

# **ISLAND-NESTING SEABIRD ASSESSMENT**

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## INTRODUCTION

Since 1968, the Maine Department of Inland Fisheries and Wildlife (MDIFW) has aggressively pursued development and refinement of wildlife species assessments and implementation of cost-effective comprehensive programs that support selected goals and objectives for the next 15 years. Assessments are based upon available information and the judgments of professional wildlife biologists responsible for individual species or groups of species. Precise data may not always be available or are too limited for meaningful statistical analysis; however, many trends and indications are sometimes clear and deserve management consideration.

The assessment has been organized to group information in a user-meaningful way. The Natural History section discusses biological characteristics of the species that are important to its management. The Management section contains history of regulations and regulatory authority, past management, past goals and objectives, and current management. The Habitat and Population sections address historic, current, and projected conditions for the species. The Use and Demand section addresses past, current, and projected use and demand of the species and its habitat. A Summary and Conclusions section summarizes the major points of the assessment.

## NATURAL HISTORY

Colonial waterbirds are those waterbirds that gather into groups to nest at locations called colony sites (Parnell et al. 1988). This document focuses on 13 species that currently nest on approximately 10 percent of Maine's numerous coastal islands and ledges. The term "colonial waterbirds" encompasses a diverse assemblage of seabirds and waterfowl that belong to four taxonomic orders including: Procellariiformes - Leach's Storm-petrel; Pelicaniformes - Great and Double-crested Cormorants; Charadriiformes - Laughing Gull, Herring Gull, Great Black-backed Gull, Common Tern, Arctic Tern, Roseate Tern, Razorbill, Black Guillemot, and Atlantic Puffin; and Anseriformes Common Eider; (scientific names are listed in Appendix I). The terms "colonial waterbirds" and "seabirds" will be used synonymously, although, at times, "seabird" may not be the most appropriate term to describe a species.

Maine's island-nesting seabirds include 13 species of birds whose population status, distribution, and nesting habitat needs vary greatly (Appendix II). Some species occur in relative abundance on numerous coastal islands (e.g. Common Eiders, Great Black-backed and Herring Gulls, Double-crested Cormorants), and these populations appear healthy. Other species have experienced population declines (e.g. Common, Arctic, and Roseate Terns {a federally listed Endangered species}). The remaining six species that nest on Maine's coastal islands including Atlantic Puffins, Razorbills, Black guillemots, Leach's Storm-petrels, Great Cormorants, and Laughing Gulls. Coastwide breeding population sizes of these species range from less than 100 pairs of Razorbills nesting at three sites in Maine to several thousand pairs at many sites.

No attempt will be made to detail the life histories of this diverse group of birds. MDIFW's species management plans for the island-nesting terns and Common Eiders (in the Waterfowl Assessment) provide the reader with life history information for the terns and Common Eiders. In this document, a brief description of each species past and present population trends, reproductive strategies, and population limiting factors (where known) is included in Appendix II. However, some generalizations about this group can be made. Life histories of most of these birds reflect adaptations to the marine environment (Ricklefs 1990). In general, they have long life spans (the oldest gull on record was reported to be over 30 years old), low reproductive rates, deferred maturity (Atlantic Puffins do not breed until they are 4 years old and then lay only 1 egg per year), and they usually nest in colonies.

Nesting socially is well established in colonial waterbirds, but the degree of coloniality varies (Parnell et al. 1988). Herring Gulls are an example of a species that generally nest in colonies, but also may nest as a single pair.

Explanations for colonial nesting include: limited nesting areas (e.g. when islands with suitable habitat are in short supply); avoidance of predation (e.g. adults of an entire colony may "mob" avian predators); and improved efficiency of exploiting patchy and unpredictable food resources (e.g. it is thought that birds pass on information about a locally abundant food source to other members of the colony (Kopachena 1991). The disadvantages of colonial nesting habits include: the potential for rapid spread of contagious diseases, increased susceptibility to avian and mammalian predators, and increased vulnerability to localized catastrophic events such as storms, oil spills, and disturbances (Parnell et al. 1988).

Maine's seabird colonies include the southernmost nesting sites in North America for the Common Eider, Atlantic Puffin, Razorbill, Black Guillemot, and Great Cormorant and the northernmost nesting sites for Laughing Gulls (Woodward and Hutchinson 1986). Outside of the breeding season, many of Maine's seabirds range throughout the Atlantic.

## MANAGEMENT

### Regulations and Regulatory Authority

Prior to the 20th century, comprehensive laws to protect colonial waterbirds nesting on Maine's coastal islands were nonexistent. However, as regulatory initiatives were developed, protection was given fairly quickly (Palmer 1949). Terns were the first group to receive protection in the late 1800s but these early laws were largely unenforceable. In response to tern protection, plume hunters switched to other species, particularly gulls.

Nationwide, the American Ornithologist's Union (A.O.U.) developed "model laws" for bird protection which were adopted by state legislatures around the turn of the century. A similar but amended version of the A.O.U. Model Law was adopted for non-game birds in Maine in 1901 (Dutcher 1902). Further initiatives aimed at the protection of the few remaining waterbird colonies on the Atlantic coast arose when members of A.O.U. and the National Association of Audubon Societies (now the National Audubon Society) established the "Thayer Fund". Monies from this fund were used for legislation and protection. In Maine, colony wardens (often the island owners themselves) were hired, and some lighthouse keepers volunteered, to enforce trespass laws on the few active colony sites that remained around the turn of the century (Dutcher 1902, Drury 1973). Only trespass laws could be enforced because non-game bird laws did not protect all the nesting species, and more importantly, the laws that did exist were not always enforced. It is the early reports of these colony wardens that document the historic low points for many colonial waterbird populations on the coast of Maine.

These early measures for protecting colonial waterbirds and their nesting islands evolved at a time when other conservation initiatives were taking place. More specifically, public sentiment was urging legislatures to prevent "legging" and prohibit spring shooting (Parnell et al. 1988). The Lacey Act of 1900, which prohibited the interstate transport of animals killed illegally, was the first federal law to address bird protection (Parnell et al. 1988). Congress first attempted to assert federal authority to conserve and manage migratory birds by passing the migratory Bird Treaty Act of 1913 (Audubon Wildlife Report 1985). The 1913 Act was quickly challenged as a violation of the states' constitutional power to manage wildlife and was found unconstitutional by lower courts. Senate supporters for federal authority over migratory birds passed legislation authorizing the President to negotiate a migratory bird protection treaty with Great Britain on behalf of Canada. They believed that the federal government's authority to negotiate treaties would ensure that future challenges based on state's rights would fail. The treaty with Great Britain was completed in 1916 and ratified as part of the Migratory Bird Treaty Act of 1918. Ultimately, protection of migratory birds in North America was provided by three additional Conventions between the United States and: Mexico in 1936 and amended in 1972; Japan in 1972; and the Soviet Union in 1976.

