



A Management Plan
for
Barrow's Goldeneye
(*Bucephala islandica*; Eastern
population)
in Newfoundland and
Labrador

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Disclaimer:

The Management Plan for Barrow's Goldeneye (*Bucephala islandica*; Eastern population) was prepared by the Department of Environment and Conservation to identify recovery strategies, based on sound biological principles, to monitor and manage Barrow's Goldeneye. It does not necessarily represent official positions of agencies and/or the views of individuals involved in the document's preparation. The goals, objectives and recovery actions identified in the management document are subject to the program priorities and budgetary constraints of the participating agencies and organizations. Goals, objectives, and management approaches may be modified in the future to accommodate new objectives or findings.

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Introduction

The world distribution of Barrow's Goldeneye (*Bucephala islandica*) consists of three separate populations: 150 000 to 200 000 birds in western North America (Eadie et al 2000), a resident population of 2000 in Iceland (Gardarsson 1978), and approximately 4500 birds in eastern North America (Savard and Dupuis 1999; Robert et al 2000a). The breeding range is discontinuous in North America and is largely restricted to northwestern North America, where more than 90% of the world's population breeds (del Hoyo et al 1992). Little is known of the distribution and ecology of the eastern North American population. During winter and early spring, approximately 4000 birds congregate in two main regions in the Gulf of St. Lawrence and about 10% winter elsewhere in Atlantic Canada and Maine (Robert et al 2000a; Savard 1990; Robert and Savard *in Prep*). Prior to the late 1990s, it was believed that ducks wintering in northeastern North America originated from arctic breeding areas in northern Labrador and southwestern Greenland (Palmer 1976; Godfrey 1986). However a telemetry study conducted in the late 1990s showed that most birds bred on small, fishless, high elevation lakes along the north shore of the St. Lawrence estuary (Robert et al 2000b).

Concern with respect to the susceptibility of the eastern population to a catastrophic oil spill given their small population size and aggregated distribution during winter, and commercial logging in areas suspected to contain breeding birds, was first expressed during the mid 1990s (Savard and Robert 1997; Savard and Dupuis 1999). In November 2000 the eastern North American population was assessed as a species of '*Special Concern*' by the Committee on the Status of Endangered Wildlife in Canada because of threats faced by the birds on their wintering and breeding grounds. The Province of Newfoundland and Labrador lists Barrow's Goldeneye (Eastern population) as a '*Vulnerable*' species under the *Endangered Species Act* (NL ESA E-10.1, 2001), and they are listed as a species of '*Special Concern*' under the federal *Species at Risk Act* (SARA, Schedule 3). The Atlantic Canada Conservation Data Center has assessed the conservation status of Barrow's Goldeneye as S1N ('Critically Imperiled' due to extreme rarity, non-breeding) in Newfoundland and as S2S3B? in Labrador ('Imperiled' or 'Vulnerable' because it is an uncommon species and molting birds occur in restricted areas,

breeding status unknown)¹. Finally, Barrow's Goldeneyes are protected under *the Canada-U.S. Migratory Birds Convention* and associated regulations pertaining to hunting.

¹ Personal communication. M. Romer, Atlantic Canada Conservation Data Centre, Corner Brook, Newfoundland

I. **BACKGROUND**

Species Information

<p>Common Name: Barrow's Goldeneye</p> <p>Scientific Name: <i>Bucephala islandica</i></p> <p><u>COSEWIC Assessment Summary</u></p> <p>Status: Special Concern (Schedule 3) Vulnerable (Newfoundland and Labrador Endangered Species Act)</p> <p>Reason for Designation: Numbers of individuals in this eastern population are limited. Although threats such as limited habitat availability and vulnerability to oil spills have been identified, none currently occur at a scale that would negatively impact the population.</p> <p>Occurrence: QC NB NS PE NL</p> <p>Status History: November 2000</p>

