

COMMON EIDER ASSESSMENT

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MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE
WILDLIFE RESOURCE ASSESSMENT SECTION
BIRD GROUP
BY
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This document is dedicated to Howard L. Mendall, 1909 – 1994

TABLE OF CONTENTS

	Page
INTRODUCTION.....	1
NATURAL HISTORY.....	2
MANAGEMENT.....	9
Regulations and Regulatory Authority.....	9
Past Management.....	12
Past Goals and Objectives.....	14
Current Management.....	15
HABITAT ASSESSMENT	17
Past Habitat.....	17
Current Habitat	18
Habitat Projections.....	20
POPULATION ASSESSMENT.....	21
Past Populations.....	21
Current Populations.....	22
Population Projections.....	24
Limiting Factors.....	24
USE AND DEMAND ASSESSMENT.....	30
Past Use and Demand.....	30
Current Use and Demand.....	31
Use and Demand Projections.....	34
SUMMARY AND CONCLUSIONS.....	35
LITERATURE CITED.....	37
LIST OF APPENDICES.....	43

Cover: 1985 Maine Duck Stamp Design by David A. Maass

INTRODUCTION

Since 1968, the Maine Department of Inland Fisheries and Wildlife (hereafter MDIFW) has aggressively pursued development and refinement of wildlife species assessments and implementation of cost-effective programs that support public-defined goals and objectives. 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, indication of a trend often deserves management consideration.

This assessment groups 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 status and 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

The Common Eider (*Somateria mollissima*) is a member of the order Anseriformes, family Anatidae, and the tribe Mergini (Bellrose 1980). Common Eiders are the most conspicuous waterfowl found year round on the coast of Maine. They are the largest ducks native to North America and in the entire Northern Hemisphere, with weights commonly in excess of five pounds (Bellrose 1980). Male eiders are sharply patterned in black and white and are unique among waterfowl in having the combination of white back and breast plus black belly and sides (Fefer 1977). Female eiders are brown or buff colored and are heavily barred. Both sexes have an exposed frontal process forming a Y-shaped frontal shield that reaches almost to the eye (Bellrose 1980), and is the basis for subspecies discrimination (Mendall 1986).

Three races of the Common Eider are found in the Atlantic Flyway. The breeding population in Maine consists entirely of the race frequently referred to as the American Eider (*Somateria mollissima dresseri*) and will be the focus of this assessment. The Northern Eider (*Somateria mollissima borealis*) nests on the coast of Greenland, Baffin Island, Southampton Island and along the north and central coasts of Labrador. Mendall (1980) reported that 6% of a sample of harvested eiders (n=1,085) wintering in Maine were either Northern Eiders or hybrids between American and Northern Eiders. The Hudson Bay Eider (*Somateria mollissima sedentaria*) is confined to islands and coasts of Hudson and James Bays. Maine supports the only major eider breeding population in the lower 48 states (Blumpton et al. 1988).

American eiders nest on islands from south-central Labrador, Newfoundland, eastern Quebec, Nova Scotia, New Brunswick, and Maine to Massachusetts (Figure 1). Their wintering range extends from Newfoundland south to Massachusetts with occasional birds found as far south as eastern Long Island, New York (Palmer 1976). Wakeley (1973) determined that part of the female eider population in Maine was migratory while the rest were resident on or near the breeding areas. Too few males have been banded to make this determination (Blumpton et al. 1988).

Common Eiders have a long history of exploitation throughout their range, and the American race (*S. m. dresseri*) was almost extirpated from the east coast by the end of the 19th century (Goudie et al. 2000). With protection, this population has recovered over the decades but currently is under increasing harvest pressure in New England (Krohn et al. 1992).

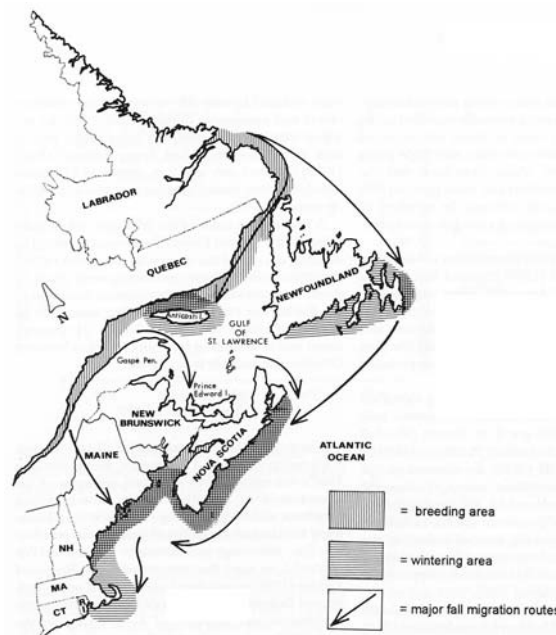


Figure 1. Geographic distribution of *Somateria mollissima dresseri* (from Krohn et al. 1992).

Life History Overview: Female Common Eiders generally begin nesting at 2 or 3 years of age (Choate 1966, Blumpton et al. 1988). Their tendency to nest in large colonies on marine islands, and to form large aggregations in inshore areas make this species truly marine in all aspects of its life history (Goudie et al. 2000). According to Wakeley (1973) the average life expectancy of an adult female is 5 years; but banding records have documented hens living much longer. The longevity record for a Maine-banded male eider is 22 years 5 months (BBL 1998).

The average annual survival rate reported in the literature varies; 81% (Wakeley and Mendall 1976) for Penobscot Bay; 83% (Reed 1975) for Quebec; and 87% (Krementz et al. 1996) for eastern North America. Krementz et al. (1996) analyzed Maine-band recoveries of Common Eider females and reported an estimated annual survival rate of 0.9003 ± 0.0841 , and a mean life span for an adult of 7.36 ± 0.97 years. Avian cholera (Korschgen 1976), predation by eagles (*Haliaeetus leucocephalus*), loss of nesting hens to mammalian predators, and sport hunting are major causes of mortality among adult eiders (Reed and Cousineau 1967). Predation, especially by Great Black-backed Gulls (*Larus marinus*), is a major cause of mortality among eider ducklings (Ahlund and Gotmark 1989, Mawhinney 1997).

Eiders are colonial nesters and, in Maine, can be found nesting in densities of 200 or more pairs per acre (Mendall 1976, R. B. Allen, unpublished data 1996). Homing is well-developed in adult female eiders, and most hens return each year, sometimes as early as mid-April (Figure 2), to nest in the same locality as in previous years (Choate 1966, Clark 1968, Milne 1974, Wakeley and Mendall 1976). Studies of nest selection reveal that the male eider accompanies the female to potential sites and remains for a

brief period of time, but has little to do with the actual nest site selection and defense (Milne 1974, Blumpton et al. 1988). Males generally lose interest in their mates as incubation progresses.

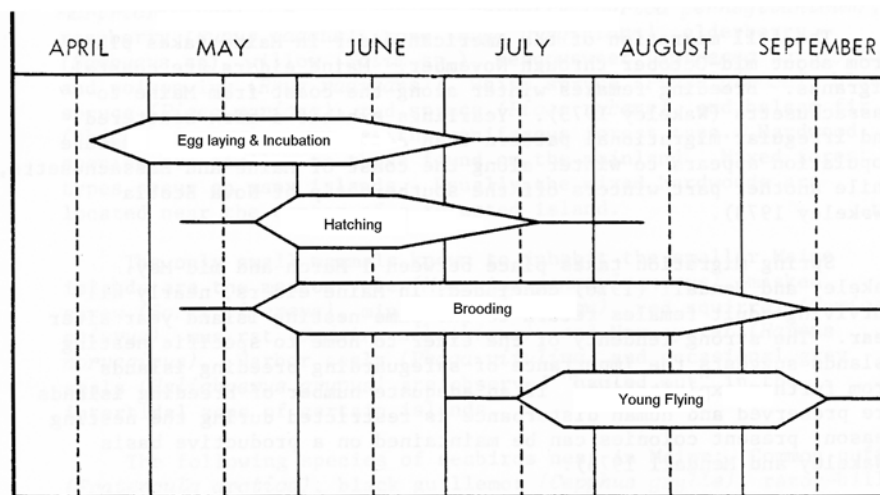


Figure 2. Breeding chronology of the Common Eider in Maine (from Fefer 1977).