Today, protection and management of the migratory bird resource in the United States is provided by the Migratory Bird Treaty Act of 1918 and subsequent amendments, authorizing the implementation of the various Conventions. The above agreements prohibited hunting of many birds (except for certain species taken by Native Americans for subsistence), described which birds could be hunted, limited hunting to



fall and winter, and prohibited market hunting (Audubon Wildlife Report 1985, Brown 1986). The Migratory Bird Treaty Act of 1918 afforded special protection for the only game species covered in this assessment, the Common Eider, and a nationwide 10-year hunting moratorium was established for this species. In Maine, the Common Eider hunting season was completely closed beyond the 10-year moratorium until 1933 (Mendall 1969).

Another group with an important role in seabird island regulations in Maine is the Maine Land Use Regulation Commission (hereafter referred to as IFLLTRCII). LURC administers land use planning and zoning responsibilities for areas without local government, and thus has regulatory authority over land use planning, zoning, and development activities on a number of seabird islands. LURC, in its Comprehensive Plan and Section 10.16,C of its Land Use Districts and Standards, gives special consideration to seabird nesting islands considered essential to the maintenance of seabird populations.

Lastly, all seabird nesting islands are now resources of state significance and are eligible to receive protection as Significant Wildlife Habitats in Maine's Natural Resources Protection Act (NRPA).

As has been noted by numerous authorities on seabirds in Maine, the response of many of seabird populations to the protection initiatives indicated above, and subsequent freedom from human-related disturbances, was spectacular.

## Past Management

While somewhat loosely defined, past management of seabirds was first conducted by Native Americans who utilized seabirds and their eggs for food. Conkling (1981), having reviewed historical documents, reported that the Indians purposely harvested eggs and birds off certain islands and would not return to that general area again for 1-3 years, presumably to allow the colony to 'recover from those losses. The early Europeans also frequented seabird islands for eggs and meat, but they were apparently less judicious in their "management" of the resource. One account in the late 1800s describes fishermen arriving on a seabird island, destroying all eggs, and returning a few days later to collect all the fresh eggs, knowing that these eggs must have been laid since their prior visit. Few Maine citizens realize that the ubiquitous Great Black-backed Gull and Double-crested Cormorant were, at one time, both extirpated from the State's seabird nesting islands.

By 1900, management of colonial waterbirds focused on enforcement of protective legislation. In addition, a few specific colony sites were also managed and trespass laws invoked (see Regulations and Regulatory Authority section above). Some populations responded so well to protection that a gull and cormorant control program was believed necessary and initiated in 1934 on the New England coast. These egg-spraying efforts appeared to markedly decrease the number of young produced on the 10 Maine islands where A. Gross personally supervised the program (Kadlec and Drury 1968). After the egg-spraying program was terminated in 1953, gull and cormorant populations once again increased.

Numerous federal, state, and private conservation agencies (e.g. The Nature Conservancy, National Audubon Society, and Maine Audubon Society) have played an important role in the acquisition and management of seabird nesting islands in Maine. As early as 1908, Little Duck Island in Hancock County was purchased to serve as a bird sanctuary. Little Duck Island was later given to the National Audubon Society, the current owner. While each landowner's management goals and objectives differed, one underlying goal was simply to protect the nesting islands.

Other management initiatives involved a number of specific species-oriented research and life history studies on seabirds and their habitats. As early as 1929, Jackson and Allan (1931) attempted to recolonize Common Terns to Appledore Island. Other noteworthy examples, and by no means is this list complete, include: valuable writings and survey records contributed by A. Norton; life history studies by R. Palmer; survey and research data collected by A. Gross, FWS; tern and Atlantic Puffin research by S. Kress et al., National Audubon Society and FWS; gull studies by W. Drury et al., Massachusetts Audubon and the College of the Atlantic; cormorant and Common Eider studies by H. Mendall et al., Maine Cooperative Wildlife Research Unit (FWS), and University of Maine, and more. In addition, our knowledge of colonial waterbirds increased considerably through survey and inventory activities in the 1970s (Erwin and Korschgen 1979) and MDIFW surveys and management plans in the 1980s (A. Hutchinson et al. MDIFW 1981-1991, Spencer and Hutchinson 1980). For more information on these writings, the reader is encouraged to reference the publications by these authors listed in the Literature Cited section.

Most of Maine's seabird populations responded well to these previously mentioned levels of protection, habitat acquisition, and management. Concurrently there has been a general reduction in human disturbance (discussed in detail later in this document) on many seabird nesting islands. Had people not emigrated from seabird islands for economic reasons and restricted their uses of other nesting islands, waterbird recolonization would not have been so spectacular.

### Past Goals and Objectives

Beginning in the late 1970s, MDIFW developed a management plan for marine birds that use coastal islands (Spencer and Hutchinson 1980). In the original plan, the stated goal was to "maintain and in some cases (i.e. terns) increase supply and to increase use-opportunity". The stated management objective was to "ensure the continuation of marine bird populations at or above existing levels in order to provide for an increasing demand (nonconsumptive) in the future". A sequent plan was developed for Department-managed islands and was called the Coast of Maine Wildlife Management Area Plan (Woodward and Hutchinson 1986, Woodward et al. 1991). Here, the primary goal was "to maintain or enhance wildlife diversity and abundance". The stated objectives for nesting islands were: (1) to provide adequate breeding habitat for coastal island-nesting species, (2) to protect nesting birds (and seals) from human or other disturbance, and (3) to provide for public use.

Today, goals and objectives exist for Roseate, Common, and Arctic Terns (MDIFW 1992) and Common Eiders (MDIFW 1988). However, more specific goals and

objectives are warranted to guide the management decision-making process for the other species nesting on Maine's coastal islands.

### Current Management

Current management of the colonial waterbird resource in Maine is the joint responsibility of the U.S. Fish and Wildlife Service (FWS) and the Maine Department of Inland Fisheries and Wildlife (MDIFW). However, numerous private conservation agencies and colleges and universities annually contribute valuable information, monies, staff time, etc. and thus play an important role in current seabird management.

In general, colonial nesting behavior enhances management of these birds and management generally consists of; (1) an understanding of the life histories of the species involved, (2) preservation of nesting habitat, and (3) provisions for a disturbance-limited environment during the nesting season. In Maine, current management of seabirds and their habitats includes: reintroductions, life history research, population regulation and manipulation, assessing reproductive success, hunting, habitat assessment, habitat enhancement, habitat acquisition, habitat zoning, and lastly, the major task of population monitoring.

FWS conducted a comprehensive survey of coastal waterbird colonies from Maine to Virginia during the springs and summers of 1976 and 1977 (Erwin and Korschgen 1979). This survey in Maine was the first statewide seabird Population assessment in recent years. These survey data serve as the baseline population data for colonial waterbird management today. Since 1977, MDIFW (often with the assistance of personnel from numerous private conservation agencies and FWS) has

re-inventoried all seabird islands coastwide, from west to east, between 1981 and 1991 (Hutchinson and Ferrero 1981, Hutchinson and Lovett 1983, Hutchinson and Lovett 1984, Woodward et al. 1987). These data are stored in a Wildlife Resource Assessment Section's - MDIFW Coastal Island Database and serve as the source of information for this document. MDIFW also maintains an updated Coast of Maine Wildlife Management Area Plan for over 172 seabird nesting islands that MDIFW owns or manages.

