

Wye Marsh Important Bird Area Conservation Action Plan

Prepared for the Wye Marsh IBA Stakeholders

by

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Inside cover with logos – including DU's

Executive Summary

Wye Marsh Important Bird Area (IBA) comprises the 920 hectare Wye Marsh Provincial Wildlife Management Area and the 60 hectare Wye Marsh National Wildlife Area. This IBA includes a large wetland system along the Wye River and surrounding forests, old fields, and the Wye Marsh Wildlife Centre. The IBA is located near Midland Ontario, along southeastern Georgian Bay. It is recognized as continentally significant for its populations of Trumpeter Swan, a reintroduced species, and breeding Black Terns and Least Bitterns. Important Bird Areas are part of a global network of sites critical to the long-term survival of bird diversity.

This conservation plan is the result of research and numerous consultations with members of the Wye Marsh IBA steering committee. It describes the IBA, its significance, threats to its species, and elaborates on what is needed for its long-term protection and enhancement in the action plan's vision, goals, objectives, and specific actions. The IBA steering committee has adopted the following vision and goals.

Vision

Wye Marsh Important Bird Area is striving to promote, conserve, and enhance the wetland and woodland habitat to support wetland species and migrant birds, a significant habitat where birds can be studied, monitored, and enjoyed. Our focus is to maintain and enhance the Wye Marsh wetland for Trumpeter Swan, Black Tern, Least Bittern, and other birds by respecting the habitat and species diversity of the entire IBA.

Goals

- 1. Maintain habitats that support viable and healthy populations of breeding marsh birds, including but not limited to Trumpeter Swan, Least Bittern, and Black Tern.*
- 2. Maintain habitats that support viable and healthy populations of breeding forest birds while respecting habitat diversity.*
- 3. Maintain and promote habitats that support migrating birds.*
- 4. Develop communication strategy and actions to promote bird conservation among partners, stakeholders and to the public.*
- 5. Respect the site's natural diversity of habitats and existing conservation policies and initiatives.*
- 6. Support monitoring and research on populations of significant species and their habitats to inform management and stewardship activity.*
- 7. Create recreational opportunities for community interest in birds.*

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Canadian Nature Federation and Bird Studies Canada are the national partners of BirdLife International in Canada. The Federation of Ontario Naturalists is responsible for site conservation planning in Ontario IBAs.

The following people, listed alphabetically by last name, are part of the Wye Marsh IBA Steering committee or have otherwise contributed to the plan. They attended at least one steering committee meeting, and/or have contributed time and effort to the development of this conservation plan:

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The following agencies, organizations, and people have contributed to the development of this conservation plan:

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1.0 Introduction

Markus slept with his eyes open. He drifted off sometimes but was always aware of his surroundings. The heavy night air was occasionally broken by the rattle of a Marsh Wren or the cooing of Least Bittern – sounds Markus had grown up with, all comfortingly familiar. The bright moon shimmered off the water, illuminating the edge of the dyke and the surrounding vegetation. All seemed peaceful ... until the moonlight was reflected back, just for a fraction of a second, from the eyes of something large moving slowly across the dyke. The brief flash caught his attention. They were being watched, perhaps stalked! Realizing the immediate threat, he sounded a deep and resonant note. His family drifted away from the cattails to the middle of the pond where the youngsters settled in between their large and powerful parents, who were formidable opponents for most predators.

While Markus the Trumpeter Swan may be fictitious, the story of the swans in Wye Marsh, a wild bit of wetland in south-central Ontario, is not fiction. Despite a long list of potential predators, lead poisoning and many other hazards, the reintroduction of Trumpeter Swan to Ontario has been successful. The efforts of Wye Marsh Wildlife Centre are central to the success of this reintroduction. However, the virtues of Wye Marsh go well beyond the swans to a thriving community of wetland birds, including nationally significant numbers of Least Bittern and Black Tern. These virtues have merited “Important Bird Area” recognition for Wye Marsh. The close proximity of Wye Marsh to Tiny Marsh and Matchedash Bay, also IBAs, underscores the importance of this area to wetland birds. This plan is about Wye Marsh and its significance to birds, and how to conserve and protect this special area.

Important Bird Areas are recognized around the world as the most important sites for protecting the bird diversity. Wye Marsh is one of approximately 1,200 IBAs recognized in Canada, and one of approximately 20 for which conservation plans are being produced in Ontario.

This conservation action plan lays out the framework for bird conservation action in the Wye Marsh IBA. It is intended to be a “work in progress.” Sections of the plan describing the site, its birds, and the institutional arrangements are presented in Chapters 3 to 8. Chapters 9 and 10 explore opportunities within the Important Bird Area (IBA) for conservation as well as threats to the IBA species. Chapter 11 elaborates the conservation action plan, presenting the vision, goals, objectives, and strategies. The vision of the Wye Marsh IBA follows:

Wye Marsh Important Bird Area is striving to promote, conserve, and enhance the wetland and woodland habitat to support wetland species and migrant birds, and maintain a significant habitat where birds can be studied, monitored, and enjoyed. Our focus is to maintain and enhance the Wye Marsh wetland for Trumpeter Swan, Black Tern, Least Bittern, and other birds by respecting the habitat and species diversity of the entire IBA.