Females line nests with abdominal down, and this highly efficient and light insulator is the basis for the eiderdown industry (Goudie et al. 2000). Eider clutches average 3 to 5 eggs (Bellrose 1980). Eggs hatch about 26 days after incubation commences (Goudie et al. 2000, K. Mawhinney pers. comm.) During incubation, the female rarely leaves the nest unless disturbed, and relies on nutrient reserves, especially fat reserves and pectoral muscle, as a source of energy to carry her through this period (Korschgen 1976). Females may lose up to 50% of their pre-laying weight during incubation (Korschgen 1976). Many females, possibly younger adults, do not have sufficient nutrient reserves remaining after egg laying to complete the 26 day incubation period, and consequently, clutches of eggs are frequently abandoned (Korschgen 1976, Mawhinney 1999). The re-nesting ability of eiders is also limited, but

early-nesting females with sufficient nutrient reserves will reneest after losing their initial clutch (Sarbello 1973, Korschgen 1976).

Nest success ranges from 15 - 70% (Bellrose 1980) and is affected by predation, adverse weather, island size, topography and cover (Clark 1968, Bourget 1970). These latter three factors, coupled with the breeding chronology of the eiders and gull species, influence the predatory behavior of Herring Gulls (*Larus argentatus*) and Great Black-backed Gulls (Bourget 1970). Nest failure is also attributed to predation by crows (*Corvus ossifragus*), ravens (*Corvus corax*), mink (*Mustela vison*), and raccoons (*Procyon lotor*)(Bellrose 1980). Further, nest failure can be greatly affected buy human disturbance (Mendall 1976, Bellrose 1980).

Once hatched, the precocial young are led to the water by females within 12-48 hours, soon after the natal down feathers are dry. Eiders exhibit post-hatch brood amalgamation or crèching behavior, whereby multiple broods and females often coalesce into groups known as crèches (Munro and Bedard 1977) or a percentage of the females abandon their young to other brood-caring females shortly after the hatch (Mawhinney 1995). This often results in large concentrations of ducklings being attended by more than one female. Within 3-7 days, strong bonds are established between female(s) and the ducklings. In addition to brood-caring females, females without young often assist brood-caring females in defending ducklings during predator attacks (Bedard and Munro 1977, R. B. Allen unpublished data).

The magnitude of duckling mortality is highly variable eiders. Several factors involved include predation by large gulls, weather, condition at hatch, food supply, disease, and sea conditions when the broods first reach the ocean (McAloney 1973).

In Nova Scotia, McAloney (1973) estimated the mortality rate of ducklings until 5 weeks at 75.5%. During a recent study in New Brunswick (1995-98), Mawhinney (1999) reported that nearly 100% of the ducklings hatched in the study area were consumed by Great Black-backed Gulls. This same researcher collaborated with MDIFW in a study of eider duckling survival on Maine islands under varying degrees of gull control, and found that predation was significant, and varied between sites and between years, but this relationship is not entirely understood.

After leaving the nesting island, females take their young to brood-rearing habitat, ideally located near or around the nesting island but can be several miles away. Brood habitat generally consists of sheltered bays or inlets with rockweed (*Fucus* and *Ascophyllum* spp.) covered shorelines located relatively near or around the nesting island (Minot 1976).

During the non-nesting season, Common Eiders remain offshore and are almost strictly marine birds (Blumpton et al. 1988). After the breeding season eiders undergo a postbreeding molt (loss and replacement of feathers) (Fefer 1977). In Maine, males may begin to molt by the middle of June (Palmer 1976), considerably earlier than females. Females undergo a molt while the young are developing and then proceed with their young to the wintering grounds, following males by about 50 days (Matthew 1989). During this molt, eiders are flightless for a period of 3-4 weeks. Aerial surveys for flocks of molting eiders carried out in 1978 and again in 1980 suggested some fidelity to the areas used. The flocks were usually seen in the vicinity of submerged ledges and were often sexually segregated. Estimates of molting flocks commonly reach 5,000 birds (A. Hutchinson unpublished rep. 1980).

Wintering areas used by eiders seem to be strongly influenced by the location of blue mussel (*Mytilus edulis*) beds, the principal winter food item (Fefer 1977). Studies in the Gulf of St. Lawrence found that wintering eiders selected areas characterized by high prey density and shallow water to minimize time and energy spent foraging. Highest density of blue mussels and green sea urchins (*Strongylocentrotus droebachiensis*) occurred in shallow water reefs and kelp beds (0-6 meters). Flocks of 1400 - 4000 eiders were observed feeding in these habitats from December through February (Guillemette et al. 1993).

MANAGEMENT

Regulations and Regulatory Authority

Prior to the 20th century, comprehensive laws to protect birds nesting on Maine's coastal islands were nonexistent. However, as regulatory initiatives were developed, protection was given fairly quickly (Palmer 1949).

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 islands that still had active colonies around the turn of the century (Dutcher 1902, Drury 1973). Only trespass laws could be enforced because nongame 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, including Common Eiders, on the coast of Maine. These early efforts to protect 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 "egging" 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 states' rights would fail. Ultimately, protection of migratory birds in North America was provided by four conventions between the United States and: Great Britain (for Canada) in 1916; 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, Article IV, afforded special protection for 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, when 5 eiders could be included in the regular duck bag (Mendall 1969). In 1948, eiders were added to the list of waterfowl that could be taken in the special sea duck season and the daily bag was set at 7. For the first time in 50 years, the daily bag limit on eiders was reduced to 5 for the 1999-00 hunting season because of high harvests and population parameters that indicated problems with recruitment. The daily aggregate bag limit of 7 sea ducks did not change.

Other agencies have contributed to the protection of eider habitat in Maine. The Maine Land Use Regulation Commission (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 eider nesting islands. In its Comprehensive Plan and Section 10.16,C of its Land Use Districts and Standards, LURC gives special consideration to seabird (including eiders) nesting islands considered essential to the maintenance of seabird populations, as determined by MDIFW.

In addition, the Legislature of 1974 directed the State Planning Office to develop an official Register of Critical Areas. The Act defined Critical Areas as natural features of statewide importance because of their unusual natural, scenic, scientific, or historical significance. In 1976, 49 islands, which provided breeding habitat for 60 percent of Maine's eider population, met the criteria for determining significant nesting areas for this species. The Critical Areas program no longer exists today (2000).

Currently, 185 eider nesting islands in organized townships with 25 or more nesting seabirds, are protected (by the permit review process) as Significant Wildlife Habitat under the Natural Resources Protection Act (NRPA) in Maine.

Past Management

While somewhat loosely defined, past management of Common Eiders was first conducted by Native Americans who utilized seabirds and their eggs for food. Conkling (1981), having reviewed historical documents, reported that Indians purposely harvested eggs and birds off certain islands and would not return to that general area again for 1-3 years, which had the effect of allowing the colony to recover from those losses. The early Europeans also frequented seabird islands for eggs and meat, but they were apparently less conservative in their "management" of the resources. 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. Also according to Conkling (1981), many "Duck Harbors" and "Duck Coves" got their names because flightless (presumably molting) eiders were driven to these cul de sacs and were then subsequently captured and killed. Few realize that the now abundant American Eider resource was nearly extirpated from our nesting islands in the late 1800s.

By 1900, management of colonial waterbirds (and eiders) 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 seabird populations responded so well to protection that in 1934, on the

New England coast, a Herring Gull and cormorant (*Phalacrocorax auritis*) control program was believed necessary for “the protection of fish stocks and eider eggs and ducklings” (Gross 1944). These activities were carried out by the Biological Survey of the U.S. Department of Agriculture (now the Fish and Wildlife Service) and the Maine Department of Sea and Shore Fisheries. These egg-spraying efforts (eggs were sprayed with oil to terminate embryo development) appeared to markedly decrease the number of young gulls and cormorants 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. U.S. Fish and Wildlife Service [hereafter FWS], MDIFW, Maine Department of Conservation, The Nature Conservancy, National Audubon Society, and Maine Audubon Society, and others) have played an important role in habitat protection (primarily via acquisition) of eider nesting islands in Maine. As early as 1908, Little Duck Island in Hancock County was purchased by a private individual to serve as a “bird sanctuary”. Later, Little Duck Island was later given to the National Audubon Society in the 1930s and continues to provide nesting space for hundreds of eiders each spring. While each landowner's management philosophies and styles differed, one general underlying premise was simply to protect the islands for nesting birds.