Current seabird management involves a more comprehensive planning process. Beginning in the mid 1980s, MDIFW revised the Waterfowl Management Plan and developed goals and objectives for waterfowl populations (with reference to Common Eiders) (MDIFW 1986). More recently, an assessment and management system for the three species of island-nesting terns was developed (MDIFW 1990). Through this planning process, goals and objectives for the remaining seabird species that nest on Maine's islands will be established.

## HABIITAT ASSESSMENT

### Past Habitat

Worldwide, colonial waterbirds commonly nest on islands. Maine's assemblage of colonial waterbirds utilize a wide range of habitats for nesting. Because of this wide variability, a comprehensive discussion of nesting habitat carrying capacity for this group is difficult.

For instance, cormorants will nest in trees on islands adjacent to feeding areas, therefore forested sites are preferred. Maine has hundreds of forested islands, but very few are used by colonial waterbirds, perhaps because these islands are too far from optimal feeding areas. Leach's Storm-petrels require soil conditions suitable for burrowing on offshore islands. These nesting conditions may be limiting in Maine. Black Guillemots need rock crevices and Razorbills a cliff ledge, common features on the Maine coast, but, in order to be suitable to nesting birds, these sites must be relatively disturbance-free, particularly from predators. Many of the other colonial nesters prefer the grassy islands that, prior to European colonization, may have been heavily forested. Regardless, the coast of Maine has numerous islands and exposed ledges, but seabirds nest on a relatively small proportion.

There are between 3,000 and 4,000 islands and exposed ledges off the Maine coast. Prior to the last ice age, these exposed features were actually the tops of ancient mountains. While the larger forested islands are easy to count, the discrepancy in island numbers results from a combination of either counting each ledge independently, lumping ledge complexes as one, or including small ledges with a nearby island. The

Coastal Island Registry, created in 1973 by the 106th Legislature to, among other things, clarify title to the islands along the coast, lists roughly 3,300 islands and ledges.

Many islands consist only of bare rock and are devoid of soil and vegetation. Gross (1944) estimated that 1,700 islands are vegetated. These vegetated islands range in size from 1/4 acre, supporting only grasses, forbs, and shrubs, to Maine's largest island, Mount Desert Island, at 107 square miles (Attwood 1973). Spruce and fir are the dominant tree species on larger islands. The smaller islands with the grass/forb/shrub vegetative component receive the greatest use by nesting seabirds (Mendall 1976, A. E. Hutchinson pers. comm., MDIFW).

Since the 16th century, Europeans and their descendants have had considerable impact (some positive and some negative) on Maine's seabird nesting habitat and its ability to support seabirds. The first permanent settlements were established on the offshore seabird islands such as Monhegan and Matinicus. Damariscove Island, the site of one of Maine's largest nesting eider populations, had year-round occupants as early as 1614. With permanent habitation came a need for wood and pasturage. Consequently, many island forests were cutover and/or burned, and the grasses and forbs grazed by livestock. During the 1800s, human populations on the islands rose, and seabird numbers declined. Not only were the birds and their eggs consumed, but their habitat was drastically altered. During the 20th century, human use of the islands diminished. Laws protecting migratory birds were established, and nesting conditions improved and resulted in increases in seabird numbers.

### Current Habitat



Today, fewer than 500 islands are documented as seabird nesting islands along the Maine coast. Korschgen (1979) identified nesting islands and provided estimates of nesting pairs for Maine in 1976 and 1977. Subsequent surveys of nesting islands have provided additional population trend information and identification of other nesting islands.

Korschgen (1979) reported colonial waterbird nesting on 353 islands and ledges, approximately 10% of the Maine's islands and ledges coastwide. Today, the coastal island database tracks 453 sites with recent (last 17 years) records of nesting seabirds. This total reflects those sites reported in Korschgen (1979) and an additional 100 sites with documented nesting records of one or more seabirds. In addition, this database also tracks sites with no records of seabird use, and sites used by other non-seabird species (i.e. seals and wading birds). The number of nesting pairs on these 99 "additional" sites range from 1 to over 1000 nesting pairs and average over 50 pairs per colony. Several of these "new colonies" are essential for the long-term health of regional seabird populations. New colonies may be the result of one or more of the following reasons: (1) a colony may have shifted from a previously used site to a site not used in 1977, (2) nesting females may have pioneered into new habitats, (3) some islands may have been inadvertently missed in the 1977 survey, (4) more suitable nesting conditions may exist today than during the 1977 survey, or (5) some species may be expanding in numbers or in range.

Many of the islands tracked in the database and used by seabirds are non-forested and are vegetated by grasses, forbs, and shrubs. These islands typically lack mammalian predators. While most seabird islands tend to be treeless, the forested

islands support nesting populations of petrels, Black Guillemots, and occasionally gulls and Common Eiders.

### *Island Ownership Patterns and it's Relevance to Seabird Habitat*

The ownership patterns of islands used by nesting seabirds profoundly influences seabird management in Maine. Beginning in the 1600s, the British and French crowns both staked claims to the islands. Since these early times, demand for owning coastal islands has varied. once highly sought in the 17th century, there were numerous times since Maine's statehood (1820) when "the state couldn't give them (the islands) away" (Caldwell 1981). However, by the mid-1960s, when demand for coastal property was rising, state officials tried to determine which islands the state owned. The Legislature enacted a law that required owners of islands to file claims of ownership with the local registrar of deeds. Once this activity was concluded, the Coastal Island Registry was established, which showed that 1,700 islands were privately owned. The remaining 1,299 unregistered islands and ledges were retained in state ownership.

Acquisition of seabird islands, or groups of islands, by state, federal, and private conservation agencies have made impressive gains in the last 20 years. Today, seabirds are nesting on 227 state, federal or municipality-owned islands. Twenty-five seabird islands are owned and managed by the National Audubon Society, Maine Audubon Society, The Nature conservancy, or private Land Trusts. The remaining 201 seabird islands are owned by private individuals (183) or the ownership is unknown (18) to this author (Appendix III). Lastly, conservation easements and municipal resource

protection zones have been established for wildlife resources and aesthetic reasons on both private and state-owned coastal islands.

### Habitat Projections

Having been "protected" since the early decades of the 20th century, some seabird populations are once again numerous (e.g. Common Eiders, gulls, and Doublecrested Cormorants) and have recolonized many coastal islands in Maine. Other populations, e.g. Atlantic Puffins, Razorbills, and terns are not presently at historic (pre-1800s for the puffins and auks and 1930s for terns) high population levels and distributions. Consequently, the islands that have historically been seabird nesting islands and those islands that have yet to be recolonized will provide the nucleus for seabird nesting populations in Maine. While protection of current nesting islands is paramount, other nearby suitable nesting islands may become important and should not be overlooked. These sites may be necessary to accommodate colony shifts or increasing populations because it is not known whether nesting habitat in itself, is limiting seabirds in Maine.

## POPULATION ASSESSMENT

### Past Populations

Just how numerous past nesting seabird populations were, prior to European settlement, is not known. However, records of seabird population demise has been documented. According to Drury and Hatch (1985), nine species of nesting seabirds were extirpated from the New England seacoast in the 18th and 19th centuries. Two of these species, the Labrador Duck and the Great Auk, are now extinct. Four species, the Great and Double-crested Cormorants, Great Black-backed Gull, and Razorbill have recolonized Maine's nesting islands. Northern Gannets, Common Murres, and Black-legged Kittiwakes occur in the Gulf of Maine but remain absent as nesters on Maine islands (Drury and Hatch 1985). This may change in the very near future as National Audubon Society researchers are attempting to attract Common Murres to Matinicus Rock (Egg Rock Update 1993).