2.0 The Important Bird Area Program

The IBA program is an international initiative coordinated by BirdLife International, a partnership of member-based organizations in over 100 countries seeking to identify and conserve sites important to all bird species world-wide. Through the protection of birds and habitats, they also promote the conservation of the world's biodiversity. There are currently IBA programs in Europe, Africa, the Middle East, Asia, and the Americas.

The Canadian BirdLife co-partners are the Canadian Nature Federation (CNF) and Bird Studies Canada (BSC). The Canadian IBA program is part of the Americas IBA program which includes the United States, Mexico, and 17 countries in Central and South America. The Federation of Ontario Naturalists is responsible for implementing conservation planning for IBAs in Ontario.

The goals of the Canadian IBA program are to:

- identify a network of sites that conserve the natural diversity of Canadian bird species and are critical to the long-term viability of naturally occurring bird populations;
- determine the type of protection or stewardship required for each site and ensure the conservation of sites through partnerships of local stakeholders who develop and implement appropriate on-the-ground conservation plans; and
- establish ongoing local involvement in site protection and monitoring.

IBAs are identified by the presence of sites with birds falling under one or more of the following internationally agreed-upon categories:

1. Sites regularly holding significant numbers of an endangered, threatened, or vulnerable species;
2. Sites regularly holding an endemic species, or species with restricted ranges;
3. Sites regularly holding an assemblage of species largely restricted to a biome;
4. Sites where birds concentrate in significant numbers when breeding, in winter, or during migration.

In Ontario, the Federation of Ontario Naturalists is conducting community conservation planning in approximately 20 sites as of 2000. Community conservation planning means engaging the local community in the development and implementation of the conservation plan. While the program at all stages is a voluntary one, the advantages of IBA recognition extend beyond those of conservation of IBA species. Community conservation planning means that people with common interests are brought together to focus on shared concerns. Each stakeholder brings a different perspective to the table, and the process that follows can take unexpected and innovative directions. Along with the development of a conservation action plan, the program also offers a dedication ceremony focusing attention on the site.

3.0 IBA Site Information

3.1 Location and description

Site: Wye Marsh, CAON015C

Location: 44°43' N, 79°51' W

Wye Marsh IBA (see Figure 1) is located in south central Ontario, proximate to Midland, within the Town of Midland, Tiny Township, and Tay Township of Simcoe County. With its headwaters in Tiny Marsh IBA, the Wye River flows northeast past the village of Wyebridge, into the Wye Valley whose floodplain more or less defines Wye Marsh. The river back fills the valley to form an extensive wetland complex. While much of the bottomland is cattail marsh, in several areas the meandering river channel broadens to form areas of open water of varying size. Many years ago, much of the marsh habitat was open water, known as Wye Lake or Mud Lake. Narrowing its flow once again, the Wye River continues north where it eventually flows into Severn Sound, a passage of water separated from Georgian Bay by Beausoleil Island.

Midland, population 16,430, has a diverse industrial base including technology, fabricating, and service industries, serving both the town and the southern Georgian Bay community of 42,105 people. In summer the population of this region swells to over 100,000 as tourists fill over 8,000 cottages, many resort hotels, and several parks. Major tourist attractions include Sainte-Marie among the Hurons, Martyr's Shrine, Huronia Museum, and Huron Indian Village.

This IBA lies within the Manitoulin-Lake Simcoe ecoregion that experiences warm summers (mean temperature 16.5° C) and mild winters (mean temperature -4.5°C). Precipitation locally is in the upper range of 750-1000 mm and evenly distributed throughout the year. Prevailing winds from the west and northerlies in winter bring ample snowfall to the northern sections of Simcoe County, resulting in the designation "the snowbelt" of central Ontario.

The Wye Valley, running southwest to northeast, has steep slopes of sandy loam soils that give way to finer silts and clays on the valley floor that in turn is covered by an accumulation of organic matter in the marsh. Most of this valley was formed during glacial activity 10,000 to 14,000 years ago and then submerged under glacial Lake Algonquin during the recession of the Wisconsin ice age. The 125-hectare Wye Lake is a shallow, warm water lake with a depth of 80 to 140 centimetres. Cattails are abundant and currently cover much of the area. A dam on the Wye River north of the marsh maintains water levels in the marsh. The Wye River drains agricultural lands of the clay plain of Tay, Tiny, Oro-Medonte, and Springwater Townships. Springs feed the lake along the river valley slopes.

The IBA includes both provincial and national wildlife management areas. Of the approximately 1,000 hectares of this IBA, the Wye Marsh (provincial) Wildlife Management Area consists of 920 hectares of various wetlands ranging from open water to dense coniferous swamp and upland forests. The Wye Marsh National Wildlife Area is approximately 47 hectares, of which one half is mixed forest and the other half abandoned pasture and hayfields lying adjacent to the wetlands of the Wye Marsh Wildlife Management Area. The Wye Marsh Wildlife Centre at the northeast end of the marsh occupies about 60 hectares.

