches and coastal fauna. Unfortunately, the effects of oil on the offshore ecosystem may be even more devastating and less obvious. Many of the offshore fauna, particularly birds, either exist at low populations or have such low reproductive output that population recovery in the event of a kill would be difficult. As will be pointed out, large portions of the total populations of many of these species assemble regularly or seasonally in deep waters off the Outer Banks of North Carolina. Therefore, these species would be particularly vulnerable to oil pollution, and adequate strategies must be developed to protect them if a spill should occur.

Since 1975, the North Carolina State Museum (NCSM) has been studying the marine birds, mammals, and, to a lesser extent, turtles off the coast of North Carolina (Lee 1984, 1986; Lee and Palmer 1981). By chance, the principal study site has been in the general oil-lease area and centered near "The Point," a well-known deep-sea area for sport and commercial fishing southeast of Oregon Inlet. Much of what is presented in this report has been compiled from unpublished information collected during the studies and is on file in the North Carolina State Museum. (Figure 1 illustrates the current oil-lease sites, and Figures 2 through 13 show various monthly observation points recorded during the 14 years of study. Collectively, these figures illustrate the general area of the surveys. Table I provides the total number of field days per month devoted to offshore surveys.)

Any group interested in oil exploration or oil drilling off the North Carolina coast must consider the state's unique position in the Atlantic ecosystem. North Carolina has the largest documented marine bird and mammal fauna of any geographic unit in the North Atlantic. In part, the documented diversity is a result of intensive field research. Studies by the NCSM staff have provided some of the most extensive long-term surveys available for any oceanic area. More than one-third of the birds known from the state's offshore waters were first documented by these studies. However, it is primarily the location of the state in relation to tropical and subtropical areas, migration routes, and oceanic currents that accounts for the diversity of species. For example, the winter avifauna is composed essentially of boreal species that winter in or migrate through North Carolina waters. The summer avifauna consists mainly of foraging tropical and subtropical birds or vagrants of species that normally migrate in the eastern Atlantic. Many of these birds, and others discussed in this report, appear to reach either the northern or southern limits of their known or expected ranges in North Carolina waters (Lee and Booth 1979).

Another reason that oil companies must give special consideration to North Carolina's marine avifauna is that most birds have relatively protracted periods of occurrence off the state's shores. There are several factors that account for this, the more obvious of which include (1) local oceanic currents and upwellings that provide important foraging areas for both low- and high-latitude species, (2) extended migratory periods for particular species because of the staggered schedules of various age groups, and (3) a typically long adolescence in some species during which subadults may linger in local waters for extended periods before returning to nesting areas. Therefore, an oil spill in any season could affect a large number of birds.

Several endangered species occur off the North Carolina coast. In addition, many species in the area represent populations of special concern, i.e., they are species whose global populations could be damaged by an oil spill. Although many of the organisms, particularly birds, have not been regarded as endangered by the United States Fish and Wildlife Service, present data suggest possible oversights. Before the NCSM studies, it was not known that significant portions of certain populations concentrate off the Outer Banks, making them particularly vulnerable to kills occurring there. Furthermore, before the threat of oil spills, nothing in their marine environment could be considered immediately harmful.

Appendix I and Appendix II provide complete lists of the marine birds, mammals, and turtles presently known from North Carolina.

Lee, D.S., and M.L. Moser. 1998. Importance des *Sargasses* pelagiques pour la recherche alimentaire des oiseaux marins. *El Pitirre* 11(3): 111-112.

Based on gut contents of 16 genera and 38 seabird species (n = 1033) and 240 days of at sea observations we document importance and species specific variation in use of *Sargassum* 'reefs'. Over half the seabird species studied forage in this tropical pelagic community. We classify these birds as *Sargassum* specialists (> 25% occurrence of associated prey), users (up to 25% of prey), and incidentals (evidence of use but no associated prey identified).

Sargassum association was documented in most Procellariiforms (9 of 10 species) and less frequently in Charadriiforms (12 of 25). Five seabirds had > 25 % documented use (Audubon's Shearwaters, 59%; Masked Boobies, 100%; Red-necked Phalaropes, 62%; Royal Terns, 40%; and Bridled Terns, 58%). These birds target *Sargassum* for feeding, and the presence or absence of this alga drives local occurrence and abundance. Selected prey tends to be small (15-40 mm) fishes, but each avian species used the resource in specific ways.

It is assumed that birds use this community throughout the tropical and sub-tropical North Atlantic. In view of the low productivity of nutrient poor surface waters in the tropics, the importance of *Sargassum* to seabird abundance and seasonal distribution is assumed to be high. Estimates in the Sargasso Sea (an area larger than the United States) suggest a standing crop of 2.0 - 5.5 metric tons/sq. nautical mile. In the Gulf Stream off the Carolina coast an additional standing crop of 57,290 tons occurs, where *Sargassum* productivity is estimated at 27,074 tons/year. The number of fishes/ton is about 2,400 individuals and the total fish biomass is usually > 1% of the *Sargassum*.

Lee, D.S., and M. Walsh-McGehee. 1998. The White-tailed Tropicbird *Phaethon lepturus*. The Birds of North America 353: 1-24.