Seabird populations experienced drastic population declines in the 1800s when human populations on islands peaked. As early as the 1830s, Audubon traveled through Maine's waters and was quoted as seeing "birds few and far between" (Caldwell 1981). By the late 1800s, nesting Double-crested and Great Cormorants and Great Black-backed Gull were extirpated. Herring Gulls occurred only on off-shore islands (Drury 1973). By 1907, Norton (1907) reported that only one Common Eider colony remained on the coast in Washington County (Norton 1907, Gross 1944).

At the beginning of the 20th century, laws had been passed to stop the exploitative use of colonial waterbirds. Important colonies were protected against

trespassers by colony wardens. Human use of the islands and the resources began to abate and, with time, breeding birds immigrated from remote islands off Maine and Canada and seabirds multiplied. Double-crested Cormorants returned to nest on Maine's islands around 1925; however, it was 1983 before Great Cormorants returned to Maine to nest on a few offshore islands.

Initially, population recovery for most seabird populations was slow, but steady (Drury 1973). Island-nesting terns were exceptions. Tern populations increased after protection, peaked in the 1940's and began declining thereafter, and has improved in recent years with intensive management. Their recovery and subsequent decline is believed related to excessive predation by the burgeoning gull population, human disturbance, habitat loss, and competition by gulls for traditional nesting sites (MDIFW 1990).

Unlike terns, many of Maine's seabird populations are relatively healthy today despite occasional losses of colonies to predation, avian cholera, and human disturbances associated with recreation and development. Common Eiders, Double-crested Cormorants, and some gull populations may still be growing, and other species such as Razorbills, Atlantic Puffins, and Laughing Gulls exist in Maine in small numbers on protected and managed islands.

### Current Populations

Considerable knowledge has been gained on the status of colonial waterbird populations in Maine since the 1970s. Erwin and Korschgen (1979) data serve as the baseline for recent colonial waterbird numbers in Maine. It is important to note that

current (1991) population data reported here are an aggregation of data collected from a variety of state, federal, and private sources; but are primarily from MDIFW surveys conducted coastwide between 1981 and 1991 (Table 1).

These data should be interpreted cautiously. First, several different survey techniques were used to collect these data. Accuracy of each survey varies with the species surveyed, survey conditions, timing of the survey, and perhaps most importantly, the objectives of the survey. Most of these data were collected by just a few individuals which improves conformity. Most surveys were actual counts of nests, were conservative, and thus provide useful population trend data.

Today, 13 species of seabirds are recorded nesting on Maine's coastal islands, an increase of 1 specie since 1977. In 1983, Great Cormorants returned to nest on a few outer islands in mid-coast Maine, and their nesting numbers now exceed 200 pairs. The rise in Great Cormorant numbers is believed to be a function of adult birds immigrating to Maine and their Maine-hatched chicks subsequently returning as breeding adults (Folger 1986).

Five species of seabirds were common i n 1977 and are still today. This list includes the: Double-crested Cormorant, Common Eider, Herring Gull, Great Black-backed Gull, and Leach's Storm-petrel. Reliable population trend data are available for the first 4 species and, when graphed on a logarithmic scale, suggest that Common Eider and Herring Gull populations **may** be leveling out. However, this should be interpreted with caution as more data will be necessary to understand the true shape of the curve, because, as mentioned previously, the last data points are an aggregation of data collected over a wide range of years. Great Black-backed Gull and Double-

Table 1. Estimated number of colonies and nesting pairs of colonial waterbirds on coastal islands in Maine, 1977 and 1993\*\*.

Species	1977		1993**	
	Number of colonies	Nesting pairs	Number of colonies	Nesting pairs
Common Eider	241	22,390	323	29,048
DC Cormorant	103	15,333	133	26,404
Herring Gull	223	26,037	251	23,137
GBB Gull	220	9,847	253	13,805
Arctic Tern	9	1,640	10	2,255
Common Tern	24	2,095	28	4,250
Roseate Tern	3	80	5	140
Laughing Gull	6	231	8	1,129
Puffin	1	125	4	135
Petrel	17	19,131	19	19,376
Guillemot	115	2,668	135	2,895
Razorbill	2	25	3	87
Gt Cormorant	0	0	9	206

\*\* These data represent an amalgamation of 12 years of data and in the truest sense do not represent an accurate assessment of the "1993" populations.

crested Cormorant numbers still appear to be increasing (Figure 1). Recent data show that the number of nesting pairs of Double-crested Cormorants has nearly doubled to 26,000 at 133 sites since 1977. This trend has also occurred in other Atlantic States; Andrews (1990) reported a 100k increase between 1977 and the mid 1980s in total Double-crested Cormorant numbers from data assimilated from Maine to Virginia.

The number of nesting pairs of eiders has increased since 1977 (Figure 1). The estimated breeding population has increased to 29,000 pairs and eiders are now reported nesting on 323 sites, up 25t from 1977. Blumpton et al. (1988), using data collected through the mid-1980s, reported that the eider population was stabilizing. Krohn et al. (1992) suggest that the steady decline in the mean number of nesting females per island between 1979-89 further indicate stabilization-, but this is speculative given the large increase in the number of additional eider nesting sites since 1977.

Herring Gulls are still abundant in Maine, with an estimated 23,000 pairs nesting at 251 sites. However, while the number of sites is higher than 1977, the number of nesting pairs show a decline since 1977. Maine's subadult Herring Gull may be moving south. This population reduction may be the result of reduced food availability in Maine caused by closure of open dumps and fish and chicken processing plants. In addition, it is likely that Herring Gulls are competing for food and nesting space with an increasing Great Black-backed Gull population which is currently estimated at over 13,000 pairs.

An accurate population estimate for Leach's Storm-petrels is difficult to obtain. Consequently, there are no new nesting population estimates for Leach's Storm-petrels



Figure 1.

since Korschgen (1979). while petrel burrows have been documented on 18 offshore islands, over 90% of the known statewide population nested on Great Duck and Little Duck Islands in the 1970s (Korschgen 1979).

Alcid populations have remained stable or have increased since 1977 (Figure 2). Razorbills now nest on three islands, one new site since 1977. Atlantic Puffin numbers have increased because translocated puffin chicks from Newfoundland have matured and have returned to nest at a few former sites in Maine. While the total numbers of nesting Razorbills and Puffins is still low, nesting has been documented at additional sites, primarily where gull control is an annual management practice. Black Guillemot numbers do not appear to have changed much over the last 2 decades because little new information on the status of breeding populations has been gained since the mid-1970s. Obtaining nest counts for this species is also difficult because of their habit of laying eggs in rock crevices. An improved survey methodology, which yields accurate data, is required for this species and the Leach's Storm-petrel (Nettleship and Birkhead 1985).

The nesting population of Common, Arctic, and Roseate Terns, and Laughing Gull has improved in recent years because of gull control activities on managed islands. However, fewer than 10 large, stable, and productive colonies exist in Maine and populations are well below those reported in the 1930s (MDIFW 1990).