Other management initiatives involved a number of research and life history studies on eiders and their habitats. The most important eider studies in Maine were conducted by H. Mendall and his students at the Maine Cooperative Wildlife Research

Unit and the University of Maine at Orono. In addition, our knowledge of nesting eider populations increased considerably through survey and inventory activities in the 1970s (Erwin and Korschgen 1979) and MDIFW surveys and management plans in the 1980s and 90s (Hutchinson et al. MDIFW 1981-1991, Spencer and Hutchinson 1980, P. Corr 1986, R.B. Allen 1993).

Maine's eider population responded well to these previously mentioned levels of protection, habitat acquisition, and management. Concurrent with eider population growth was the general reduction in human disturbance (discussed in detail later in this document) on many eider nesting islands. Had people not emigrated from these islands for economic reasons, and restricted their uses of other nesting islands, Common Eider recolonization would not have been so spectacular.

Past Goals and Objectives

Beginning in the late 1970s, MDIFW developed a management plan for state-owned coastal islands and marine birds (Spencer and Hutchinson 1980). In the original plan, the stated goal was to "maintain and in some cases (e.g. 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 (non- consumptive use) in the future". This plan was revised into 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 management objectives for the 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, general goals and objectives exist for waterfowl in MDIFW's Waterfowl Assessment and Management System. The goal (*as it would relate to Common Eiders*) is "to increase breeding waterfowl populations to maximize fall populations".

Management objectives for waterfowl (*and Common Eiders*) are (1): to reduce the non-legal mortality of waterfowl populations by 25% through 2001 and (2): to provide Maine hunters maximum annual hunting opportunity through 2001, which will allow for achievement of the abundance objectives and be consistent with the federal framework (MDIFW 1996). Recent research and harvest surveys on Common Eiders in Maine suggest more species-specific goals and objectives are warranted to guide the management decision-making process for this species. For this reason, this species assessment and a subsequent management system will be developed.

Current Management

Current management of Common Eiders in Maine is the joint responsibility of the FWS and MDIFW. However, numerous conservation nongovernmental organizations (NGOs) and colleges and universities annually contribute valuable survey information and thus play a role in eider management.

In 1976-77, 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 FWS and numerous NGOs) has re-inventoried all seabird islands along the Maine coast, between 1981 and 1991 (Hutchinson and Ferrero 1981, Hutchinson and Lovett 1983, Hutchinson and Lovett 1984, Woodward et al. 1987). These and other more current data are stored at MDIFW's Wildlife Resource Assessment Section's Coastal Island Database and serve as the source of information for this document. An updated Coast of Maine Wildlife Management Area Plan for nearly 200 seabird and Bald Eagle nesting islands that MDIFW owns or manages is maintained by MDIFW.

Wildlife management in Maine involves a comprehensive planning process. Beginning in the mid-80s, MDIFW revised the Waterfowl Management Plan and developed goals and objectives for waterfowl populations (MDIFW 1986). In brief, the goal remains to “increase breeding waterfowl populations to maximize fall populations” and the objectives are to “maximize annual hunting opportunity and reduce non hunting (i.e. lead poisoning) mortality”.

Through this planning process, species-specific goals and objectives will be established for the Common Eider.

HABITAT ASSESSMENT

Past Habitat

The term “Habitat” in this assessment is assumed to mean nesting habitat, or coastal islands. Worldwide, Common Eiders generally nest on islands. These sites must be relatively disturbance-free and predator-free. Eiders, and many of the other colonial nesting birds, prefer to nest on the grassy islands that, prior to European colonization, may have once been heavily forested. The coast of Maine has numerous islands and exposed ledges, but seabirds (including eiders) nest on a relatively small proportion of them.

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 eiders (Mendall 1976, A. Hutchinson pers. comm.). However, it is also not uncommon for eiders to nest on certain predator-free forested islands where low hanging spruce boughs provide vertical cover for nesting females.

Since the 16th century, Europeans and their descendants have had considerable impact (some positive and some negative) on Maine's eider nesting habitat and its ability to support eiders. The first permanent settlements were established on the offshore seabird islands such as Monhegan and Matinicus. Damariscove Island, the current site of one of Maine's large 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 cut over and/or burned, and the grasses and forbs grazed by livestock. During the 1800s, human populations on the islands rose, and eider numbers declined. Not only were the birds and their eggs consumed, but their nesting habitat was drastically altered. During the 20th century, human use of the islands diminished and nesting conditions improved. Laws protecting migratory birds were established and eider numbers increased dramatically.

Current Habitat

Korschgen (1979) visited all eider nesting islands and provided estimates of nesting pairs for Maine between 1976 and 1977. At that time, an estimated 22,390 pairs of Common Eiders nested on 241 islands, coastwide. Subsequent surveys have identified other nesting islands and additional population trend information. Today, the coastal island database tracks 320 sites with nest records totaling approximately 29,000 pairs. These totals reflect data collected on those islands reported in Korschgen (1979) and additional islands that now contain nesting eiders. Eiders may have colonized new sites because: (1) there are more eiders than in 1977, and more nesting space is required, (2) nesting females have pioneered into new habitats, (3) some colonies may have shifted from a previously used site to a site not used in 1977, (4) more suitable nesting conditions may exist today on some islands than did in 1977, and (5) some islands may have been inadvertently missed during the 1977 survey.

In 1988, a Habitat Suitability Index model was developed for breeding Common Eiders by the Maine Cooperative Fish and Wildlife Research Unit, FWS (Appendix VIII).

The model was developed to assess the relative habitat quality of Maine coastal islands for nesting eiders. The model used two factors, cover and disturbance, to determine habitat suitability for nesting eiders. The authors assumed that nesting cover, which reduces avian predation, depends on vegetative characteristics throughout incubation. Both overhead and side cover (concealment from predators) are important and are a function of the type and structure of the vegetation present on the nesting island (Blumpton et al. 1988). In Maine, eiders are commonly found nesting in vegetation which develops early in the season, such as cow parsnip and stinging nettle, or occasionally beneath drooping branches of spruce and woody blow downs on islands with trees.

The disturbance component consisted of three variables: (1) island size, (2) accessible boat landing sites, and (3) distance of island from human settlement. Nesting eiders are especially sensitive to disturbance from humans and predators. The model assumes islands less than 5 ha have the least potential for settlement by humans and mammalian predators (Blumpton et al. 1988).

The authors conclude that as with other models, the HSI value obtained for a particular island may have no relationship to actual population numbers because factors such as disease, predation rates, and proximity to other nesting islands were not considered. The primary value of the model is for ranking coastal islands as to their potential for supporting nesting eiders (Blumpton et al. 1988).

Protecting seabird nesting islands via acquisition has been a high priority activity by federal and state agencies and NGOs. The list of islands that have been acquired for habitat protection is impressive. In 2000, 188 of 320 eider nesting islands are under

some form of conservation status, representing 69% of all nesting eiders tracked in MDIFW databases (Appendix III). Further, wildlife on numerous privately-owned islands has been afforded habitat protection through LURC zoning and Resource Protection Plans, NRPA Significant Wildlife Habitat designation, conservation easements, and municipal resource protection zones.

Habitat Projections

Having been "protected" since the early decades of the 20th century, eiders are once again numerous and have had most of this century to recolonize a finite set of suitable coastal islands. As was mentioned earlier in this document, Maine possesses approximately 1,700 vegetated islands. Most of these islands are not suitable as nesting islands because of the presence of mammalian and avian predators, excessive human disturbance, or unsuitable nesting habitat conditions. Eiders are currently nesting on over 300 islands. In time, eiders will likely colonize new islands. These sites may be necessary to accommodate colony shifts or increasing populations because it is not known whether nesting habitat, in itself, is limiting eiders in Maine.