*A discussion of distinguishing characteristics, distribution, systematics, migration, habitat, food habits, behavior, breeding and migratory distribution for the White-tailed Tropicbird *Phaethon lepturus* including the defined study area for The Point.

Lee, D.S., W.A. McLellan, R. Boettcher, and W.H. Lang. 1998. Habitat and Living Resources Review: Recent Information on Pelagic Seabirds, Marine Mammals, and Sea Turtles of the North Carolina Outer Continental Shelf and an Evaluation of Effects of Proposed Offshore Oil and Gas Exploration. pp. 53-63. In: Vigil, D.L. (ed.). North Carolina/Minerals Management Service Technical Workshop on Manteo Unit Exploration: February 4-5, 1998. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA.

*These are the proceedings from a workshop/meeting (conducted on February 4-5, 1998) between the North Carolina Department of Environment and Natural Resources, and the U.S. Department of the Interior's Minerals Management Service (MMS). The geographic area being discussed is approximately 45 miles east-northeast of Cape Hatteras, NC, referred to as the Manteo Unit. This workshop reviewed environmental and socioeconomic information known and needed on the Manteo Unit. The MMS's Gulf of Mexico OCS Regional Director gave an MMS perspective on history and status of the area. Chevron gave a presentation on how the exploratory well would be drilled. The scientific characterization was presented in greater detail by a number of scientific experts who spoke on the following disciplines physical environment, habitat and living resources, seabirds, marine mammals, sea turtles, and social and economic issues. Specific chapters are cited individually, when appropriate.

During the late 1980's, the state of North Carolina responded to a proposal by the Mobil Oil Corporation to undertake exploratory gas/oil operations in Federal lease blocks on the Outer Continental Shelf (OCS) known as the Manteo Unit. One of the products resulting from the permit request was a report that addressed potential biological effects from offshore drilling activities as related to sea birds and other fauna of the region (Lee and Socci 1989). Chevron USA now proposes an exploratory well on one of the same Manteo blocks originally leased to various oil companies by the Minerals Management Service (MMS). Since 1989, additional information concerning the seabirds, marine mammals, and sea turtles on the North Carolina OCS has been obtained, and new research is planned or underway. This paper is intended to highlight recent development and briefly mention some concerns associated with offshore oil and gas activities that may affect these animals (e.g., Pelagic Seabirds: Globally Endangered Species, Seabirds of Concern; Marine Mammals; Sea Turtles; Potential Effects From Drillship Operations).

Lee, D.S., and W.H. Lang. 1998. Biological Environment: Surface Biota. pp. 84-86. In: Vigil, D.L. (ed.). North Carolina/Minerals Management Service Technical Workshop on Manteo Unit Exploration: February 4-5, 1998. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA.

*These are the proceedings from a workshop/meeting (conducted on February 4-5, 1998) between the North Carolina Department of Environment and Natural Resources (DENR), and the U.S. Department of the Interior's Minerals Management Service (MMS). The geographic area being discussed is approximately 45 miles east-northeast of Cape Hatteras, North Carolina, referred to as the Manteo Unit. This workshop reviewed environmental and socioeconomic information known and needed, on the Manteo Unit. The MMS's Gulf of Mexico OCS Regional Director gave an MMS perspective on history and status of the area. Chevron gave a presentation on how the exploratory well would be drilled. The scientific characterization was presented in greater detail by a number of scientific experts who spoke on the following disciplines physical environment, habitat and living resources, seabirds, marine mammals, sea turtles, and social and economic issues. Specific chapters are cited individually, when appropriate.

Surface biota during this session was defined as a catch-word phrase to refer to a combination of seabirds, cetaceans, (whales and dolphins), and sea turtles. The group was tasked to discuss immediate concerns that could result from one exploratory drillship's activities on the surface biota in the Manteo Unit. Once potential effects of the exploration well were discussed, remaining time was spent on additional concerns, assuming further development and production were to occur.

Lee, D.S., and N. Vina. 1993. A Re-evaluation of the Status of the Endangered Black-Capped Petrel, *Pterodroma hasitata*, in Cuba. *Ornithological Neotropical* 4: 99-101.

*The Black-capped Petrel, *Pterodroma hasitata*, is the only extant gadfly petrel known to breed in the West Indies region. Now seriously threatened or endangered, breeding populations are known on only one of the five historically documented breeding islands (the extinct *Pterodroma* of Jamaica is considered a separate species; Mike Imber, pers. comm.). The extant breeding populations on the island of Hispaniola (Dominican Republic and Haiti) are small, fragmented, and currently believed to be declining, although the exact sizes, locations, and detailed chronologies of the breeding colonies remain poorly-studied. Nesting sites are now limited to open-canopy highland forest on inaccessible cliff faces. In addition to direct exploitation by colonists in previous centuries and recent declines in

breeding habitat due to deforestation, introduced predators may have played a role in the species' decline. In the late 1970's the reported discovery of a nesting population in a remote area in Cuba (see below) suggested that the species had at least one additional nesting area and that this one was relatively stable.