Lastly, Korschgen (1979) expressed concern that the majority of Maine's seabirds and wading birds nested on privately-owned land. Subsequent to the surveys of the 1970s, numerous island acquisition initiatives by state, federal, and private conservation agencies have occurred. Today, approximately 68% of Maine's colonial

waterbirds (which includes islands with nesting wading birds) nest on islands owned by the public or by private conservation agencies, a vast improvement in the last 14 years. Further, habitat protection has been afforded the wildlife resources on numerous privately-owned islands as well through LURC zoning and Resource Protection Plans, conservation easements, and municipal resource protection zones.

### Population Projections

Assuming current management levels, nesting populations of seabirds on Maine's coastal islands and ledges are projected to remain stable or improve in the next 15 years. Human-induced negative influences could be greatly offset by increased habitat protection and acquisition initiatives, management, and increased public awareness of seabird issues.

Statewide populations for Common Eiders and Great Black-backed Gulls **may** increase if present trends continue. Herring Gull numbers **may** decline somewhat if the current trend continues and human garbage and commercial fishing waste continues to be less available for foraging gulls. Double-crested and Great Cormorant numbers will likely increase over the next 15 years.

More precise estimates of Black Guillemot and Leach's Storm-petrel numbers are contingent upon the development of an appropriate survey methodology. Puffin and Razorbill numbers should continue to increase over the next 15 years and improved reproductive success is anticipated for these birds on islands with active gull control activities.

During the next 15 years, if current levels of management are maintained, populations of Common, Arctic, and Roseate Terns and Laughing Gulls can be expected to remain at or near the current level (MDIFW 1990). If existing management programs are reduced or eliminated, tern and Laughing Gull numbers can be expected to decline (MDIFW 1990).

### Limiting Factors

In general, loss of food resources, catastrophic weather, habitat degradation, pollution away from the nesting islands, avian and mammalian predation, competition, and human disturbance, may limit seabird populations. Birt et al. (1987) believe that, in general, seabird populations are limited by food resources during the breeding season. While this may be the case, other factors may also limit seabird numbers, including; displacement by gulls for preferred nesting sites, habitat availability, human disturbance, over-hunting, oil spills, chemical poisoning, avian cholera, and the major influence of human overexploitation of many important marine resources.

Factors limiting seabird numbers in Maine are many, and for some species, are not well understood. Because this assessment deals with life histories and life requisites of 13 species, population limiting factors are, when known, diverse. The reader is referred to the species accounts in Appendix II for a brief discussion of some species-specific limiting factors, as are reported in the literature.

## USE AND DEMAND ASSESSMENT

### Past Use and Demand - Habitat and Seabirds

In the past, seabird populations were influenced by both the exploitative human use of nesting islands and the seabirds and their eggs. Maine's cultural and economic history is closely linked to the coastal islands, the island resources, and particularly the resources in the marine environment. Native Americans used the seabirds for food as evidenced by faunal remains preserved in coastal shell heaps. Use and exploitation of the insular resources by Europeans began almost 500 years ago when explorers plied the Gulf of Maine in search of riches. The most significant wealth they found was a diverse and abundant fishery. As early as the 17th century, year-round settlements on offshore islands existed so fishermen could be close to these seemingly inexhaustible fish stocks. And, according to Conkling and Timson (1979), major island settlement began around 1750 after the French and Indian Wars.

Historical use of seabird habitat shaped the nesting conditions that exist today, nearly 400 years after European settlers first established permanent settlements on Maine islands. Conkling (1981) suggested that every island along the coast which was over 25 acres in size housed people or livestock at one time. Many of the smaller islands were likely used as well. Principal human-induced impacts (both positive and negative) on the nesting habitat included: developing fishing and shipping communities, habitat alteration caused by granite quarrying; building military and lighthouse installations; timber harvesting for lumber, firewood, kilnwood, and pulp; and the more subtle, but important, effect of grazing livestock on the vegetation.

Historical use of and demand for seabirds themselves included: subsistence hunting and gathering by native Americans dating back more than 4000 years; subsistence use of the birds and their eggs by island residents; exploitative market hunting of birds for their feathers to decorate women's hats; legal harvest by hunters; and recreational use by bird watchers.

A great deal has been written on the demise of seabirds along the coast of Maine (Palmer 1949, Drury 1973, Mendall 1976, Conkling 1981). The decimation was so complete that many feared these birds were headed to extinction (Audubon Wildlife Report 1985). The Great Auk (a common resident in Maine waters, but its status as a breeder is debated) was harvested for meat, feathers, and oil, until it eventually became extinct in 1844 when the last bird was taken for a museum collection. This event provides the most unfortunate testimonial to the consequences of man as predator in a seabird colony. Protection also came too late for the Labrador Duck, as this species too is extinct.

Drury (1973) summarized numerous historical accounts by suggesting that during the 18th and 19th centuries, seabirds were almost "eaten off" Maine's outer islands.. Populations of other seabirds of little food value were also decimated; they were used as fish bait, their feathers were fashionable for hats (a pair of gull wings brought \$ 0.40 at the end of the 19<sup>th</sup> century), or their habitat was altered. Others were killed for sport shooting or because people believed the birds competed with commercial fishing activities. Gull control was enacted, because gulls preyed on more favored bird species such as terns and eiders. Bird predators, such as dogs, cats, raccoons, and rats, were purposely and inadvertently introduced into many colonies,

with damaging results. Seabirds were killed because their excrement soiled water supplies and some colonies were simply vandalized. Undoubtedly these species would not have returned to nest on the islands of Maine without protection.

Recolonization and population growth by seabirds occurred because of changes in the use and demand for seabirds and their habitats through changes in laws, technology, and failing economies. The need for humans to live on islands near fish stocks decreased when boats with gasoline engines carried fishermen to offshore waters. Development and availability of concrete lessened the demand for granite. Rails and roads replaced coastal schooners. Commercial fisheries and island forests had been exploited, and most seabirds became legally protected. For these and other reasons, people moved to the mainland.

Kress (1982) stated that "this combination of life style changes and protective legislation made the islands suitable for nesting once again". Prior to these events, Maine's seabirds and their habitats were exploited beyond their ability to replace annual losses.

### Current Use and Demand

Current use of colonial waterbirds in Maine has both nonconsumptive and consumptive components. The nonconsumptive users include birdwatchers, photographers, and the general public. Each summer, numerous individuals pay for sight-seeing cruises to many nesting colonies, including Matinicus and Eastern Egg Rocks. While limited amounts of data exist to accurately assess seabird use and demand, general "nongame wildlife" statistics are available.

Researchers estimate that between 73t (FWS 1982) and 91k (Boyle et al. 1990) of the state's adult population are nonconsumptive users of fish and wildlife.

The Common Eider is the only harvested seabird in Maine covered by this assessment. In Maine, and elsewhere in New England, hunter interest in eiders is increasing. The percentage of eiders in the Maine waterfowl harvest has increased from 3-4% in the mid-1960s to over 20% in the mid-1980s (Corr et al. 1988). Currently, Atlantic Flyway hunting regulations for eiders are liberal. The hunting season generally runs from early October through the middle of January. The daily bag limit for eiders is 7. Eiders are the only harvested species colonially nesting on Maine's islands and exhibit low reproductive potential, close monitoring of their status is particularly warranted.