I.2 Life History

Barrow's Goldeneye (*Bucephala islandica*; Gmelin 1798) is a sea duck belonging to the genus *Bucephala*, or goldeneyes. Three species occur in North America; its' congeners are the Bufflehead (*B. albeola*) and Common Goldeneye (*B. clangula*) duck . All *Bucephala* nest in cavities, form monogamous long-term pair bonds, exhibit strong fidelity to breeding and wintering areas, and will aggressively defend both pair and brood territories. Named after British arctic explorer John Barrow, Barrow's Goldeneye is a stocky mid-sized sea duck with a short neck, large rounded head, yellow eyes and a small grey-black bill. Adult sexes are dimorphic in size (males are larger) and plumage throughout the year (Eadie et al 2000). Breeding Barrow's Goldeneye males have an iridescent, purple head with a large white crescent

patch in front of the eye, white sides, belly and breast, and black back, wings and tail. At a distance, the shape of the adult drake's head is the best distinguishing feature, but the wing coverts of Barrow's males also have less white than those of Common Goldeneyes. In the field, at a distance on the water, or in flight, it is difficult to distinguish *B. islandica* from the much more common *B. clangula*, particularly females, immature birds, or males in eclipse plumage. Accurate identification is further complicated by the fact that the two species often intermingle during winter, during the molt (males), and have sympatric breeding ranges to an extent (Robert et al 2000a). Further, Common X Barrow's hybrids have been observed (Palmer 1976; Eadie et al 2000). This difficulty has undoubtedly constrained the description of the breeding range of the eastern population of Barrow's Goldeneye, and the interpretation of historical records. For detailed information on distinguishing between female and immature Goldeneyes, see Tobish (1986).

Foraging habits vary between winter and summer and reflect prey available in freshwater (breeding and molting) and saltwater (wintering and molting males) habitats. During summer, Barrow's Goldeneye consume primarily aquatic insects, especially dragonfly and damselfly nymphs (*Odonata*), caddisfly larvae (*Trichoptera*) and *Diptera* larvae. Plant seeds, crustaceans, and molluscs are also consumed (Palmer 1976; listed in order of proportion of diet composed of prey item). Literature regarding food habits is summarized in Eadie et al (2000). The winter diet is composed primarily of molluscs, with secondary prey items including algae, crustaceans and small fish (Eadie et al 2000 Fig 2-6). Foraging occurs primarily during the day in shallow water along shorelines in areas without dense emergent vegetation (Palmer 1976). Food is obtained by diving (15-70s duration), and ducklings are able to make short dives at only two days of age. During the non-breeding season, large flocks often dive synchronously (Beauchamp 1992).

Barrow's Goldeneye are monogamous breeders and form long-term pair bonds that are re-established every fall after a period of separation of the sexes during breeding and brood rearing, the molt and fall migration (Eadie et al 2000). Pairs may return to the same winter territory in subsequent years (Savard 1985) which may facilitate a reunion. Breeding does not begin until 2 years of age and often later (Eadie et al 2000), and (in the western population) approximately 85% of birds breed annually after 4 years of age (Eadie 1989). Unpaired birds perform courtship displays for several months beginning in late fall, and most birds are paired prior to

the spring migration (Palmer 1976). Females show strong site tenacity, returning to the same breeding areas year after year, particularly if a clutch was successfully raised there in the past (Eadie and Gauthier 1985). Unpaired males may also return to a previously-used breeding area, or alternatively proceed directly to a molting area (Robert et al 2002). Satellite-tracked male Barrow's Goldeneye from the eastern population began their spring migration during the last week of April (Robert et al 2000b). These same males also spent a minimum average of 44 days (range 3-50) on the breeding grounds (Robert et al 2000b) although a later study with a larger sample size indicated that males stayed at their breeding areas an average of 34 days, travelling to a molting area around 11 June (Robert et al 2002).

Geographic characteristics and location of breeding sites for the Eastern population of Barrow's Goldeneye are derived from a study in which 16 adult drakes were fitted with satellite transmitters, 13 of whom travelled to a breeding area (Robert et al 2000b; 2002). Locations collected from satellite data were supplemented with directed aerial surveys and also by incidental observations collected on routine surveys for Black Ducks in the region 1990-1998. The majority of lakes used for breeding were within 100 km of the north shore of the St. Lawrence, and were small (~46% < 5 ha, ~70% < 10 ha) lakes at relatively high (~ 500 m) elevation relative to the surrounding topography, often located in headwaters (Robert et al 2000).