POPULATION ASSESSMENT

Past Populations

Just how numerous past eider populations were, prior to European settlement, is not known. Since colonial times however, the number of eiders on the Maine coast has fluctuated greatly. Eider populations were greatly reduced during late 19th century, mainly from egg collecting and unrestricted shooting. At the beginning of the 20th century, laws were passed to stop the exploitative use of colonial waterbirds and the most significant colonies were protected by colony wardens. In 1905, eiders could be found nesting on only one island, Old Man Island, off Cutler. The National Association of Audubon Societies (now the National Audubon Society) leased Old Man Island and established a warden there to protect the sanctuary during the nesting season. In 1907, the warden reported only two pairs of eiders nesting there. As a result of protective laws and the availability of suitable nesting conditions, eider populations grew. Initially, population recovery was slow, but steady. In 1910 there was a substantial increase in numbers of nesting eiders on Old Man Island, presumably from immigrating eiders from remote islands in Canada (Drury 1973). By 1915, eiders were reported nesting on several islands westward to Jericho Bay. Eider numbers steadily increased from less than 100 nests in one colony in 1910, to approximately 2,000 pairs on 31 colonies in 1944 (Gross 1944). By 1970, eider numbers were reported as approximately 20,000 nests in 215 colonies by (Fefer 1977).

Current Populations

Considerable knowledge has been gained on the status of eider populations in Maine since the 1970s. Erwin and Korschgen (1979) data serve as the baseline for recent eider numbers and trends in Maine. At the end of their 2-year census, they estimated that approximately 22,390 pairs of eiders were nesting on 241 sites along the Maine coast. Today, our database tracks an estimated 29,000 pairs nesting in 320 colonies. It is important to note that these recent data are actually an aggregation of data collected from a variety of state, federal, and private sources; but are primarily from MDIFW censuses conducted “bay by bay” between 1981 and 1991. No one-year coastwide survey has been conducted for eiders in 20 years, because this endeavor would be very labor intensive and costly, and it would be difficult to justify without specific population goals and objectives in place. However, with adequate funding and partnerships with the many seabird researchers now working on Maine’s coast, this census would likely be feasible if properly coordinated and conducted.

Past population data should be interpreted cautiously because they were collected over a wide period of years. However, most of these data were collected by just a few individuals, which improves uniformity, and represent actual counts of nests. Thus, these data provide useful long-term trend information.

In a recent review of the Status of Sea Ducks in the Atlantic Flyway (Caithamer et al. 2000) assembled all available data on sea duck populations. For the purpose of this Assessment, only information on Common Eiders from their investigation will be discussed.

In general, the population surveys Caithamer et al. (2000) looked at included the Mid-winter Inventory (MWI) (Appendix V), Christmas Bird Counts (CBC), and Sea Duck Survey (SDS), as well as harvest information. In summation, the authors detected: (1) no trend in total numbers of eiders on the MWI during 1976-97, (2) a 2.7% increase per year during 1973-95 in the CBC, (3) no trend in the total count of eiders on the SDS, and (4) a 4% annual increase in the eider harvest between 1972-96. From this, they concluded that population indices of Common Eiders are mostly consistent and reveal increasing numbers of eiders in the Atlantic Flyway during 1972-97 (Caithamer et al. 2000).

There appears to be little doubt that the eider population has increased since the early 1970s. However, there exist no recent data to indicate population trend in the 1990s. Anecdotal reports from seabird researchers and the author suggest gains in nesting numbers in some parts of the coast that offset losses in other areas. The estimated number of nesting pairs suggest that Common Eider populations may have approached the carrying capacity of the habitat. Blumpton et al. (1988), using data collected through the mid-80s, believed the eider population was stabilizing around 28,000 pairs. Krohn et al. (1992) suggested that the steady decline in the mean number of nesting females per island, between 1979-89, further indicates stabilization, but this is speculative given the large increase in the number of additional eider nesting sites since 1977.

Population Projections

Although the numbers of eiders breeding and wintering in Maine appear high, the status of these populations could change rapidly. Common Eiders have low recruitment and high adult survival rates thus there is concern that continued increases in harvest rates, combined with natural mortalities (avian cholera and high predation rates of ducklings by a burgeoning Great Black-backed Gull population) could result in a dramatic decline in eider numbers. More information on population abundance, survival rates, recruitment, and harvests, and other potential limiting factors is needed in order to make reliable eider population projections.

Limiting Factors

In general, avian and mammalian predators, human disturbance, competition for nesting sites, over hunting, habitat degradation (i.e. loss of nesting habitat, rockweed harvesting, etc.), catastrophic weather, competition with commercial fisheries or loss of food resources, and disease may limit eider populations. For this species, it is likely that all act in concert to limit Maine's eider population.

Avian and mammalian predators. Increasing avian predator populations (e.g. Great Black-backed Gulls, Herring Gulls, and Bald Eagles) have a negative impact on eider populations, especially recruitment of young. While eagles have been observed taking adult eiders as well as ducklings, gull predation is the major source of duckling mortality. Both Herring and Great Black-backed Gull populations have increased dramatically since the turn of the century. In the late 1800's, nesting Great Black-backed Gulls were

extirpated in Maine, and Herring Gulls occurred only on a few off shore islands (Drury 1973). During the first three decades of eider population recovery in Maine, no Great Black-backed Gulls were nesting here. Great Black-backed Gulls were again documented nesting in Maine in 1928 (Gross 1945). Today, numerous Great Black-backed Gulls nest on 231 islands. Their 1995 nesting population was estimated at approximately 16,000 pairs, a number that is nearly double that reported in 1977. Over the same time period, Herring Gull numbers have increased slightly to an estimated 28,000 pairs on 183 sites, 40 fewer sites than in 1977. This reduction in Herring Gull use of certain nesting islands suggests that Great Black-backed Gulls may be outcompeting Herring Gulls for the best nesting islands.

Eiders commonly nest in association with nesting Herring and Great Black-backed Gulls, and subsequently confer some advantage by this relationship. This advantage occurs when nesting (territorial) gulls keep predaceous nonbreeding gulls and crows away from eider nest sites. However, there seems to be a point where some density of Great Black-backed Gulls precludes high recruitment of eider ducklings.

Recent studies suggest that gull predation on eider ducklings may have a profound effect on eider recruitment in certain areas. In New Brunswick, Mawhinney (2000) studied post hatch and brood ecology of Common Eiders on the Wolves, a group of islands off of New Brunswick in the Bay of Fundy. In 1995, researchers estimated that 80-90% of the eider nests hatched, and resulted in approximately 3,500 eider ducklings in the study area (Mawhinney 2000). However, because of heavy predation by Great Black-backed Gulls, they estimated that only 12 ducklings fledged in the archipelago. Results of subsequent aerial surveys indicated that recruitment was low

throughout the entire Bay of Fundy, despite stable numbers of breeding pairs (Mawhinney 2000). Mawhinney (2000) concluded that current levels of recruitment observed for the eider population in the Bay of Fundy are not enough to offset the estimated 13% mortality rate (all causes) for adult female eiders originating in the Atlantic Coast subpopulation.

In 1997, while maintaining a research presence on The Wolves and working in cooperation with MDIFW and Petit Manan National Wildlife Refuge (FWS), Mawhinney (2000) expanded her work to Green Island and Petit Manan Island, in Steuben, Maine. On these two Maine islands, Herring and Great Black-backed Gulls nesting was eliminated. These gull control activities are necessary to manage the restored tern colony on Petit Manan. Since the removal of large gulls, both tern and eider numbers have increased to several thousand birds. Further, this gave MDIFW the opportunity to study duckling survival on islands with different levels of nesting gull populations. Today, gulls annually attempt to nest on Green Island and some invariably succeed in doing so. During the initial year of eider investigations (1997), between 40-60 Great Black-backed Gulls were present (but not nesting) on Green Island.

On Green and Petit Manan Islands, as in New Brunswick, eider ducklings were captured and radio tagged in the nest to determine movements and mortality. Again, predation on day-old ducklings was high and only an estimated 185 ducklings of 2400 hatched (< 8%) fledged. However, survival to fledging was significantly higher in Maine than in The Wolves (Mawhinney 2000). Great Black-backed Gulls loafing in the area were the only predator observed taking ducklings (Mawhinney 1997). Lastly, Mawhinney (2000) concluded that the number of ducklings surviving to fledging on The

Wolves was not correlated with the commercial catches of herring as an alternative food source for predatory gulls.

Gulls also compete with eiders for preferred nesting areas on certain islands, as they often arrive on nesting territories several weeks before eiders. Lastly, other avian predators known to prey on adult eiders and their young include Bald Eagles, whose population is increasing along the Maine coast, and Great Horned Owls (*Bubo virginianus*).