There is major cause for concern that some of these seabirds continue to shot south of United States borders.

### Use and Demand Projections

Consumptive (eider hunting) and nonconsumptive use and demand for seabirds, and perhaps more importantly, their nesting habitat, is expected to increase over the next 15 years. Administrators with regulatory authority for wildlife issues are aware that interest in these birds and the islands has increased. The integrity of seabird colonies is projected to be threatened by modern and diverse development and recreation pressure as well as exploitation of marine fisheries in Maine's waters and beyond.



## SUMMARY AND CONCLUSIONS

Colonial waterbirds are those waterbirds that gather into groups to nest at locations called colony sites. This document focuses on 13 species of seabirds and waterfowl that currently nest on roughly 10 percent of Maine's numerous coastal islands and ledges.

Seabird populations experienced drastic population declines in the 1800s when island human populations peaked and island resources were exploited. However, by the beginning of the 20th century, laws had been passed to stop the exploitation of seabirds.

Fortunately, most of Maine's seabird populations responded well to protection, habitat acquisition, and management of the twentieth century. Today, 13 species of seabirds are recorded nesting on Maine's coastal islands, an increase of 1 species since the last coastwide survey conducted in 1976-77. Of the species that occur in relative abundance (e.g. eiders, gulls, and Double-crested Cormorants) current populations are projected to be stable or improve over the next 15 years. Species that have experienced recent population declines (e.g. terns ) are receiving management activities aimed at halting the decline and improving future nesting conditions.

From reviews of past and recent information, it is apparent that an important subset of islands in Maine have supported past and current seabird populations. Protection of these islands is needed to assure the long-term health and facilitate management of most of the seabird populations discussed in this assessment. When appropriate, species-specific management at certain sites (islands or island groups) will

be necessary to meet assessment goals and objectives for some species. Controlled and restricted human use on other nesting islands will be necessary for the long-term well-being of the remaining species.

In the last decade of the 20th century, seabird management will change as species-specific goals and objectives are developed. Providing protection for the nesting birds at certain colony sites is a giant step but may not be totally adequate management because the activities of man continue to influence the island resources. While acquisition of important nesting islands and seabird surveys and inventories will be ongoing initiatives, a more active role in seabird research and management is warranted.

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**APPENDIX I****Seabirds Nesting in Maine**

Leach's Storm-Petrel (*Oceanodroma leucorhoa*)

Great Cormorant (*Phalacrocorax carbo*)

Double-crested Cormorant (*Phalacrocorax auritis*)

Common Eider (*Somateria mollissima*)

Laughing Gull (*Larus atricilla*)

Herring Gull (*Larus argentatus*)

Great Black-backed Gull (*Larus marinus*)

Common Tern (*Sterna hirundo*)

Arctic Tern (*Sterna paradisaea*)

Roseate Tern (*Sterna dougallii*)

Razorbill (*Alca torda*)

Black Guillemot (*Cephus grylle*)

Atlantic Puffin (*Fratercula arctica*)

**APPENDIX II**

## Status Summaries of Island-nesting Seabirds

<u>Species</u>	<u>Page Number</u>
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Atlantic Puffin .....	48
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Common Tern .....	51
Double-crested Cormorant .....	52
Great Cormorant .....	53
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## STATUS SUMMARIES OF ISLAND-NESTING SEABIRDS

**ARCTIC TERN (Sterna paradisaea)**

**PAST TRENDS:** Arctic Terns were exploited for food and feathers in the mid to late 1800s. Their populations were more or less stable until 1970s because 3 major colonies were protected by lighthouse keepers. Declining in more recent times because of competition with and predation by Herring and Great Black-backed Gulls.

**PRESENT STATUS:** 1977 - 1,640 in 9 colonies; 1991 - 2,094 in 10 colonies. Declining since 1940 on Matinicus Island. There was a general decline in population until recent gull control activities.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** The normal clutch size is 1-2 (usually 2) eggs. Sterninae (general): age at first reproduction is 3-5 years. Average survival to breeding 7-57%. Average adult survival is estimated at 79-92%.

**LIMITING FACTORS:** These terns are displaced by gulls on preferred nesting locations. Human disturbance and competition for space and predation by gulls limits populations.

**OTHER COMMENTS:** Typically inhabits outer islands. The southernmost breeding limit for Arctic terns is Massachusetts but southward expansion would not be unexpected. For more information and goals and objectives for terns, see MDIFW (1990), Island-nesting tern assessment and management system.

## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**ATLANTIC PUFFIN (Fratercula arctica)**

**PAST TRENDS:** Puffins were nesting in considerable numbers prior to 1860. The reduction, primarily by shooting, began very early in the 1800s. The species was almost eliminated in Maine in late 1800s. The Puffin population increased through 1950 (1-2 pairs in Matinicus Rock in 1902 and over 100 in 1985) . Puffins once nested on 8 islands in Maine.

**PRESENT STATUS:** 1977 - 125 on 1 island; 1991 - 133 on 3 islands. The Puffin population has been increasing slowly during this century. Population estimate for Atlantic Puffins is 5.8 million breeding pairs (range 3.8 - 8.2 million) . The Puffin population in Maine is apparently stable but in low numbers.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** Puffins usually lay 1 egg in a hole in ground or rock crevice. In general, alcids do not breed until age 4-6 years. Reported survival to breeding age is reported as 13-53%-. Average adult survival approximates 80-96%;. Incubation is done primarily by female and lasts approximately 42 days. Adults feed young for 6 weeks and then leave chick to fend for itself.

**LIMITING FACTORS:** In Nova Scotia, gull predation limits Puffin populations. In Maine, Drury reported that gulls limit Puffin numbers and colony sites. other global decimating factors include: over-hunting, gill netting, toxic chemical pollution, over-exploitation of captain stocks, gull predation on eggs, chicks, and adults and competition for nesting habitat (which has inhibited range expansion to former nesting islands) .

**OTHER COMMENTS:** Puffins have been referred to as "sea parrots". For more information on the Alcidae in general, see Nettleship and Birkhead (1985). For more information on Maine's Puffins see publications by Dr. Stephen Kress and Eastern Egg Rock Updates.

## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**BLACK GUILLEMOT (Cepphus grylle)**

**PAST TRENDS:** There exist little useable data on population numbers prior to 1900 when the population was believed to range between 85 - 600 pairs. This species may have survived extirpation because of its more diverse breeding distribution. Norton (1944) believed the guillemot population had changed little in the previous 70 years, but this is uncertain. Palmer (1949) reported a gradual increase in guillemot numbers since 1910, and these increases may have been associated with discoveries of new colonies. Various reports in the literature report 150 pairs in 1903 on 14 islands; 1931 - 600 pairs on 24 islands; 1945 - 1,350 pairs on 24 islands and 3,400 pairs in early 1970s (Drury 1973). Apparently the population increase through this century was fairly steady.