Nests are built and maintained in natural and artificial cavities by the female, up to 2 kilometres from water. In Iceland, where trees are not available, females use holes in rocks or nest on the ground under willow or birch shrubs (Lack 1934). Yearlings and non-breeding adult females will prospect for potential nest cavities in the summer prior to a nesting attempt (Eadie and Gauthier 1985). Some females lay eggs only as brood parasites (Eadie 1989). Only 4 visual observations of females with a brood exist for the eastern population, and based on the age of the ducklings it was estimated that incubation began 23 May, 30 May, 2 June and 10 June respectively (Robert et al 2000b). Note however that pairs were observed on a total of 137 lakes and 5 rivers, suggesting that breeding is widespread (Robert et al 2000b). These dates are comparable to Iceland (Bent 1925) and later than those for the western population, where the average nest-initiation date was 6 May (Palmer 1976). Average clutch size is unknown for the eastern population, but ranges between 6-12 eggs in the western population. Eggs are laid at intervals of 1-2 days, and incubation generally begins after the last egg is laid, lasts

approximately 30 days, and is done solely by the female. Hatchlings are precocial and self-feeding and require little direct care; however females will defend the brood-rearing territory against attacks from conspecifics and predators (summarized in Eadie et al 2000), and brood the ducklings during inclement weather. Young remain in the nest for only 24-36 hours, and broods are often moved from nesting lakes to rearing lakes, sometimes several kilometres apart (Savard et al 1991). Survival of ducklings is lowest during the first week of life (Savard et al 1991). Mortality has been attributed to inclement weather, predation, and infanticide by conspecific females or Red-necked Grebes (*Podiceps grisegena*) and Common Loons (*Gavia immer*) (Savard et al 1991). Despite the fact that female Barrow's Goldeneye are extremely aggressive and often kill ducklings of conspecifics, brood amalgamation commonly occurs, primarily under circumstances where females have abandoned offspring soon after hatch (Palmer 1976; Bellrose 1980; Eadie et al 1988). Most crèches consisted of young of similar age (Savard 1987), and most females rejected foreign young >10 days old (Eadie and Lyon 1998). Young birds begin to fly between 55 to 65 days after hatch (Bellrose 1980), at which time the female has often already left.

Information is limited on the location of sites used for molting by female Barrow's Goldeneye. In British Columbia, they molt on large lakes less than 100 km from their breeding areas. In Québec, females were observed on a large, non-breeding lake on the high plateau west of the Saguenay River during August and September 1999, suggesting that adult females of the Eastern population may also use lakes in the general vicinity of their breeding areas (Robert et al 2000a). In contrast, drakes of the Eastern population undertake a true molt migration, travelling an average of ~ 1000 km north of their breeding areas over 19 days, arriving around 30 June (Benoit et al 2001; Robert et al 2002). Males remained in the molting areas (located in Hudson and Ungava Bays, the north coast of Labrador and in Frobisher Bay on Baffin Island) for an average of 105 days, departing in early October and returning to the St. Lawrence River estuary or the Gulf of St. Lawrence around 6 November. Both male and female ducks remain in their coastal wintering areas until early May (Robert et al 2002).