The arrival of mammalian predators on an eider nesting islands during the nesting season can be catastrophic to ground nesting birds. Should raccoons or foxes begin preying on hen eiders or their eggs, the entire colony will likely abandon the island. Mink, an indigenous and frequent visitor to many of Maine's coastal nesting islands will occasionally kill eiders, but generally prey on burrow-nesting Leach's Storm-petrels (*Oceanodroma leucorhoa*) or Black Guillemots (*Cepphus grylle*). Female eiders may be large enough to defend themselves and their nests from this predator. Lastly, Harbor Seals (*Phoca vitulina*) have been observed preying on ducklings on the open water (F. Kircheis, pers. comm.).

Hunting. A major limiting factor for adult Common Eiders is sport hunting.

Fortunately, this is a mortality factor that can be controlled through hunting season regulations. In recent years, interest in sea duck hunting has increased in response to restrictive regulations on inland waterfowl species and generous bag limits and season lengths for sea ducks. Recently, there is speculation that the eider population, although generally believed to be stable or increasing slightly throughout its range, may

be experiencing reduced survival rates of adult females below sustainable levels. Relative to other species of waterfowl, eiders naturally have high annual adult survival rates that may suggest they can withstand higher harvest rates. But this is not the case. When considering harvest strategies, managers must consider not only survival rates but also eider's relatively low recruitment rate (Bellrose 1980). Species with low recruitment and high adult survival usually are not considered capable of withstanding much harvest pressure (Nichols et al. 1984). According to Goudie et al. (1994) populations may decline when hunting mortality exceeds 3 to 5% of the adult population per year.

Disease. Avian Cholera is an important cause of mortality in Maine eiders. This disease is associated with the weakened condition of incubating females and high nest densities (Fefer 1977). According to Mendall (1976) three epidemics of cholera occurred in Maine in 1963, 1970, and 1974. The 1970 outbreak was especially widespread and an estimated loss of up to 20% of the nesting eiders in Penobscot and Muscongus Bays was recorded. Avian Cholera outbreaks were again reported in Penobscot, Casco, Muscongus, and Blue Hill Bays in the early and mid-80s, killing large numbers of nesting hens (Appendix VI).

Although reports of lead shot ingestion in eiders are rare, lead poisoning in eiders has been documented from Denmark and Alaska (Franson et al. 1995).

Food Resources. Limitations in the availability of food resources in Maine could be a potential problem for the eider population. Commercial fishermen annually compete

with eiders for blue mussels, green urchins, and periwinkles, the three most important food items of adult eiders in Maine (Korchegen 1976, Krohn et al. 1992). Commercial fishing, aquaculture, and rockweed harvesting continue to influence eiders throughout their range. It is not known whether human exploitation of these resources and competition with eiders has created any problems. However, regional changes in the distribution of eiders may be associated with the activities of fishermen, with birds returning in subsequent years to areas where mussels and urchins have recovered from exploitation. Lastly, mussel and finfish aquaculture and rockweed harvesting continue to expand into eider habitats; and eiders, as well as other sea ducks, have been documented depredating mussel farms and leased mussel beds. Brood-rearing habitat is comprised primarily of rockweed beds.

Other factors. Eiders are subject to additional direct and indirect mortality from a range of human activities. These factors include lowered nest success due to human –related development and disturbance on nesting islands), chronic or catastrophic oil pollution events, aquaculture facilities in close proximity to nesting islands, and impacts of fisheries (net entanglements, bycatch in nets, changes in marine community structure) (Elliot 1998).

USE AND DEMAND ASSESSMENT

Past Use and Demand

In the past, eider populations were influenced by both the exploitative human use of nesting islands and the exploitation of eiders 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 eiders for food as evidenced by faunal remains preserved in coastal shell heaps. Use and exploitation of insular resources by Europeans began almost 500 years ago when explorers plied the Gulf of Maine in search of riches.

Historical use of eider 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 that was over 25 acres in size housed people or livestock at one time. Many of the smaller islands were likely used as well. Principle 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, kiln wood, and pulp; and the more subtle, but important, effect of grazing livestock on the vegetation.

Historical use of and demand for eiders 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 for meat and feathers (eider down because of its superb insulating properties fetched a premium

price for quilts and bedding); legal harvest by hunters; and recreational use by bird watchers.

Drury (1973) summarized numerous historical accounts by suggesting that during the 18th and 19th centuries, seabirds were almost "eaten off" Maine's outer islands. Bird predators, such as dogs, cats, raccoons, and rats, were purposely or inadvertently introduced into many colonies, with damaging results.

Recolonization and population growth by eiders and other 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 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 "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 Common Eiders in Maine has both nonconsumptive and consumptive components. The nonconsumptive users include avid bird watchers, photographers, and the general public. While limited amounts of data exist to accurately assess seabird use and demand, general "nongame wildlife" statistics are

available. Researchers estimate that between 73% (FWS 1982) and 91% (Boyle et al. 1990) of Maine's adult population engaged in some nonconsumptive use of wildlife and expended more than \$50 million in 1988 (Boyle et al. 1990).

The Common Eider is a game species, and as such, is subsequently hunted; Atlantic Flyway hunting regulations for eiders are liberal (Appendix VII). In Maine, the hunting season generally runs from early October through the middle of January. The daily bag limit for eiders has been 7 up until 1999/2000 when it was reduced to 5.

Hunting pressure on eiders increased in the 1980s and 90s in eastern North America as opportunities to hunt other species, such as Black Ducks and Canada Geese, were reduced or restricted. Hunting of this race of the Common Eider is important in parts of Quebec, Newfoundland, Nova Scotia, Maine, and Massachusetts. The average annual harvest from 1992-96 was estimated at approximately 41,500 (Maine 33%, Massachusetts 28%, Nova Scotia 23%, Newfoundland 8%, and Quebec 4%). However, due to difficulties in surveying sea duck hunters, these figures are likely to be underestimates of the actual harvest.

In Maine, and elsewhere in New England, hunter interest in eiders continues to increase. The percentage of eiders in the Maine waterfowl harvest has increased from 3-4% in the mid-60s to over 20% in the mid-80s to a recent high 29% in 1996 (Corr 1997) (Table 2).

Table 2. Maine Common Eider and total waterfowl harvest statistics, 1961-1999.

<u>Year</u>	<u>Eider Harvest</u>	<u>Total waterfowl harvest</u>	<u>% of Harvest</u>
1961-65 (mean)	1,360	46,000	3.0
1966-70 (mean)	2,800	78,400	3.5
1971-75 (mean)	8,820	92,400	9.5
1976-80 (mean)	7,580	83,400	9.1
1981-85 (mean)	11,980	73,200	16.4
1986-90 (mean)	13,680	54,200	25.0
1991-95 (mean)	14,840	62,480	24.0
1996	21,100	72,100	29.2
1997	19,300	69,800	27.6
1998	9,000	70,100	12.8
1999	16,000	73,500	21.8

Total harvest estimates for eiders in for the U.S. portion of the Atlantic Flyway has increased from 1,400 eiders harvested in 1961 to a recent high of 42,000 in 1996 (Appendix II).

There are indications that harvests of eiders in Nova Scotia and coastal New England may have doubled in recent years, to levels that are no longer sustainable. Recent studies in Nova Scotia indicate significant reduction in survival rates of adult females. High hunting pressure is confirmed by recent findings in one Canadian study where approximately 35% of adult females carry embedded shot (Elliot 1998).

For these reasons, Nova Scotia and Newfoundland adopted changes in their 1998 hunting season designed to reduce the eider harvest between 15-25% (CWS 1997).

In a review of available data on sea duck population status and harvests, Caithamer et al. (2000) reported that the Common Eider harvest increased by 4% per year in the eastern United States between 1972-96. However, the Common Eider Index of Recruitment (proportion of immature birds to adult birds in the harvest) decreased

during this time, suggesting a long-term decline. Despite an apparent large and well-distributed eider population, an increasing harvest rate coupled with a declining recruitment rate suggests a more conservative harvest management strategy is warranted. Further, managing the harvest of sea ducks (eiders) can be contentious because some individuals and groups question the ethics of providing liberal hunting opportunity on birds perceived to have a high rate of nonuse due to nonretrieval of crippled birds and wanton waste (Caithamer et al. 2000).

Use and Demand Projections

Consumptive and non consumptive use and demand for Common Eiders and their nesting habitat is expected to increase over the next 15 years, likely causing the eider population to decline. Administrators with regulatory authority for eider issues (FWS and MDIFW) are aware that interest in these birds and their habitats has increased. Further, the integrity of eider habitats may be threatened by diverse contemporary forms of development and recreational pressure.