**PRESENT STATUS:** 1977 - 2,668 pairs on 115 islands (believed to be a low estimate by researchers) ; 1991 - 2,776 pairs on 132 islands. Atlantic population at only 270,000 with little data on specific populations (Nettleship and Birkhead 1985). Some declines reported but southern populations may be increasing.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** Guillemots usually lay 2 eggs in burrows but generally only 1 chick fledges. General alcidæ breeding: age at first reproduction is 4-6 years. Survival to breeding age is estimated at 13-53%. Average adult annual survival is high, reportedly 80-96%. Both sexes incubate eggs for roughly 27-33 days. Chicks stay in nest for another 6-8 weeks before fledging.

**LIXITING FACTORS:** Primarily, a lack of predator-free suitable nesting conditions limit populations. Other global threats include: oil pollution, human disturbance, agricultural and industrial chemicals, losses in commercial fishing gear, and predation by gulls.

**OTHER CO S:** "Sea doves" or "sea pigeons" reported on the coast of Maine by Josselyn (1674). Prefers to eat rock eels which it procure; in shoal water habitats while diving.

## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**COMMON EIDER (Somateria mollissima)**

**PAST TRENDS:** Eiders were historically abundant (even into the mid 1800s) but reduced to a few nesting pairs around the turn of the century. This species was exploited for food, eggs, and feathers. In 1907, it is reported that only 2 pairs remained on the Maine coast on Old Man Island in Cutler. In general, three factors aided their population recovery: abolition of spring shooting, a closed hunting season on eiders, and protection of several key nesting islands. However, early recovery was not rapid and by the 1940s the number approached 2100. The population apparently experienced exponential growth to 18,000 by the late 1960s. Steady population growth since the 1960s and the population may have leveled off (Krohn et al 1992).

**PRESENT STATUS:** 1977 - 22,000 on 240 islands; 1991 - 30,000 on 325 islands. There appears to be a trend towards smaller colonies on more islands.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** Eiders generally lay 4-6 eggs. Eiders experience delayed maturity to 2-3 years of age. For nesting, female eiders seek wooded or treeless islands uninhabited by man. Eiders experience high duckling mortality and approximately 10% of ducklings survive to flying stage.

**LIMITING FACTORS:** Gull competition for preferred nest sites and predation of eggs and young, mammalian predators, avian cholera, suitable nest sites (?), human disturbance-related lowered nest success all appear to influence eider numbers.

**OTHER COMMENTS:** Eider populations may be approaching carrying capacity in Maine. Twenty-two important eider nesting islands are listed in the Maine Critical Areas Program. Several research projects on eiders were conducted by the Maine Cooperative Wildlife Research Unit (FWS) in cooperation with the University of Maine at Orono.

## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**COMMON TERN (Sterna hirundo)**

**PAST TRENDS:** Terns were heavily exploited in 1880s for their feathers. After protection, Common tern populations grew to a high in 1931 (6,500 pairs) but has declined since 1940 because of gull competition and predation.

**PRESENT STATUS:** Common Tern numbers was declining until recently but are now responding positively to gull control. 1977 - 2,095 pairs on 24 islands; 1991 - 4,032 pairs on 24 islands.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** The normal clutch size is 2-3 eggs. Sterninae general: age at first reproduction is 3-5 years. Average survival to breeding is reported as 7-57%. Average annual adult survival of Common Terns is reported to be 79-92%.

**LIMITING FACTORS:** Tern numbers are limited by human disturbance, predators (gulls, rats, owls, Black-crowned Night Herons), and displacement by large gulls.

**OTHER COMMENTS:** In Maine there exist numerous resources for more information on terns. These include, but are not limited to: Kress, Nisbet, Drury, Gulf of Maine Tern Working Group, IFW Tern Assessment. Habitat management via vegetation manipulation has been successful on research islands. Future work should be directed towards an assessment of populations on the Latin America wintering grounds. For more information and goals and objectives for terns, see MDIFW (1990), the Island-nesting tern assessment and management system.

## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**DOUBLE-CRESTED CORMORANT (Phalacrocorax auritis)**

**PAST TRENDS:** Cormorants were eliminated off the New England coast in the late 1800s. This species didn't nest again in Maine until 1925. Once recolonized, their populations grew rapidly. Cormorant control by egg spraying began in 1944 and continued until 1953. This activity may have temporarily halted population growth; however, population expansion since the 1950s continues today.

**PRESENT STATUS:** 1977 - 15,000 pairs on 103 islands; 1991 28,400 pairs on 132 islands. Population has nearly doubled since the 1970s when protection from shooting was provided by the 1972 Treaty which officially recognized members of this taxonomic group as migratory birds.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** In general, Cormorant clutch sizes are between 2-5 eggs; their age at first breeding is 4-5 years. Cormorant survival to breeding is reported 35-40%. Thereafter, adult survival is reported to approximate 84%. Incubation of eggs is done by both parents and lasts about 25 days.

**LIMITING FACTORS:** Unknown at this time.

**OTHER COMMENTS:** Primarily eat fish of no commercial value, but are known to prey on stocked Atlantic Salmon smolts. Some "control" continues today to protect hatchery raised and released salmon smolts. Cormorant colonies will move in response to disturbance.

## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**GREAT BLACK -BACKED GRULL (Larus marinus)**

**PAST TRENDS:** This species was eliminated from New England in the late 1800s because gulls were pursued for their food and feathers. Great Black-backed Gulls returned to Maine to nest in 1928. By 1930, the recolonized population had increased to 30 pairs on 12 islands. By 1977, the population had grown to 9,800 pairs on 220 islands. These increases were believed to be the result of expanded food availability from dumps and inshore fishing activities. Control on this species first began in 1948 on Metinic Green Island but was discontinued in the early 1950s.

**PRESENT STATUS:** 1977 - 9,800 pairs on 220 islands; 1991 13,650 pairs on 255 islands. Numbers may have stabilized with annual fluctuations being normal.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** The clutch size is 2-3 eggs, usually 3. Larinae (general): age at first reproduction is 3-4 years; average survival to breeding is reported as 36-73%; average annual adult survival approximates 80-95%.

**LIMITING FACTORS:** Unknown at this time.

**OTHER COMMENTS:** This species is the largest gull in the world. Generally does not nest on islands as far out to sea as the Herring Gull. Great Black-backed Gulls nest earlier than other seabirds and in smaller colonies. For more information, see Drury (1973).

## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**GREAT CORMORANT (Phalacrocorax carbo)**

**PAST TRENDS:** Great Cormorants were reported as a sporadic nester in Maine and was believed to be extirpated from Maine islands by egging and hunting for food and feathers in the late 1800s. Their meat was used for food and fish bait.

**PRESENT STATUS:** Great Cormorants recolonized Maine islands as a nesting species in 1983. In 1991, 229 pairs nested on 4 islands in the Isle au Haut area. The population appeared to increase at a fairly rapid rate.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** Nests on cliff ledges on islands or on the mainland. Females generally lay 3-7 eggs (usually 4-5). Folger (1986) reported fledgling rate of about 2 chicks per nest. Age at first reproduction around 4-5 years of age; Survival to breeding is reported as 35-40%; adult annual survival approximates 84%.

**LIMITING FACTORS:** Limiting factors are largely unknown. Recently nesting on several remote islands between Isle au Haut and Swan's Island.