I.3 Distribution and Status and in Newfoundland and Labrador

I.3.1 Distribution and Status

The distribution of Barrow's Goldeneye is discontinuous in North America, where Eastern and Western populations are geographically and demographically isolated. The Eastern North American and sedentary Icelandic populations are probably also isolated, based on recent information on breeding and molting areas used by Eastern birds wintering in the Gulf of St. Lawrence (Robert et al 2002). Knowledge of the seasonal distribution and ecology of the Eastern population has vastly improved since the mid 1990s, though much remains to be learned, particularly with respect to the extent of the breeding range. The majority of the population (~ 4500 birds) winters in the St. Lawrence estuary, with small numbers occurring throughout Atlantic Canada and the coast of Maine. In the 20th century it was believed that the primary breeding area for Barrow's Goldeneye occurred in northern Labrador and Québec (e.g. Palmer 1976; Bellrose 1980), a hypothesis which has since been rejected. A recent study suggests that a core breeding area occurs on small, high elevation lakes in the boreal forest along the north shore of the St. Lawrence estuary (Robert et al 2000b). Using satellite imagery to determine the number of small lakes (< 100 ha) available within a 'core breeding area' between the Manicougan and Natashquan Rivers, Robert et al (2000a) suggest that the amount of habitat available is adequate to support as many as 1700 breeding pairs, or the entire estimated breeding population of Barrow's Goldeneye. However, this interpretation is contingent on the assumption that all birds breed within the core area and an accurate estimate of population size. The preferred breeding habitat (as identified in Robert et al 2000b) also occurs in southern Labrador, a region adjacent to and contiguous with the core breeding area in Québec in which no surveys have been conducted. The identification of a core breeding area is an important contribution to our understanding of the ecology of Barrow's Goldeneye. However the eastern and northern extent of the breeding range requires further investigation so that these areas may be adequately monitored and managed. In addition, threats faced by birds will likely differ in terms of the risk they pose and the extent over which they occur across the breeding range. For example, while commercial forestry has been identified as a significant threat for birds nesting in the core area in Québec (Robert et al 2000a), it does not occur in southern

Labrador and thus would not affect any birds potentially breeding there. The fact that not all threats occur universally across the range of Barrow's Goldeneye would lessen the risk posed by any given threat to the population as a whole. For this reason, knowledge of the full extent of the breeding (and other) range/s is essential for management. Until further studies and surveys are completed, uncertainty pertaining to the status of breeding within Labrador, and to a secondary degree in Newfoundland, persists.

The following section describes historical and current records of Barrow's Goldeneye in Newfoundland and Labrador.

I.3.2 Summary of Historical and Recent Observations

Breeding

Peters and Burleigh (1951) list the duck as '*Hypothetical*' in Newfoundland. Daury and Bateman (1996) describe a '*probable female*' with 9 young on the Torrent River on the Northern Peninsula of Newfoundland in 1993. Since then, that region has been surveyed 9 times and no birds have been seen. However in May of 2006 a single male was seen in the Upper Humber River². As the infrequency of records here suggests, if breeding does occur in Newfoundland, it is probably sporadic or infrequent.

Todd (1963) summarized visual records and instances in which specimens of adults and juveniles had been obtained in northern Labrador (a treeless region), though these remain unsubstantiated, and are often questioned due to the difficulty in distinguishing between Common and Barrow's Goldeneye females and young. Among these is the 1906 account from German explorer and ornithologist Bernard Hantzsch, who collected '*old and young*' near Port Burwell (the northern tip of Labrador) on 10 August 1906 while travelling with the Moravian steamer *Harmony*, and also described in detail a young male in first plumage shot in the same area on 30 August of the same year. Newfoundland wildlife officer L.M. Tuck is said to have collected both adults and juveniles at various locales along the coast of Labrador during the 1940s and 1950s. Finally, Todd includes a record by C.R. Eklund, who shot what he believed to be a Barrow's Goldeneye in Payne Lake in July of 1957. In the absence of museum specimens to confirm identification, it is possible that some of these records may be of birds on, or

² Personal Communication. S. Gilliland. Canadian Wildlife Service, Mt. Pearl, Newfoundland

travelling to, molting sites, or birds that have been mistakenly identified as Barrow's rather than Common Goldeneyes, a view also stated in Robert et al (2000). However, while there is no direct evidence that breeding does occur in Labrador and northern Québec, several historical and current records suggest that the status of breeding there is still equivocal. For example, several sightings of paired birds considerably north of the described breeding range have been made during the breeding season in Labrador. Over the past 30 years and most recently in 2006, 2-3 pairs have been observed in central Labrador at Gosling Lake, and in the Goose and Churchill River and their tributaries during the first 2 weeks of May³. Similarly, on May 15, 2004 T. Chubbs observed 3 pairs on the north side of Winakapau Lake. During this time of year most lakes are still frozen, and only the inlets and outlets of rivers have open water, concentrating migrating waterfowl. In each case females were identified through their association with the males, who were in full breeding plumage. Records that are indicative of breeding in northern Labrador also exist. On 2 September 1983 a female Barrow's in full molt was banded at Okak Bay⁴. The (late) onset of her molt and the fact that females probably do not undertake molt migrations (Eadie et al 2000) suggest that she may have raised a brood in the area. Finally, on 13 October 1998 two ducks initially believed to be Common Goldeneye were shot in Otter Creek (near Goose Bay). The wings of both specimens were turned into the Canadian Wildlife Service and one of the two birds was later identified as an immature male Barrow's Goldeneye. Collectively, these observations suggest that breeding may occur outside of the core area currently identified. If so, these areas are likely to be of secondary importance given that none of the marked males wintering in the St. Lawrence travelled there to breed. Directed studies, particularly in southern and northern Labrador, are necessary to better document the extent of the breeding range.