Lee has heard these Petrels vocalizing at sea off the North Carolina coast in December.

Lee, D.S., and R.A. Rowlett. 1979. Additions to the Seabird Fauna of North Carolina. *The Chat* 43(1): 1-9.

During the last several years the knowledge of North Carolina's pelagic and offshore avifauna has been greatly enhanced. Not only is information available concerning expected seasonal occurrence of the known fauna (Lee and Booth, in prep.), but documented seabird diversity has significantly increased. Although some information has been obtained accidentally from storm casualties, most of the recent data are a direct result of numerous planned offshore trips for the express purpose of observing and identifying birds at sea. These trips have contributed significantly to the understanding of the seasonal and geographic distribution of seabirds in the western North Atlantic. This paper provides documentation of seven species not previously recognized as occurring in North Carolina's offshore waters, and additional records for the Black-capped Petrel.

The records presented here are mostly incidental observations from a long-range study by Lee on the natural history of seabirds in North Carolina's offshore waters. Information on measurements, geographical and seasonal distribution, food items, and resource partitioning will be presented elsewhere. Studies on external parasites (M.M. Browne, N.C. State University), internal parasites (Ron Mobley, N.C. State University), heavy metal concentrations (Joseph Bonaventura, Duke University Marine Laboratory), and the oil glands (David W. Johnston, University of Florida) of these birds are in progress. Specimens have been deposited in the systematics collection of the North Carolina State Museum (NCSM) and the United States National Museum (USNM), and measurements of those cited in this paper are summarized in Table 1.

Lee, D.S., and S.P. Platania. 1979. Unverified Sight Records of Seabirds in North Carolina Waters. *The Chat* 43: 79-81.

*Five seabirds not officially recognized as occurring in North Carolina's offshore waters have been sighted off Oregon Inlet between June 1977 and the present. These observations are, for the most part, probably inadequate for admission of the species to the state list. Our intent here is to inform bird students of these unverifiable occurrences so they will be aware of the possibility of encountering these species during those brief observation periods typical of offshore field trips. Although some of this information was available when the paper concerning additions to North Carolina's seabirds (Lee and Rowlett 1979) was submitted for publication, these birds were intentionally not included with those documented by specimens.

Lee, D.S., and S.W. Cardiff. 1993. Status of the Arctic Tern in the Coastal and Offshore Waters of the Southeastern United States. *Journal of Field Ornithology* 64(2): 158-168.

Sixty-one records of the Arctic Tern (*Sterna paradisaea*) in the coastal southeastern United States (Maryland-Texas, through spring 1991) that were mostly subsequent to a compilation of records by Clapp et al. (1983) are summarized, and a re-analysis of the 81 total regional records (excluding eight

questionable reports) is presented. Data are provided on 11 specimen records. There are still no acceptable records for Alabama, Mississippi or Texas, and only sight records for Maryland and South Carolina. This summary supports the findings of Clapp et al. (1983) in that the majority (88%) of records are from spring, and that fall migration through the region is very limited (12%; no fall specimens or photographs). Spring migration is generally later and more protracted than previously indicated. The scarcity of Arctic Terns in fall is attributed to the clockwise Atlantic migration route. The species' relative rarity in spring may result from migration routes that are well-offshore and largely bypass the recessed coast of the southeastern U.S.; June and July birds found along the northern Gulf Coast probably strayed and became "trapped" in the Gulf of Mexico. Caution in the identification of Arctic Terns, and in the evaluation of all (especially early spring) records of this species from the southeastern U.S., is advocated.

Moser, M.L. and D.S. Lee. 1992. A Fourteen-Year Survey of Plastic Ingestion by Western North Atlantic Seabirds. *Colonial Waterbirds* 15(1): 83-94.

To evaluate the incidence of ocean-borne plastic particle ingestion by western North Atlantic seabirds, we analyzed the gut contents of 1033 birds collected off the coast of North Carolina from 1975-1989. Twenty-one of 38 seabird species (55%) contained plastic particles. Procellariiform birds contained the most plastic and the presence of plastic was clearly correlated with feeding mode and diet. Plastic ingestion by procellariiforms increased over the 14 year study period, probably as a result of increasing plastic particle availability. Some seabirds showed a tendency to select specific plastic shapes and colors, indicating that they may be mistaking plastics for potential prey items. We found no evidence that seabird health was affected by the presence of plastic, even in species containing the largest quantities: Northern Fulmars (*Fulmarus glacialis*), Red Phalaropes (*Phalaropus fulicaria*) and Greater Shearwaters (*Puffinus gravis*).

Orbach, M. 1989. Plenary Session: How Could These Resources be Affected By the Proposed Drilling and What Mitigation Measures Might be Used to Prevent Irreversible Damage. pp. 63-64. In: Crawford, K. (ed.). Proceedings: 1989 Marine Expo: The Natural Resources Associated with Mobil's Proposed Drill Site. NC Outer Continental Shelf Office, NC Department of Administration. Raleigh, NC.

*The following is a summary of the plenary session.