SUMMARY AND CONCLUSIONS

The Common Eider (*Somateria mollissima dresseri*), largest of the North American ducks, are marine waterfowl that nest on relatively small uninhabited islands in Maine. Maine supports the largest breeding population in the eastern US and maritimes. In addition, the Gulf of Maine supports a large proportion of the wintering population. Common Eiders are characterized as having high adult survival rates, delayed sexual maturity, and a relatively small clutch size. Eiders feed mainly on marine invertebrates with blue mussels, periwinkles, and green sea urchins making up a major part of their year-round diet.

Common Eiders experienced drastic population declines in the 1800s when human populations on islands peaked and island resources were overexploited. However, by the beginning of the 20th century, laws were passed to stop the exploitation of most birds. Fortunately, Maine's eider population responded well to protection, a hunting moratorium, acquisition of nesting habitat, and management in the twentieth century. From a historic low population of two pairs in the early 1900s, today nearly 29,000 pairs of eiders nest on 320 islands. Although eider numbers appear to be stable, adult survival and recruitment of young in breeding populations may be declining. Currently, the ability to assess population trends and implement conservation measures is hampered by a lack of standardized population data and knowledge of such fundamental parameters as recruitment to breeding (Goudie et al. 2000). The eiders potentially long life-span coupled with low annual breeding success results in populations that are highly sensitive to adult mortality – for example, populations may

decline when hunting mortality exceeds 3-5% of adult population per year (Goudie et al. 2000). For these reasons, waterfowl managers in the Northeast have selected a more conservative harvest management posture for sea ducks and have reduced daily bag limits for certain sea duck species in Maine, Massachusetts, Rhode Island, Nova Scotia and Newfoundland. The future status of Maine's Common Eider population cannot be determined without better data on breeding and nonbreeding population status, recruitment, and harvest mortality. Should this population decline significantly, recovery would require decades owing to slow intrinsic rates of population growth.

Although a major proportion of eider nesting habitat is protected, nesting habitat on unprotected islands may be degraded by increased development and recreation. Further, the eider's principal food resources are highly valued by commercial fishermen. The implementation of sound management practices based on well-structured goals and objectives for this species are necessary if we are to maintain a healthy eider population for decades to come.

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LIST OF APPENDICES

- I. STATUS SUMMARY OF THE COMMON EIDER**
- II. ATLANTIC FLYWAY EIDER HARVESTS (1969-1999).**
- III. OWNERSHIP PATTERNS OF EIDER NESTING ISLANDS**
- IV. PAST MANAGEMENT GOALS AND OBJECTIVES**
- V. ATLANTIC FLYWAY MIDWINTER WATERFOWL INVENTORY (EIDERS)**
- VI. AVIAN CHOLERA IN MAINE**
- VII. IMPORTANT EVENTS - SEA DUCKS IN MAINE**
- VIII. HABITAT SUITABILITY INDEX - COMMON EIDER**

APPENDIX I. STATUS SUMMARY OF THE COMMON EIDER**SPECIES:** COMMON EIDER (*Somateria mollissima*)

PAST TRENDS: Historically abundant (even into the mid 1800s) but reduced to a few nesting pairs around the turn of the century. Eiders were exploited for food, eggs, and feathers. 1907 - only 2 pairs on Old Man Island (Cutler). In general, three factors aided their recovery: abolition of spring shooting, a closed hunting season on eiders for several years, and protection of several important 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, may have peaked in the mid 1980s.

PRESENT STATUS: 1977 - 22,000 on 240 islands: 2000 - 29,000 on 320 islands.

Recent trends towards smaller colonies on more islands. Population may have leveled off or decreased since mid 1980s.

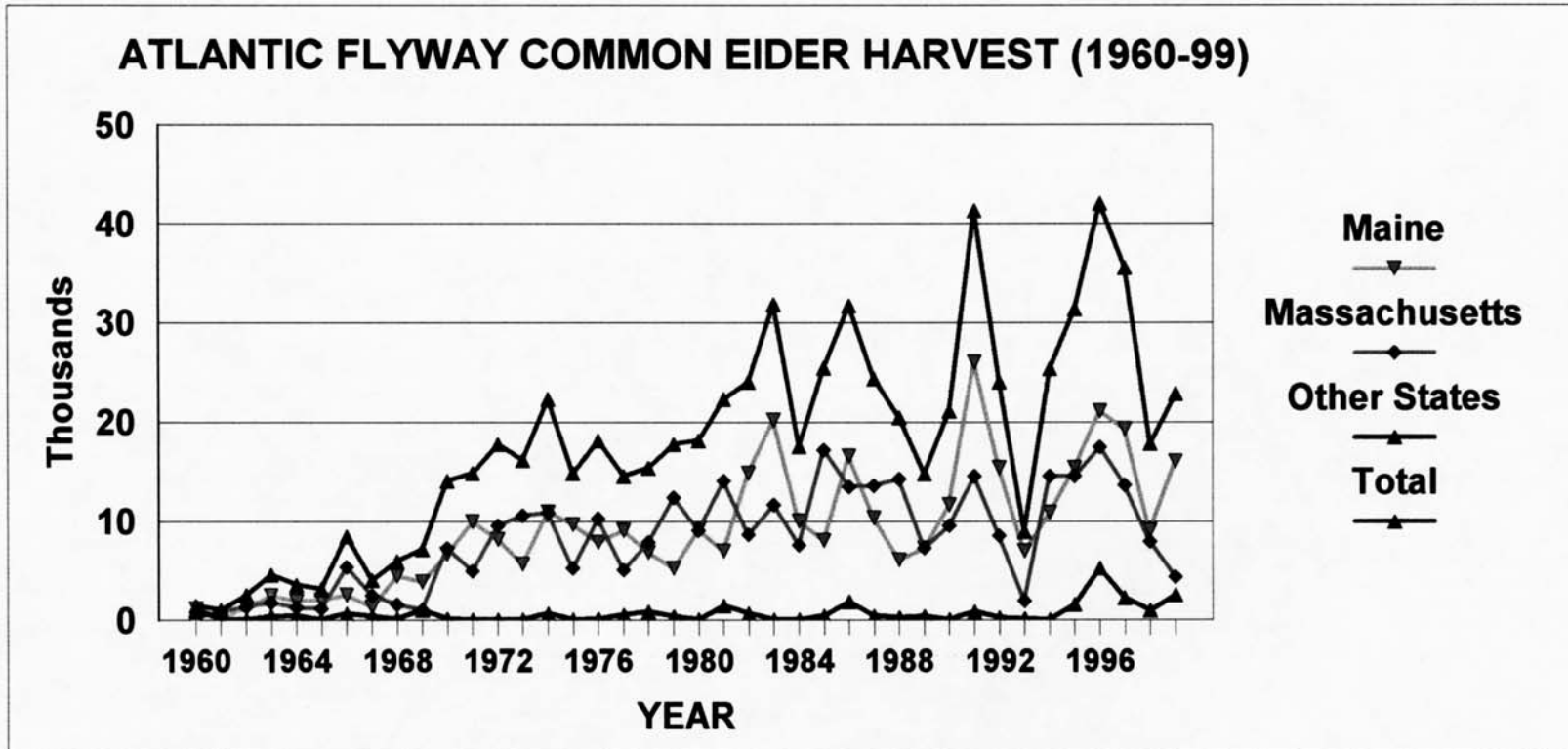
REPRODUCTIVE STRATEGIES AND SUCCESS: Generally averages 4 eggs/clutch. Delayed maturity until 2-3 years of age. Seeks wooded or treeless islands uninhabited by man. Approximately 10-15% of ducklings must survive to fledging for overall population stability.

LIMITING FACTORS: Gull competition for preferred nest sites and predation of eggs and ducklings, mammalian predators, avian cholera, human disturbance-related lowered nest success, and potentially sport hunting.

OTHER COMMENTS: Nesting population may be at carrying capacity. Twenty-two islands listed in Maine Critical Areas Program. Several research projects on eiders conducted by the Maine Cooperative Wildlife Research Unit (FWS) in cooperation with the University of Maine at Orono in 1970s.

APPENDIX II. ATLANTIC FLYWAY COMMON EIDER HARVEST (1960-1999).