Molting

Numerous molting sites for adult male Barrow's Goldeneye have been identified using surveys, opportunistic observations, and most recently, a telemetry study. Most were located in coastal areas, though freshwater lakes near the coast were also used. In general males travelled to Ungava Bay, the northeastern coast of Hudson Bay, Frobisher Bay, and coastal northern

³ Personal Communication. J. Thomas. Department of Natural Resources, Goose Bay, Labrador.

⁴ Personal Communication. F. Phillips. Department of Natural Resources, Goose Bay, Labrador. Band number: 876-01220

Labrador beginning in Nain (specific details are summarized in Benoit et al 2001; Robert et al 2002). With respect to Labrador, Goudie et al (1993) documented molting birds in Rowsell Harbour and Ramah Bay (where they have been seen repeatedly since), and also north of Nachvak fiord and numerous other protected inlets and bays between 58⁰N and 60⁰N (Harrington 1994). Daury and Bateman (1996) reported observing 24 and 132 molting drakes at Ramah Bay in 1981 and 1984, respectively. T. Chubbs and J. Brazil observed 3-5 male Barrow's in a flock of a about 50 Goldeneyes in Little Ramah Bay on 31 July 2000. In early July 2006, a group of approximately 250 Barrow's Goldeneye were observed at the head of the northern arm of Hebron fiord⁵. Similarly, Daury and Bateman 1996) and Veitch (1993) report molting males on numerous occasions between 1981 and 1994 in Hebron Fiord, generally in groups of less than 60 birds. About 1500 Goldeneyes were observed molting in Nain Bay, of which approximately half were thought to be Barrow's during July 1955 (Gilchrist and Chamberlain 1955; Todd 1963). In July 1982 approximately 1000 Goldeneyes were seen, of which 25% were estimated to be Barrow's Goldeneye (Whitman and Gilchrest 1982). However, no birds were observed there in August 2004⁶.

Wintering

It appears that virtually the entire eastern population of Barrow's Goldeneye winters along the north shore of the St. Lawrence corridor, particularly the St. Lawrence estuary, where there are large expanses of open water throughout the winter (Robert et al 2000a; Robert and Savard *in Prep*). Approximately 400 birds are believed to winter in the coastal waters of the Atlantic Provinces and Maine. Only a small number of birds have been documented at 6 sites in Newfoundland⁷, including Traytown Bay, Port Blandford, Spaniard's Bay, St. Mary's Bay, Stephenville Crossing and at the mouth of the Humber River near Corner Brook. Incidental sightings have also been observed in Newman Sound⁸, and are protected by the Migratory Bird Sanctuary in that area.

⁵ R. Perry and W. Barney, Wildlife Division, Government of Newfoundland and Labrador, Corner Brook, NL.

⁶ Personal Communication. S. Gilliland, Canadian Wildlife Service, Mt. Pearl, NL

⁷ <http://groups.google.com/group/nf.birds>

⁸ Personal Communication, P. Ryan, Canadian Wildlife Service, Mt Pearl, NL

I.4 Threats and Limiting Factors

Threats faced by Barrow's Goldeneye vary by biological season and corresponding locations. During late fall, winter and early spring, 90% of the total population is congregated at a few sites in the St. Lawrence corridor (Robert et al 2000a; Robert and Savard *in Prep*). Regular surveys since the 1997 have shown that 4 areas in the St. Lawrence estuary contain 75% of the total population between November and April (Robert and Savard *in Prep*). Because the population is concentrated within a relatively small geographic area and is contained within an important shipping corridor, it could face considerable and unsustainable losses in the event of an oil spill on its winter range (Robert et al 2003; 2000a). A secondary threat faced by Barrow's Goldeneye in the wintering areas is the bioaccumulation of environmental contaminants stored in sediments. Eadie et al (2000) report on a 7-yr study that showed birds from Québec contained relatively higher levels of organo-chlorines than those from western Canada, but also state that levels of these chemicals were generally low.