There appears to be a good deal of baseline information available about Mobil's proposed drill site area. However, there was a general consensus that there are serious gaps in our understanding of the relationships and functions of the many communities found in and around the exploration area known as the "Manteo Prospect". Some major areas of concern include protection of area benthos, impacts on community ecology, and effects of drilling discharges .

There was almost unanimous support for a monitoring program of the drilling operations and their impacts. Programs should be devised to examine: 1) The fate of drilling discharges, including dispersion (range and extent) and accumulation along fronts and the ocean bottom; and 2) The effects (both chemical and mechanical) of drilling discharges on the benthos, the indigenous fisheries (including eggs/larvae), prey species, forage strategies, and the sargassum communities.

Concerns were also raised regarding the effects the ship and anchor system might have on the biota as a result of displacement, noise, or collisions, and the impacts of exploration activities on the commercial and recreational fisheries found at "The Point".

Because of previous scientific work done at or near the proposed drill site, this area may be well suited to such monitoring programs. Not only would information from these programs be vital for developing mitigation measures, but it could also serve as a critical database on which to build a management framework for future development. In addition, data already collected on local fish resources, marine birds, the benthos and bottom conditions, and physical oceanography could provide an excellent base for further research.

Platania, S.F., G.S. Grant, and D.S. Lee. 1986. Core Temperatures of Non-nesting Western Atlantic Seabirds. *Brimleyana* 12: 13-18.

Core body temperatures of 23 species of birds collected off the North Carolina coast did not differ with sex, weight, time of day, or season. Within the orders Procellariiformes and Charadriiformes, there seems to be no correlation of temperature with mass. Temperature data on injured birds are similar to those of ones recently killed. Results of this study compared favorably with those obtained by other researchers and indicate no significant differences between body temperatures of foraging and non-incubating procellariiform birds at the nesting colonies. Temperature differences between birds taken at sea and those studied at nesting sites amount to about 1 °C and are best attributed to the activity state of the birds.

Ross, S.W. 1985a. A Summary of Biological Processes in the Proposed VACAPES EMPRESS II Area Off North Carolina Relating to Plankton Communities, Pelagic Macroinvertebrates, Ichthyofauna, Sea turtles, Marine Mammals, and Sea Birds. Appendix B. In: U.S. Department of the Navy. EMPRESS II: Supplemental Draft Environmental Impact Statement for the Proposed Operation of the Navy Electromagnetic Pulse Radiation Environment Simulator for Ships (Empress II) in the Chesapeake Bay and Atlantic Ocean. United States Navy. Environmental/ Intergovernmental Section. Atlantic Division. Naval Facilities Engineering and Command. Norfolk, VA.

*This technical report is Appendix B within the "EMPRESS II: Supplemental Draft Environmental Impact Statement for the Proposed Operation of the Navy Electromagnetic Pulse Radiation Environment Simulator for Ships (Empress II) in the Chesapeake Bay and Atlantic Ocean" report. This technical report is a Summary of Biological Processes in the Proposed VACAPES EMPRESS II area off North Carolina Relating to Planktonic Communities, Pelagic Macroinvertebrates, Ichthyofauna, Sea turtles, Marine Mammals, and Sea Birds. Technical reports supporting this summary have been written by authorities in each discipline and are included in Appendices. These supporting technical reports are cited individually. The southern portion of VACAPES EMPRESS II Area of North Carolina overlaps with the northern portion of the defined study area for the Data Inventory Related to the Hatteras Middle Slope (The Point) Area.

Ross, S.W., and A. Scarborough-Bull. 1998. Biological Environment Work Session Results: Fisheries. pp. 76-79. In: Vigil, D.L. (ed.). North Carolina/Minerals Management Service Technical Workshop on Manteo Unit Exploration: February 4-5, 1998. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. New Orleans, LA.

*These are the proceedings from a workshop/meeting (conducted on February 4-5, 1998) between the North Carolina Department of Environment and Natural Resources, and the U.S. Department of the Interior's Minerals Management Service (MMS). The geographic area being discussed is approximately 45 miles east-northeast of Cape Hatteras, NC, referred to as the Manteo Unit. This workshop reviewed environmental and socioeconomic information known and needed on the Manteo Unit. The MMS's Gulf of Mexico OCS Regional Director gave an MMS perspective on history and status of the area. Chevron gave a presentation on how the exploratory well would be drilled. The scientific characterization was presented in greater detail by a number of scientific experts who spoke on the following disciplines physical environment, habitat and living resources, seabirds, marine mammals, sea turtles, and social and economic issues. Specific chapters are cited individually, when appropriate.

The goal of this session was to raise scientific concerns/issues regarding the potential impacts of OCS drilling on fisheries. The session specifically recommended information needs on a short-term and long-term basis. The short-term was defined as the time period before exploratory drilling would take place in the Manteo Unit offshore North Carolina. The long-term was defined as the time period before development activities took place in the same location. Due to time constraints, the session spent more time in short-term information needs.