**OTHER COMMENTS:** Gross (1944) is quoted as saying "be on watch for its nesting on the Maine coast." Recent increases in numbers on Maine islands is likely due to adults relocating from the Maritimes, not necessarily from recruitment of birds hatched on the islands. Nesting great Cormorants are usually associated with nesting Double-crested Cormorants. The species will desert a colony site en masse when severely disturbed.



## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**HERRING GULL (Larus argentatus)**

**PAST TRENDS:** Feather hunting, in addition to the usual exploitation of seabirds, in 1876 and again around 1896 (after terns received some protection) reduced the population down to about 10,000 pairs on Maine's outer islands. Egging was very popular with the fishermen and farmers, as well as quarrymen during slack times. Populations started building slowly at first until the 1930's and 1940's when it grew rapidly. Gull control began in 1934 when eggs were punctured. Later control involved spraying eggs between 1940 and 1953. Effectiveness of control program is debatable, but Palmer noted a marked decline in the breeding population. Between 1945-50, the Herring Gull population appeared to plateau, which may have been caused more by human disturbance than actual egg spraying. The reasons given for gull control include: gulls were deleterious to eiders, Laughing Gulls, and terns; they soiled public water supplies; and gulls were an air traffic problem around airports.

**STATUS:** 1977- 26,000 pairs on 223 islands. 1991 - 23,000 pairs on 258 islands. Populations may have leveled off or be declining as food base is decreasing (closing open dumps and fish and chicken processing plants).

**REPRODUCTIVE STRATEGIES AND SUCCESS:** Clutch size 2-3 eggs, usually 3; Larinae (general) : age at first reproduction 3-4 years; average survival to breeding reported as 36-73%; average adult survival nearly 80-95%.

**LIMITING FACTORS:** Herring Gulls nested on entire coastline in 1929. Areas where Herring Gull numbers have declined is coincident with declines in total fish landings, particularly the commercial herring fishery.

**OTHER COMMENTS:** Remarkably adaptable, food habits benefit other sea life (starfish and urchins) and can cause crop damage (particularly blueberry crops) . Terns and Laughing Gulls have suffered since 1928 because of Herring and Great Black-backed Gull competition and predation.

## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**LAUGHING GULL (Larus atricilla)**

**PAST TRENDS:** Survived millinery trade in western Maine (barely) and in Nantucket sound. 1895 - 14 birds on Western Egg Rock. Only a few colonies persisted and none in 1944 (Palmer 1949). Ceased breeding because of human molestation and shooting, rats, conflicts with grazing sheep, and Herring gull competition and predation. Recolonized a few Maine islands and increased to 250 pairs in 1952.

**PRESENT STATUS:** 1977 - 231 pairs on 6 islands; 1991 - 716 pairs on 9 islands. This species appears to be doing well on managed islands where gull numbers are controlled. Also doing well in colonies south of Maine.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** Generally lays 3 eggs.; Larinae (general): age at first reproduction 3-4 years; average survival to breeding reported as 36-73%; average annual adult survival reported as 80-95%.

**LIMITING FACTORS:** Do not fare well on islands where sheep are present as these gulls prefer to nest in rank vegetation. Laughing Gulls are also displaced by large gulls from preferred nest sites. Typically a southern species with a marginal population north of New Jersey.

**OTHER COMMENTS:** Responding to gull control at northern edge of their range. This species is often associated with nesting terns.

## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**LEACH'S STORM-PETREL (Oceanodroma leucorhoa)**

**PAST TRENDS:** Survived the exploitative 1800s in moderate numbers but unlike the other seabirds, their numbers may have declined since 1900 because of "destruction of breeding places". In the early decades of the 20th century, dogs and cats brought by people to the nesting islands took a heavy toll. A fox farm on No Mans Land in 1916 likely wiped out that nesting population. Sheep grazing also is disruptive to this species. Mink on inner islands cause considerable problems to nesting birds.

**PRESENT STATUS:** Abundant but localized on limited number of islands. 1977 - 19,000 pairs on 17 islands (93% on Great and Little Duck Islands); 1991 - 19,400 pairs on 14 islands. These estimates are generally believed to be high.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** Most of the Atlantic population breeds in eastern Newfoundland. The normal clutch size is 1 egg. The age at first breeding is generally 4-5 years. Adult survival is reported to be 87-88%. Both sexes incubate.

**LIMITING FACTORS:** A lack of suitable predator-free nesting islands with the appropriate humus for burrowing may limit Maine's petrels. Gulls prey on adults and young. Huntington suggested they are food-limited (copepod crustaceans), not site-limited.

**OTHER COMMENTS:** Maine's nesting petrels are nocturnal. They have been referred to as "Mother Carey's Chickens". Petrels were disliked by lighthouse keepers as they soiled fresh water supplies. Four petrel islands are listed by the Maine Critical Areas Program. Conservation needs include accurate census information and special protection of large traditional colony sites. Petrels are offshore pelagic surface feeders.

## STATUS SUMMARY OF ISLAND-NESTING SEABIRDS

**RAZORBILL (Alca torda)**

**PAST TRENDS:** Razorbills were exploited by humans up to the 20th century. Since, there have been widespread declines on both sides of the Atlantic, particularly the southern populations of razorbills. In Maine, Razorbills were eliminated from the nesting islands in the mid to late 1800s (Folger 1986). The species reappeared in the 1920s but not confirmed nesting until 1968 on Matinicus Rock.

**PRESENT STATUS:** 700,000 in the Atlantic. 1977 - 25 pairs on 2 islands; 1991 - 75 pairs on 3 islands. Slowly increasing in Maine.

**REPRODUCTIVE STRATEGIES AND SUCCESS:** A single egg is laid on bare rock. Razorbills first breed and nest at 3-5 years of age. The juvenile survival rate is reported as 13-53% (ave. 30%). Adult survival reported as 80-96%. Both sexes incubate for the 35 day period.

**LIMITING FACTORS:** Largely unknown but problems with human exploitation, incidental kills in fishing nets, competition with commercial fishing interests, disturbance, habitat destruction, natural and introduced -predators, and oil pollution. Other major threats include pollution effects on the food base and harassment by gulls.

**OTHER COMMENTS:** According to Folger (1986), only 6 islands in Maine ever supported Razorbills. The size of the nesting population before extirpation is unknown. Single visit survey counts are questionable. major source of information is Nettleship and Birkhead (1985). Razorbills feed in the plankton zone.

**APPENDIX III****Maine Seabird Nesting Island Ownership Status**

**PUBLIC OWNERSHIP - 227 ISLANDS**

Bureau of Public Lands  
 Bureau of Parks and Recreation  
 State of Maine  
 Municipalities  
 Department of Inland Fisheries and Wildlife  
 BPL ownership with IFW management authority  
 U.S. Fish and Wildlife Service  
 National Park Service  
 U. S. Coast Guard  
 U. S. Navy

**PRIVATE CONSERVATION OWNERSHIP - 25 ISLANDS**

The Nature Conservancy  
 Maine Audubon Society  
 National Audubon Society  
 Cumberland Mainland and Island Trust

**PRIVATE OWNERSHIP - 183 ISLANDS**

**UNKNOWN OWNERSHIP - 18 ISLANDS**