It is difficult to accurately assess the relative risk posed by different threats during breeding as knowledge of breeding areas, particularly their status and location within the Province, is still limited. In Québec commercial forestry is likely a significant threat with both direct and indirect affects on Barrow's Goldeneye survival and reproductive success. Direct threats include destruction of nests during harvest operations and a reduced number of suitable potential nest sites. Indirect threats include increased risk of predation when nests are located further from lakes and ducklings must travel greater distances to reach them, and increased disturbance from hunters and fishers who may be able to access previously inaccessible areas (Robert et al 2000a; Robert 2003).

In addition, the practice of stocking lakes with fish for recreational fishing reduces the quality of these lakes for nesting and brood-rearing (Robert et al 2000a; Robert 2003). Although it has not yet been confirmed for the Eastern North American population, in Western Canada Barrow's Goldeneye prefer lakes with reduced or absent fish populations (Eadie et al 2000). Stocking lakes with sport fish reduces the abundance of macro invertebrate fauna and may reduce the availability of suitable lakes and may result in a corresponding change in brood distribution. As a consequence, females and their broods may take longer overland brood movements to access suitable lakes, thereby increasing the probability of duckling mortality

(Einarsson 1988; Wayland and McNicol 1994). It is important to note that the introduction of fish to previously fishless lakes may occur inadvertently as a result of mitigative measures undertaken in response to a loss of fish habitat from developments. For example, the installation of fishways or removal of falls would allow fish to access lakes that were previously inaccessible.

Hunting is a threat that may occur on the wintering grounds, and during the molt period, at spring staging areas and during the fall migration. While the total harvest appears to be small, it may be high in localized regions (e.g. near a concentration of wintering or molting birds or during spring staging), and insufficient data exists to accurately assess the level of harvest. Notably, the hunting season in Labrador begins in early September, 4-7 weeks prior to the end of the molt period (average departure date October 4 plus or minus ~ 14 days; Robert et al 2002; Benoit et al 2001). Molting male Barrow's Goldeneye have been documented in several locations on the north coast of Labrador beginning in Nain Bay. During this period, molting birds may be particularly vulnerable to hunters given their aggregated distribution and partial or complete flightlessness. Consequently hunting during the molt period is a potentially significant threat, though the degree it is currently realized is unknown. Importantly, Palmer (1976 cited in Harrington 1994) reports that hunting at the beginning of the 20th century reduced the (then thought to be breeding) population on the northern Labrador coast, though the accuracy of this claim is difficult to verify.

Other threats which may affect Barrow's Goldeneye include hydro-electric developments and mining. These would result in the direct removal or alteration of habitat used by breeding or molting birds, and a loss of effective habitat due to disturbance and associated secondary infrastructure (roads, airstrips) that may increase access to recreational users. Finally, acid rain has been shown to influence the water chemistry and chemical composition of invertebrate fauna with negative consequences for growth rate and survival of Black Ducks (*Anas rubripes*) and Mallards (*A. platyrhynchos*) (Sparling, 1990). The effect of the latter threats on Barrow's Goldeneye populations as a whole, and within the Province, is unknown. However, as new information on both the ecology and distribution of Barrow's within the Province and the influence of these potential threats on this species and its congeners is gained, one can attempt to evaluate the relative risk these threats pose.