Two major short-term issues were raised concerning fisheries and oil and gas exploration. (1) There is a need to define and describe usage of the area known as The Point. (2) There is a need to synthesize and inventory existing data. Three long-term issues were raised for discussion. Three major long-term issues were raised concerning fisheries and oil and gas exploration. (1) There is a need to better understand the trophodynamics/energetic pathways at The Point. (2) There is a need to understand ichthyoplankton and its ecological role at The Point. (3) There is a need to understand structuring mechanisms. Four additional issues were raised concerning fisheries and oil and gas exploration on a long-term basis. Due to time constraints these concerns were not discussed in detail. (1) Concerns related to discharges from both drilling and production. (2) Concerns related to the presence of either temporary or permanent structures. (3) Concerns related to the effects of noise. (4) Concerns related to the presence of lights. Any endeavors on this project should be tied to the study of the effects of light on the seabirds that feed and/or roost at The Point.

Ross, S.W., K.J. Sulak, J. Gartner, and D.S. Lee. Unpublished data. Ongoing project: Definition of Ecological/Trophic Linkages Among Fishes and Other Nekton in the Area Known as The Point--North Carolina Continental Shelf Slope.

*This is an on-going study of fishes, invertebrates, sargassum and marine birds at the area known as The Point. The emphasis is on trophic linkages. The summer 1999 and 2000 stations were mapped (Fig. 7). Seabird data were collected throughout the cruise.

Rowlett, R.A. 1978. A Massive Flight of Cory's Shearwaters at Cape Hatteras. *The Chat* 42: 45-46.

* A massive migration of Cory's Shearwaters (*Puffinas diomedea*) was observed from the beach at Cape Point, Cape Hatteras, Dare County, NC., on 28 October 1974. A total of more than 8850 Cory's were counted during 4 hours of continuous observation in the morning and 3 hours late in the afternoon. In addition, Greater Shearwaters (*P. gravis*), Sooty Shearwaters (*P. griseus*), Northern Gannets (*Morus bassanus*), Pomarine Jaegers (*Stercorarius pomarinus*), Parasitic jaegers (*S.*

parasiticus), Black-legged Kittiwakes (*Rissa tridactyla*), and Roseate Terns (*Sterna dougallii*) were seen. Table I summarizes our observations. The Point is mentioned.

Shepard, A. (ed.). 1991. Undersea Research at The Point. NURC/UNCW 1991 Undersea Research: Informational Meeting. National Undersea Research Center, University of North Carolina at Wilmington. Wilmington, NC. 9 p.

*This handout provides a summary of research being conducted at "The Point" area (Manteo Lease Block 467).

The National Undersea Research Center at the University of North Carolina at Wilmington, funded by a grant from the National Oceanic and Atmospheric Administration's (NOAA) Office of Undersea Research (OUR), was established in 1980 to promote, facilitate, and conduct research in the Southeastern United States utilizing undersea techniques, including advanced wet diving and manned and unmanned submersibles. A main Center goal is to provide information to NOAA that will assist the agency in fulfilling its charter to explore, understand, conserve and manage the U.S. marine environment and associated resources. To help meet this goal, the Center supports and conducts interdisciplinary oceanographic research projects studying continental margin processes, particularly the interactions and linkages between estuarine, continental shelf, and slope (including submarine canyon) environments.

Tove, M.H. 1997a. Fea's Petrel in North America. *Birding* 29(3): 207-214.

One of the world's more controversial seabird groups in regard to taxonomy and identification is the soft-plumaged petrel complex. Most authorities currently recognize three species in the complex: Soft-plumaged Petrel (*Pterodroma mollis*), which is widespread throughout the Southern Hemisphere; Fea's Petrel (*P. feae*); and Zino's Petrel (*P. madeira*), which is nearly extinct. Fea's and Zino's Petrels breed only in the eastern Atlantic. Until recently, no member of this complex was thought to occur in the ABA Area. Then, one of them began to be seen regularly off North Carolina, as will be described in Part 11 of this two-part article. Conventional wisdom held that the three species were almost indistinguishable from each other in the field and nearly so in the hand. But, after a thorough re-examination of distribution, breeding cycles, and field identification of the three species, it has been determined that Fea's is the species being seen in the ABA Area.

———. 1997b. Fea's Petrel in North America. *Birding* 29(4): 309-315.

Part I of this article, which appeared in the June 1997 *Birding*, summarized the taxonomy, distribution, and identification of the soft-plumaged petrel complex: Soft-plumaged Petrel, Fea's Petrel, and Zino's Petrel. Since 1981, members of this complex have been seen in the ABA Area—primarily off North Carolina and regularly since 1991—with 17 records documented here in Part II as involving Fea's Petrels or probable Fea's Petrels.

U.S. Department of the Interior, Minerals Management Service. 1989. Environmental Report Visual II: Study Area for Coastal North Carolina. U.S. Department of the Interior, MMS Minerals Management Service, Atlantic OCS Region.

*This map was developed using base mapping from Espey, Houston and Associates, Inc. Draft (base) map is included. This map (Environmental Report Visual II: Study Area for Coastal North Carolina) includes the project area and specifically shows lease blocks, including Manteo Lease Block 467. Features include: Habitat types, Bird Nesting Habitat (described by species), National Wildlife Refuge Boundaries, National Seashore Boundaries, Endangered/Threatened Species (e.g., birds, plants, sea turtles).