YEAR	MAINE	MASS.	OTHER	TOTAL
1960	1100	200	100	1,400
1961	200	800	0	1,000
1962	1,200	1,300	0	2,500
1963	2,400	1,700	300	4,500
1964	1,900	1,200	400	3,500
1965	2,000	1,100	0	3,100
1966	2,500	5,300	600	8,400
1967	1,300	2,400	300	4,000
1968	4,400	1,500	100	5,900
1969	3,800	1,000	1,000	7,100
1970	6,600	7,200	100	14,000
1971	9,900	4,900	0	14,800
1972	8,100	9,500	0	17,700
1973	5,600	10,500	0	16,100
1974	10,900	10,800	600	22,300
1975	9,600	5,200	0	14,800
1976	7,800	10,200	100	18,100
1977	9,000	5,000	500	14,500
1978	6,800	7,800	800	15,300
1979	5,200	12,300	300	17,700
1980	9,100	9,000	0	18,100
1981	6,900	14,000	1,400	22,300
1982	14,800	8,600	600	24,000
1983	20,200	11,600	0	31,800
1984	10,000	7,500	0	17,500
1985	8,000	17,100	400	25,400
1986	16,500	13,400	1,800	31,700
1987	10,300	13,500	400	24,300
1988	6,000	14,200	200	20,400
1989	7,200	7,200	300	14,700
1990	11,600	9,500	0	21,100
1991	26,000	14,500	800	41,300
1992	15,300	8,500	200	24,000
1993	6,900	1,900	100	8,900
1994	10,800	14,500	0	25,300
1995	15,300	14,500	1,500	31,300
1996	21,100	15,700	5,200	42,000
1997	19,300	13,600	2,200	35,500
1998	9,000	7,900	900	17,800
1999	16,000	4,300	2,500	22,800



APPENDIX III. OWNERSHIP PATTERNS OF EIDER NESTING ISLANDS (2000).

<u>OWNERSHIP TYPE/ORGANIZATION</u>	<u>NUMBER OF ISLANDS</u>
PUBLIC OWNERSHIP (165 ISLANDS)	
Bureau of Public Lands	7
Bureau of Parks and Recreation	1
State of Maine	6
Municipalities	3
Department of Inland Fisheries and Wildlife	37
BPL ownership with IFW management authority	82
U.S. Fish and Wildlife Service	25
National Park Service	2
U. S. Navy	1
DIFW/Land Trust	1
PRIVATE CONSERVATION OWNERSHIP (23 ISLANDS)	
The Nature Conservancy	11
Maine Audubon Society	2
National Audubon Society	7
Island Trusts	3
PRIVATE OWNERSHIP (132 - ISLANDS)	

Appendix IV. 1985 Management Goals and Objectives from Waterfowl Management System and Island-nesting Seabird Management System.

A. Waterfowl Management System Goal and Objectives

Management Goal (as it relates to Common Eiders):

Increase breeding waterfowl populations to maximize fall populations.

Management Objectives (as they relate to Common Eiders):

Abundance Objective: To reduce the nonlegal mortality of waterfowl populations by 25% by 1990.

Harvest Objective: To provide Maine hunters maximum annual hunting opportunity through 1990 which will allow for achievement of the abundance objectives and be consistent with the federal framework.

B. Island-nesting Seabird Management System Goals and Objectives (1992-2000)

Management Goal: Maintain or enhance the long-term presence, diversity, and viability of seabirds nesting on the coast of Maine

Objective 1: Maintain seabird nesting habitat on all coastal nesting islands containing 1 or more nesting pairs of seabirds since 1976 through 2000.

Objective 2: Develop specific population goals and objectives for priority species by 2000.

Capability of Habitat: Since 1976, 1 or more seabird pairs have been documented nesting on 452 islands or exposed ledges on the coast of Maine.

Feasibility: Objective 1 can be met through habitat protection initiatives such as acquisition, resource protection zoning, land use planning, conservation easements, and landowner agreements and through physical manipulation of the habitat itself.

A portion of Objective 2 has already been met as population goals and objectives have been developed for Common, Arctic, and Roseate Terns and Common Eiders (in the Waterfowl Management Plan). Interim goals and objectives for additional species will be developed to guide management activities in these areas. Final goals and objectives for these priority species and the remaining seabird species will be developed following species-specific assessments.

APPENDIX IV. Waterfowl Management System Goals and Objectives (Continued).

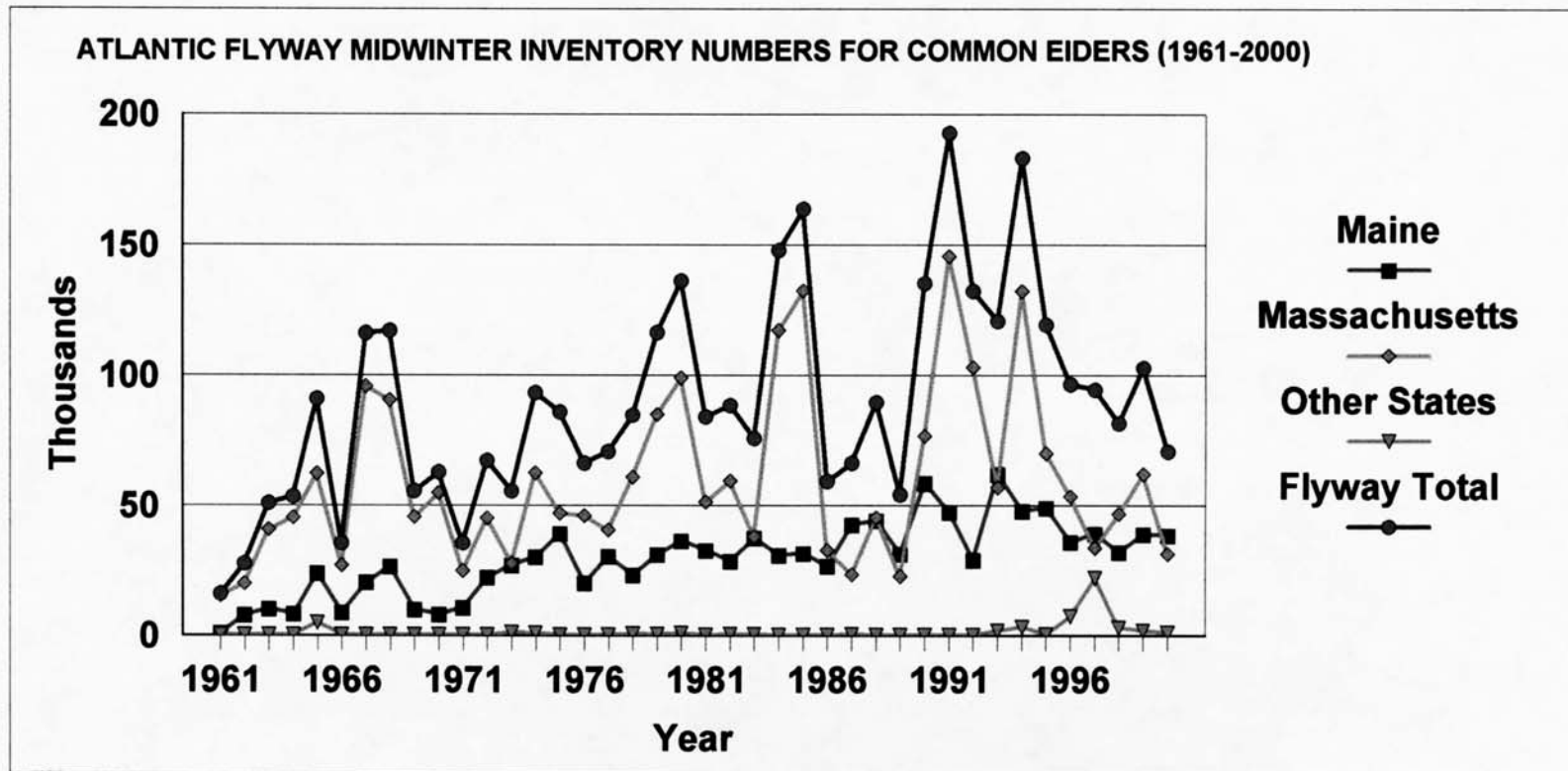
Desirability: The objectives will in general be desirable to both the consumptive users (eider hunters) and nonconsumptive users of the seabird resources.