Sources of mortality in Barrow's Goldeneye stem from natural, accidental, and human-related causes (Eadie et al 2000; Robert et al 2000a). Natural causes of death include predation, accidents and disease. Predation occurs mostly on incubating females and young broods. During this same period, inclement weather can lead to high mortality in new ducklings. In addition, incubating females have been observed misjudging the entrance to a nest cavity and may die as a result (Eadie et al 2000). Diseases that may result in mortality in Barrow's Goldeneye include botulism (*Clostridium botulinum*), avian cholera (*Pasteurella multocida*) and viral enteritis (Botzler 1991), although little is known about levels of infection. Similarly, Barrow's Goldeneyes are likely to be affected by parasites similar to Common Goldeneyes, though little data exists on parasite loads and their influence on body condition and survival.

The latter threats have been discussed with respect to the level of risk they pose to Barrow's Goldeneye at a population level. Given that the majority of Barrow's Goldeneye winter and/or breed outside the Province, population declines can occur independent of any recovery or management actions undertaken in the Province. In particular, given the species' prevalence in Québec over the winter and during the breeding season, any activities that adversely affect the population there could result in population declines. Within the scope of a provincial management plan, an evaluation of the relevance of population-level threats on the range contained within Newfoundland and Labrador is warranted. With respect to threats faced on the wintering grounds, only a small number of birds have been documented at 6 sites in Newfoundland, and while they may also be affected by oil spills, the affect on the Barrow's population would be negligible overall. While the breeding range of this species is not yet fully described (particularly in terms of its eastern and northern extent), there is no direct evidence that breeding occurs in Newfoundland or in Labrador at this time. Similar habitat as used by breeding birds in Québec occurs in southern Labrador, a region that is contiguous with the breeding range in Québec. In the event that further studies indicate that breeding birds occur there this threat too would not pose a risk as no commercial forestry currently occurs in that region of Labrador. Hunting, both within management seasons and for subsistence purposes, is the most significant threat faced by Barrow's Goldeneye in the Province. This threat may be exacerbated given the length of time adult males spend in molting areas. Several large concentrations of molting birds occur in northern Labrador (Robert et al 2000a; Wildlife

Division unpublished data), and the birds remain at these sites for as long as 4 months of the year, a portion of which time they are legally hunted.

II. **MANAGEMENT**

In general, management plans for species at risk establish population and distribution-related recovery goals. The Canadian Wildlife Service (CWS) is the primary agency responsible for the management of Barrow's Goldeneye across its range. Under the federal Species at Risk Act (SARA) a management plan for this species will be prepared by July 2008. This plan will outline population level goals and objectives for the population as a whole, including birds wintering, molting, or possibly breeding within Newfoundland or Labrador. It is outside the mandate of this Provincial management plan to set goals, objectives and timelines pertaining to a recovery program. However, much of the ducks' habitat occurs on Provincial or aboriginal lands. In conjunction with these groups, the Province will strive to identify areas of consistent use and set appropriate levels of protection. These protective measures might include, but are not limited to, the enforcement of regulations under the *Migratory Bird Convention Act* by provincial Conservation Officers, the establishment of a Wildlife Reserve, and enhanced education and stewardship within the Labrador Species At Risk Stewardship Program (a collaborative program run through the Government of Canada's Habitat Stewardship Program) that hires stewardship facilitators from the Innu Nation and the Nunatsiavut government to influence a stewardship ethic within their communities.

Currently, the largest constraint to effective management is the lack of information on the distribution and ecology of the eastern population within the Province. In the absence of direct evidence of breeding within southern and possibly northern Labrador, and to a secondary degree in Newfoundland, and without a more complete inventory of the location, intensity of use and ecological function of key molting areas, it is difficult to set appropriate population and distribution goals for management of Barrow's Goldeneye in the Province. It is also difficult to assess the relative risk different threats may pose, and to manage them accordingly. The Province can contribute to the federal recovery planning process by identifying knowledge gaps and highlighting regions for which more information is required in order to effectively manage habitat areas; by facilitating the commencement of directed studies within the Province; by sharing information on opportunistic observations and sightings collected incidental to other research programs; and by incorporating any new information into land use decision-making.

The following section lists Provincial priorities and responsibilities and associated information requirements that are necessary for the conservation and management of Barrow's Goldeneye in Newfoundland and Labrador. All objectives are considered equally important, and the information requirements listed are considered necessary to achieve the goal.