U.S. Department of the Interior, Minerals Management Service. 1990. Atlantic Outer Continental Shelf: Final Environmental Report on Proposed Exploratory Drilling Offshore North Carolina, U.S. Department of the Interior, Minerals Management Service, Atlantic OCS Region, Environmental Assessment Section. Herndon, VA.

*Topics include: fisheries, birds, marine mammals, physical oceanography, chemical oceanography, geology, gas and oil production. The proposed action is to drill a single exploratory well approximately 72 km (45 mi) east-northeast of Cape Hatteras, NC in 820 m (2,690 ft) of water. Total depth for the proposed well is 4,267 m (14,000 ft) and the location is on Block 467 on the Minerals Management Service Protraction diagram NI 18-2. The proposal has been submitted by Mobil for itself and 7 partners to drill the well on the approved 21-block exploration unit.

U.S. Department of the Interior, Minerals Management Service. 1992. Proceedings of the Fourth Atlantic OCS Region Information Transfer Meeting, September 1991. U.S. Department of the Interior, Minerals Management Service. Herndon, VA. 198 p.

The Fourth Atlantic Outer Continental Shelf (OCS) Regional Information Transfer Meeting (ITM) was held on 24-25 September, 1991, in Wilmington, NC. The focus of the meeting was on the OCS off North Carolina, specifically on activities related to a proposed exploratory well for oil and gas by Mobil on Block 467 a site 40 miles off the coast of North Carolina. The area of industry interest is known as the Manteo Prospect, while the activities surrounding the proposed drilling are referred to collectively as the Manteo Project. The wildcat wellsite is in 2,690 ft. (857 m) of water near the edge of the Gulf Stream. It is also near a fishing ground known locally as "The Point." The area is believed to be gas prone rather than oil prone. The estimated size of the resource could be as high as 5 trillion cubic feet of gas.

The purpose of the meeting was to exchange information on the leasing background, legislative activities, scientific results, and socioeconomic studies. Legislative-related reports include descriptions of the Oil Pollution Act of 1990, the Outer Banks Protection Act, the Environmental Studies Review Panel, and the North Carolina Physical Oceanography Panel. Reports of studies on marine life include benthic diatoms, benthic fauna, pelagic seabirds, sea turtles, and right whales. One report describes the use of airships (blimps) for ocean research a capability relevant to North Carolina because of the east coast airship facility is located in the state. Local marine science facilities described include NOAA's National Undersea Research Center at the University of North Carolina at Wilmington (NURC/UNCW) and the National Marine Fisheries Service laboratory in Beaufort.

Developments in oil spill cleanup technology and capabilities are described by both the Coast Guard and the industry. A socioeconomic report describes the effects of the oil and gas activities on the tourist industry. Lastly, research on the restoration of salt marshes indicates that rehabilitation of an

area is possible when development or an accident has occurred. While the emphasis of the meeting was on oil and gas, two reports described the results of projects related to offshore sand mining. The appendix lists the names and addresses of speakers. Individual chapters are cited individually when appropriate.

U.S. Department of the Navy. 1985. EMPRESS II: Supplemental Draft Environmental Impact Statement for the Proposed Operation of the Navy Electromagnetic Pulse Radiation Environment Simulator for Ships (Empress II) in the Chesapeake Bay and Atlantic Ocean. United States Navy. Environmental/Intergovernmental Section. Atlantic Division. Naval Facilities Engineering and Command. Norfolk, VA.

*This is a National Environmental Policy Act (NEPA) document characterizing the proposed EMPRESS II project. Appendix B contains a Summary of Biological Processes in the Proposed VACAPES EMPRESS II area off North Carolina Relating to Planktonic Communities, Pelagic Macroinvertebrates, Ichthyofauna, Sea turtles, Marine Mammals, and Sea Birds. Technical reports supporting this summary have been written by authorities in each discipline and are included in Appendices. The technical reports are cited individually. The southern portion of VACAPES EMPRESS II Area of North Carolina overlaps with the northern portion of the defined study area for the Data Inventory Related to the Hatteras Middle Slope (The Point) Area.

Vigil, D.L. (ed.). 1998. North Carolina/Minerals Management Service Technical Workshop on Manteo Unit Exploration: February 4-5, 1998. U.S. Dept. of the Interior, Minerals Management Service. Gulf of Mexico OCS Region. New Orleans, LA. 168 p.

*These are the proceedings from a workshop/meeting (conducted on February 4-5, 1998) between the North Carolina Department of Environment and Natural Resources, and the U.S. Department of the Interior's Minerals Management Service (MMS). The geographic area being discussed is approximately 45 miles east-northeast of Cape Hatteras, NC, referred to as the Manteo Unit. This workshop reviewed environmental and socioeconomic information known and needed on the Manteo Unit. The MMS's Gulf of Mexico OCS Regional Director gave an MMS perspective on history and status of the area. Chevron gave a presentation on how the exploratory well would be drilled. The scientific characterization was presented in greater detail by a number of scientific experts who spoke on the following disciplines physical environment, habitat and living resources (invertebrates and fish), seabirds, marine mammals, sea turtles, and social and economic issues. Specific chapters are cited individually, when appropriate.