Possible consequences: Restricted land uses on some privately- owned nesting islands will likely result in conflicts between resource managers and landowners. However, many seabird nesting islands are currently owned by public agencies or private conservation groups with long-term interests in the conservation of seabird nesting habitat. Recreational use on these islands will be restricted, primarily during the nesting season. Despite these restrictions, nonconsumptive users (primarily bird watchers) can still observe seabirds around nesting islands from a distance.

Increased populations of some seabirds may conflict with commercial fisheries and aquaculture. However, these conflicts and relationships are not totally understood. An example of potential conflicts include: eider competition with commercial fishermen who harvest mussels, green urchins, and periwinkles. Cormorants may compete with commercial and recreational Atlantic Salmon fishermen because cormorants prey on stocked and native Atlantic Salmon smolts. Lastly, gulls adversely affect the productivity of other seabird species by eating their eggs and young. Gulls have also been documented eating commercial blueberries.

APPENDIX V. ATLANTIC FLYWAY MIDWINTER WATERFOWL INVENTORY (EIDER)

YEAR	MAINE	MASS	OTHER	TOTAL
1961	700	15,100	0	15,800
1962	7,800	19,700	0	27,500
1963	10,100	40,600	0	50,700
1964	8,300	45,100	0	53,400
1965	23,800	62,100	4,800	90,700
1966	8,600	26,600	0	35,200
1967	20,200	95,500	0	115,700
1968	26,200	90,400	0	116,600
1969	9,900	45,500	0	55,400
1970	7,900	54,700	0	62,600
1971	10,500	24,700	0	35,200
1972	22,100	44,900	0	67,000
1973	26,800	27,500	1,100	55,400
1974	29,900	62,300	900	93,100
1975	38,900	46,800	0	85,700
1976	19,900	45,900	100	65,900
1977	30,100	40,300	100	70,500
1978	23,100	60,700	600	84,400
1979	30,900	84,700	400	116,000
1980	36,200	98,900	700	135,800
1981	32,500	51,100	200	83,800
1982	28,300	59,400	400	88,100
1983	37,400	37,700	300	75,400
1984	30,700	116,900	100	147,700
1985	31,300	132,100	0	163,400
1986	26,500	32,500	0	59,000
1987	42,400	23,200	400	66,000
1988	44,100	45,200	100	89,400
1989	31,200	22,600	100	53,900
1990	58,400	76,400	100	134,900
1991	47,300	145,400	100	192,800
1992	28,900	102,800	100	131,800
1993	61,900	56,700	1,700	120,300
1994	47,800	132,000	3,100	182,900
1995	49,000	69,600	300	118,900
1996	35,700	53,300	7,200	96,200
1997	39,000	33,300	21,900	94,200
1998	31,809	46,525	2,862	81,196
1999	38,735	61,885	1,813	102,433
2000	38,351	31,030	1,041	70,422
2001	28,644	47,913	739	77,296



**APPENDIX VI. SOME NOTABLE OCCURRENCES OF AVIAN CHOLERA IN MAINE
EIDER NESTING COLONIES.**

<u>Date</u>	<u>Location</u>	<u>Number of Deaths</u>
1963	Islesboro area	116 nesting females
1970	Penobscot Bay Muscle Ridge - 1 island	43 (98% females)
	Muscongus Bay Offshore - 8 islands	513
1972	Penobscot Bay Isleboro - 2 islands	24
1974	Penobscot Bay Muscle Ridge - 3 islands	53 (96% females)
1976	Penobscot Bay Muscle Ridge	1 female
1980	Blue Hill Bay 14 islands	1,917 (62% females)
1981	Blue Hill Bay 15 islands	300 - 500
1982	Blue Hill Bay	100
1984	Muscongus Bay 1 island	1,000 - 1,500 (60 - 70% females)
	Penobscot Bay (1 island)	11 females
1985	Muscongus Bay and Penobscot Bay	less than 200
1987	Casco Bay Penobscot Bay	800+ (60-70 females) approx. 20
1989	Casco Bay	100+
1994	Penobscot Bay 1 island	50+ all females
1995	Penobscot Bay - (1 island)	approx. 50

APPENDIX VII. TIMELINE OF IMPORTANT EVENTS AFFECTING SEADUCK CONSERVATION

- 1907 Eider population low, two nests on Old Man Island, Cutler, Maine.
- 1913 Congress asserts federal authority to conserve and manage migratory birds by passing the Migratory Bird Act of 1913. This measure was aimed to protect all birds from hunting, especially during the nesting season, in order to save them from extinction. Taking was prohibited except when permitted by federal regulation. This was challenged in federal court as a violation of the state's constitutional power to manage wildlife.
- 1916 Because migratory birds mover across state, provincial, and national borders, these species require conservation on a continental basis. Protection is provided for by the Convention for the Protection of Migratory Birds (1916) and was signed by the U.S. and Great Britain (on behalf of Canada) in 1916; U.S. and Mexico in 1936; U.S. and Japan in 1972. The major reason for this treaty was "to protect birds from indiscriminate slaughter by sport, market, and subsistence hunters". It established open and closed seasons for game birds. The 1916 treaty also promulgated a 10-year hunting moratorium for certain game birds and established a procedure for providing special protection for Wood Ducks and Eiders.
- 1918 Congress passed the Migratory Bird Treaty Act providing statutory authority implementing the Convention in the U.S. Specially, the MBTA prohibits taking any migratory bird, except as permitted by certain regulations. Thus it is: "unlawful at any time, by any means or in any manner to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, deliver for shipment, ship, export, import, cause to be shipped, exported or imported, deliver for transportation, transport, or cause to be transported, carry, or cause to be carried, or receive for shipment, transportation, carriage, or export, and migratory bird, or any part, nest, or egg, of any such birds.....". This too was challenged and upheld.
- 1919 Limited legal gun gauge
- 1928 Great Black-backed Gulls (3 pairs) nest on Duck Island, Isle of Shoals.
- 1933 Eiders given complete protection until 1933 when 5 became part of the regular waterfowl bag.
- 1935 Limited shells to three, live decoys and bait banned.
- 1938 First year sea ducks could be taken in addition to regular bag. Season ran from Sept. 15 - 30 and was restricted to Scoters.
- 1947 Above season ran for 10 years until in 1947 season was extended to Oct. 6 - Dec. 16 and the bag limit was extended to 7 (Scoters only).
- 1948 Eiders added to sea duck season; daily limit 7.
- 1950 Old Squaws added to sea duck season; daily limit 7.
- 1953 Special sea duck season gradually lengthened between 1947-53 and became Sept. 16 to Dec. 31.
- 1957 In general, September hunting was replaced by two weeks in January.

APPENDIX VII. TIMELINE OF IMPORTANT EVENTS (Continued).

- 1963 First documented die off of female eiders to Avian Cholera.
- 1964 Sea Duck season Sept. 25 to Jan. 10.
- 1971 Season: Sept. 25 to Jan. 8
- '79-87 Season: October 1 to Jan. 15.
- 1986 Steel shot required in WMU 6; WMUs 6, 7 and 8 (1987) and statewide in 1988.
- 1988 Season: Oct. 10 to Jan 20.
- 1989 Season: Oct. 9 to Jan 20.
- 1990 Season: Oct. 8 to Jan. 19.
- 1991 Season: Oct. 7 to Jan. 20.
- 1992 Season: Oct. 5 to Jan. 19.
- 1993 Season: Oct. 4 to Jan. 18; Scoter bag limit reduced to 4 in Flyway.
- 1994 Season: Oct. 3 to Jan. 17.
- 1995 Season: Oct. 6 to Jan. 20.
- 1996 Season: Oct. 4 to Jan. 18.
- 1997 Season: Oct. 1 to Jan 20.
- 1998 Season: Oct. 1 to Jan. 20; proposed reduction to 5 eiders in Maine's bag this year rejected; Nova Scotia reduced sea duck bag from 10 to 5/day. Rhode Island reduced eider bag to 4/day.
- 1999 Season: Oct. 1 to Jan 20: reduced daily bag to 5; Massachusetts to 4/day, only 1 can be a hen.
- 2000 Season: Oct. 2 Jan 20; daily bag 5 in Maine.

APPENDIX VIII. HABITAT SUITABILITY INDEX : AMERICAN EIDER (BREEDING)

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WILDLIFE RESEARCH

**HABITAT SUITABILITY INDEX MODELS:
AMERICAN EIDER (BREEDING)**



Fish and Wildlife Service

U.S. Department of the Interior