II.1 Provincial Priorities

II.1.1 Goal

To manage areas used by molting, wintering and possibly breeding Barrow's Goldeneye in a manner that retains their ecological integrity and suitability for these activities.

II.1.2 Associated Information Requirements

- A. Map environmental and other habitat features associated with preferred breeding habitat for Labrador and insular Newfoundland; and
- B. Investigate the status of breeding within areas of suitable habitat identified, particularly in the region contiguous with the core breeding range in Québec;
- C. Clarify the status of breeding in northern Labrador, and describe any associated habitat and landscape characteristics, as these are bound to differ from sites located in the treed, relatively productive boreal forest;
- D. Further delineate sites used for molting by adult males, including their location, intensity of use, environmental and habitat features, and whether or not males show fidelity to them over time;
- E. Acquire additional information on the relationship between wintering, staging, breeding and molting sites particularly as they pertain to Labrador and insular Newfoundland.

II.1.3 Provincial Responsibilities

- A. To work on the conservation of Barrow's Goldeneye collaboratively with the Canadian Wildlife service and other Provinces and Territories where Barrow's Goldeneye occur, and to share information to improve management;
- B. To assess, monitor and mitigate risks posed by existing and emerging threats in areas used by wintering, staging, breeding, or molting birds;
- C. To maintain a database of all incidental or opportunistic sightings;
- D. To map areas of suitable or preferred habitat as they are identified, compare them with protected areas and identify priorities for protection or regions that may be at risk without management.
- E. To work with hunters from local communities and aboriginal groups to promote awareness of Barrow's Goldeneye and their 'Vulnerable' status, and to foster a stewardship ethic.

II.2 Protection

II.2.1 General Prohibitions

The Barrow's Goldeneye is managed under the *Migratory Birds Convention Act* and accompanying regulations (Government of Canada 1994). The Act prohibits the possession of Barrow's Goldeneye nests and forbids any commercial transactions or exchanges of the latter. Hunting is permitted during fall migration (beginning 3rd Saturday in September ending 2nd Saturday in December in Newfoundland, and beginning the 1st Saturday in September and ending the 2nd Saturday in December in Labrador). Barrow's Goldeneye may be hunted in the same manner as any other ducks in Eastern Canada, and daily bag and possession limits are 6 and 12, respectively. While hunting is permitted, only a small fraction of waterfowl returns in the Province consist of Barrow's Goldeneye. Areas where concentrations of Barrow's Goldeneyes are known to occur are closed to hunting in Atlantic Canada⁹. In a National Harvest survey conducted between 1969 and 1998, only 28 ducks, or 5.9% of the total harvest, were

⁹ S. Gilliland, Canadian Wildlife Service, Mt. Pearl, Newfoundland, Canada.

returned from Newfoundland and Labrador, (Table 18 in Robert et al. 2000a). However, these numbers should be interpreted cautiously as the number of wings returned each year are too low to accurately estimate the number of individuals harvested (Robert et al 2000a).

Species listed as 'Vulnerable' under Schedule C of the *Endangered Species Act* do not receive any automatic protection. However, the *Act* makes provisions under 44(1)f to provide for the protection of 'Vulnerable' species in a manner similar to that provided for species designated as 'Threatened' or 'Endangered' if this action is recommended in the Management Plan. In addition to prohibitions against killing, such a designation would include enhanced protection including prohibitions against disturbance, protection of a 'residence' or nest, and protection of habitat. If required, the ducks or their habitat may be afforded enhanced protection as outlined in the Provincial endangered species legislation. Prior to adding new prohibitions however, the Province would consult and work cooperatively with the Canadian Wildlife Service so that management approaches could be coordinated.

II.2.2 Protection of Habitat

As information on the ecology and distribution of Barrow's Goldeneye is acquired, the Province will set appropriate levels of protection for areas of consistent use. In addition, once habitat requirements for molting and breeding birds are clarified, it will be possible to estimate the extent and distribution of potentially suitable habitat within the Province and evaluate the proportion currently protected or managed in a manner that retains its suitability for the given life history function. Any new information with respect to breeding or molting birds identified in the course of future research will be considered for additional protection where necessary.

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