Watson, G.E., D.S. Lee, and E.S. Backus. 1986. Status and subspecific identity of White-faced Storm-Petrels in the western North Atlantic Ocean. *American Birds* 40(3): 401-407.

Since 1885, there have been at least 47 records of White-faced Storm-Petrels (*Pelagodroma marina*) in the western North Atlantic Ocean (Table 1). Some of the earliest records are of pelagic sightings from vessels crossing the Atlantic Ocean. Others, particularly in recent years, have been recorded on day trips or short cruises within 100 miles of the coast from Cape Hatteras, North Carolina, North to waters off southern New England. Twelve were collected as specimens; ten of these have been preserved and photographs exist of an eleventh permitting identification of the subspecies that reaches North American waters.

Whaling, P., D.S. Lee, J. Bonaventura, and M. Rentzepis. 1980. The body burden approach of looking at natural mercury accumulation in pelagic seabirds (abstract). Annual Meeting of American Ornithologist's Union.

*This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

Whaling, P. and P.E. Olsen. 1981. Substantial levels of natural mercury found in three species of pelagic seabird (abstract). Southeastern Coastal and Estuarine Birds: A Conference. Baruch Institute, Univ. of SC.

*This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

Wiley, H., and D.S. Lee. 1998. Long-tailed Jaeger *Stercorarius longicaudus*. The Birds of North America 365.

*A discussion of distinguishing characteristics, distribution, systematics, migration, habitat, food habits, behavior, breeding and migratory distribution for the Long-tailed Jaeger *Stercorarius longicaudus* including the defined study area for The Point. This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

Wiley, R.H., and D.S. Lee. 1999. Parasitic Jaeger *Stercorarius parasiticus*. The Birds of North America 445: 1-28.

*A discussion of distinguishing characteristics, distribution, systematics, migration, habitat, food habits, behavior, breeding and migratory distribution for the Parasitic Jaeger *Stercorarius parasiticus* including the defined study area for The Point.

———. 2000. Pomarine Jaeger *Stercorarius pomarinus*. The Birds of North America 483.

*A discussion of distinguishing characteristics, distribution, systematics, migration, habitat, food habits, behavior, breeding and migratory distribution for the Pomarine Jaeger *Stercorarius pomarinus* including the defined study area for The Point. This citation includes research conducted within the defined study area for The Point (D. Lee, pers. comm. 24 February 2000). Mr. Lee did not have a copy of this document and we could not otherwise find the document.

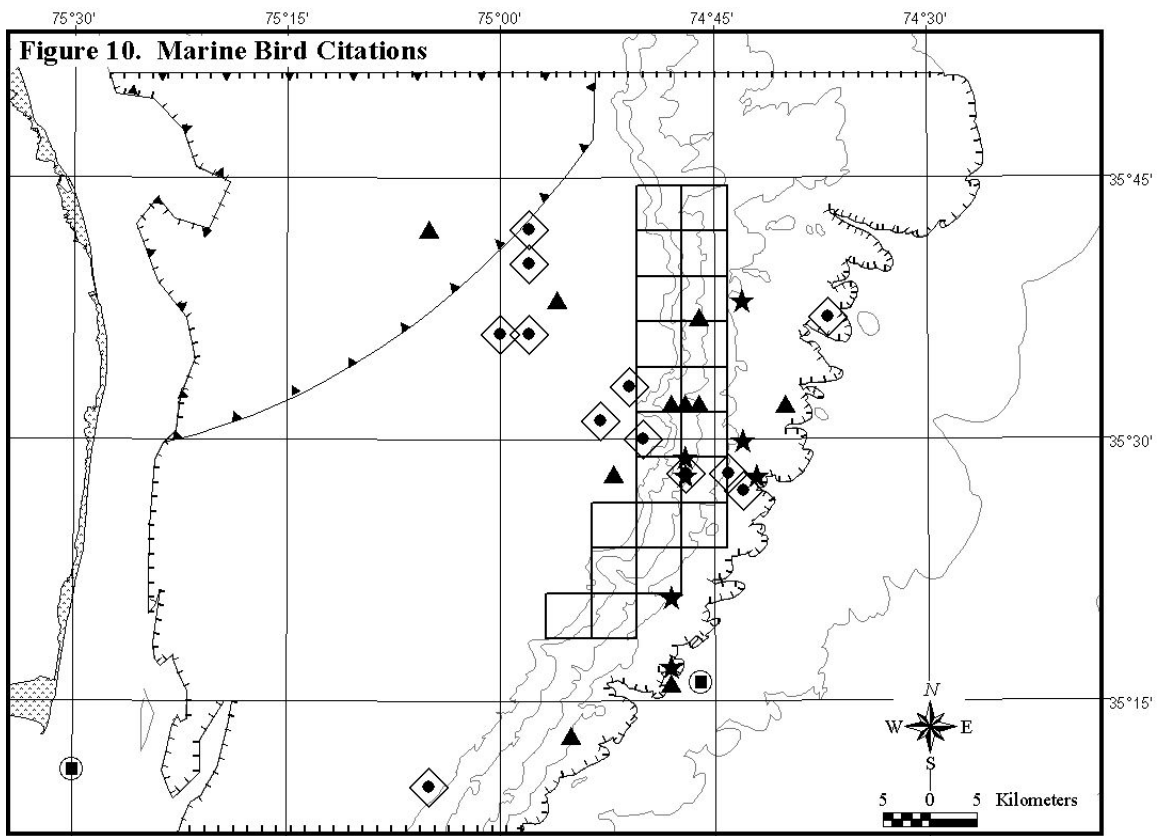
Wingate, D.B., T. Haas, E.S. Brinkley, and J.B. Patteson. 1998. Identification of Bermuda Petrel. *Birding* 30: 18-36.

Though there have been several probable sight records of Bermuda Petrel in the ABA Area over the last three decades, the species has been documented with photographs within the ABA Area only once, on 26 May 1996 off Hatteras, North Carolina; these photographs are reproduced in the following article. Since its rediscovery in 1951, when only 17 pairs were found, the species has made a slow but steady comeback from the brink of extinction, with 52 nesting pairs at Bermuda and a world


population of about 180 birds as of 1996. Past sight records have been clouded by confusion over the identification of this rare seabird, especially its differences from its presumed close relative, the Black-capped Petrel. Increases in both numbers of Bermuda Petrels and in Gulf Stream pelagic trips off the coast of North Carolina might result in more records of the "Cahow" in the ABA Area. In order to distinguish Bermuda Petrel at sea from a small Black-capped Petrel, the following features (in decreasing order of importance) should be observed or evident in photographs:


- A dark eye-patch with deep gray plumage surrounding it, merging with a gray crown and nape, rather than a well-defined dark cap.
- A very limited, amount of white in a narrow fringe bordering the black rump, with the rest of the uppertail area uniformly gray or dark gray--or an uppertail area entirely dark.
- A diffuse area of pale gray, or gray-brown extending down the side of the neck and breast, giving the bird a hooded or cowled appearance overall, rather than a narrow, dark, elongate mark at the side of the breast, as in Black-capped Petrel.
- A relatively small head and especially a smaller bill with less overall arch in the nail of the maxilla, than Black-capped Petrel.
- Underwing pattern similar to that of Black-capped Petrel but with more dark plumage relative to the white internal areas of the underwing.
- Overall size at sea noticeably smaller than, and flight behavior distinctly different from, Black-capped Petrel: the Bermuda Petrel is more buoyant, with wings held slightly bowed and oriented closer to the horizontal than to the vertical during dynamic flight.

For all of these features to be considerable, it is helpful to have numbers of Black-capped Petrels in the vicinity for comparison, and to have a prolonged study of the suspected Bermuda Petrel at close range. On most pelagic trips conducted off North Carolina, fortunately, Black-capped Petrels are observed in good numbers, so that such a comparison would likely be possible.





Key to Marine Bird Citations (Figure 10).


 Study Area Boundary


 Lease Blocks


Mapped Citations

 Lee (1988b)

 Lee (1988c)

 Lee & Rowlett (1979)

 Ross, S. (1985a); U.S. Dept. Navy (1985)

 Tove (1997b)

Studies that Focus on the Manteo Lease Blocks

Blair (1998)

Crawford (1989)

Lee & Lang (1998)

Ross & Scarborough-Bull (1998)

U.S.D.O.I.-Minerals Mgmt. Service (1990, 1992)

Vigil (1998)

Studies that Cover the Hatteras

Middle Slope Area ("The Point")

Browne (1980)

Buckley (1973)

Lee (1989a, 1991a, 1992b, 1999b)

Lee et al. (1998)

Orbach (1989)

Shepard (1991)

U.S.D.O.I.-Minerals Mgmt. Service (1989)

Studies Based on Large

Digitized Databases

Ross et al. (unpub.)

Broad Regional Studies

Abernathy et al. (1989)

Brinkley (1994a, 1994b)

Carter & Parnell (1974)

Clapp et al. (1982a, 1982b, 1983)

Dittmann et al. (1989)

Haney & Lee (1994)

Haney et al. (1991, 1993, 1999)

Hass (1997, in press)

Helmuth (1920)

Jones (1967)

Lee & Booth (1979)

Lee & Cardiff (1993)

Lee & Haney (1984, 1996)

Lee & Horner (1989)

Lee & Irvin (1983)

Lee & Moser (1998)

Lee & Platania (1979)

Lee & Socci (1989)

Lee & Vina (1993)

Lee & Walsh-McGehee (1998)

Lee (1977, 1979, 1984, 1985c, 1986a, 1986c)

Lee (1987a, 1987b, 1988a, 1989b, 1991b, 1992a)

Lee (1995a, 1995b, 1999a, 2000)

Lee et al. (1981)

Moser & Lee (1992)

Platania et al. (1986)

Rowlett (1978)

Tove (1997a)

Watson et al. (1986)

Whaling & Olsen (1981)

Whaling et al. (1980)

Wiley & Lee (1998, 1999, 2000)

Wingate et al. (1998)