Figure 1. The Wye Marsh IBA

4.0 IBA Species Information

4.1 IBA Species

Wye Marsh Wildlife Centre has become known as the “home of the Trumpeter Swan ” in Ontario. Through the efforts of its staff and volunteers, the Wye Marsh Wildlife Centre is a cooperator in the Ontario Trumpeter Swan Restoration Program, a reintroduction program begun in the early 1980s by Harry Lumsden, a biologist with the Ontario Ministry of Natural Resources. The prime wetland habitat and the historical presence of Trumpeter Swan in the Wye Marsh Valley, confirmed by archaeological evidence, made Wye Marsh the initial site of the province’s re-introduction program (see sidebar).

The Story Behind the Swan Reintroduction

In 1984 Harry Lumsden published a compelling argument that Trumpeter Swans had historically bred in eastern Canada (Lumsden 1984). Lumsden assembled anecdotal evidence from accounts of explorers and fur traders and examined archaeological records. As an avian biologist, he hypothesized that the swans’ breeding distribution would be defined by their need for specific conditions: an ice-free period of at least 140 days to complete their breeding cycle; habitat similar to that of the western population; and a calcium source for egg production and cygnet growth. The wetlands of Huronia strongly supported his hypothesis. As well, the second-richest archaeological site of Trumpeter Swan bones (178) in North America were excavated at the Jesuit mission (1639-49) near present-day Wye Marsh. It is believed that native hunters armed only with bows and arrows would have had great difficulty killing Trumpeter Swans. With the arrival of Europeans and the availability of guns, traders, natives and settlers easily shot swans, which were an excellent source of meat. After 1850, a few sightings at Toronto, Long Point and Lake St. Clair were the only indication of Trumpeter Swan in eastern Canada.

The Wye Marsh Wildlife Centre received its first captive breeding pair in 1988. In 2000, the Wildlife Centre cared for and monitored one captive pair and about 80 free-flying Trumpeter Swans which represent about 30 per cent of the province’s Trumpeter Swans and about 9 per cent of the Interior population of this species (Canadian IBA Database 2000). In 2000, 10 free-flying pairs of Trumpeter Swans nested in and about the IBA, successfully fledging about 30 young (Michelle Hudolin, pers. comm. 2000).

A cold-hardy species, the Trumpeter Swans at Wye Marsh are short-distance migrants. Since 1996, significant numbers have remained at Wye Marsh and at the mouth of the Wye River until early winter. In 1998, 54 were recorded on the Wye Marsh Christmas Bird Count (American Birds 1999). In late December and early January, as the waters of the marsh freeze, these swans migrate to Hamilton Harbour, the Desjardins Canal in Dundas (which remains ice free due to sewage effluent), and along the Burlington lakeshore when the Harbour freezes

over (Rob Dobos, pers. comm. 2000). They return as early as mid-February before the breeding ponds are ice-free. Wye Marsh Trumpeters have been in upper New York State and in West Virginia.

Least Bittern breeds in the marshes of this IBA. With 11 birds on territory in 2000 (Kate Jermyn, pers. comm. 2000), the number breeding is nationally significant and represents 1+ per cent of the Canadian population (Canadian IBA Database 2000). Least Bittern is designated as a Species of Concern in Canada and provincially is considered Vulnerable. In 2000, at least 45

pairs of Black Tern nested in Wye Marsh IBA with perhaps another 10-15 nests in an inaccessible area of the marsh (Jermyn, pers. comm. 2000). As many as 61 pairs have bred in the recent past (Canadian IBA Database 1999) making Wye Marsh a nationally significant IBA for this species. Although no Canadian population estimate is available, a threshold of 50 pairs for significant colonies has been used in a Canadian regional study, *Priority Migratory Bird Habitats of Canada's Prairie Provinces, 1990*. As an interim measure, 50 pairs are used to identify nationally significant sites (ibid.). In Ontario, Black Tern is designated as Vulnerable.

4.1.1 Trumpeter Swan (*Cygnus buccinator*)

The Trumpeter Swan is not only the largest species of North America waterfowl but also the world's largest swan. Conspicuous with its all-white plumage, this swan might be confused in Ontario with either the Tundra Swan or the introduced Mute Swan. Its all-black bill distinguishes it from the Mute Swan, and its loud, deep, trumpet-like call distinguishes it from both Mute and Tundra Swans. Although Tundra Swan also has a black bill, it usually has a yellow spot in front of the eye.

Distribution and abundance

The Trumpeter Swan was believed to be formerly abundant and geographically widespread from Alaska to the Bay of Fundy, south to the Carolinas, Missouri, and Arkansas. During the periods of the fur trade and European settlement (1600s to 1800s), great numbers were killed for feathers and meat. Until reintroduction, the Trumpeter Swan had not been recorded in Ontario since 1884. In the early decades of the 1900s, American ornithologists were predicting extinction for the Trumpeter Swan (Bellrose 1976). By 1932, only 69 were known to exist in continental United States, although this swan was thought to exist in Alaska and Western Canada (Mitchell 1994). For example, in 1918 a small flock was discovered in the Grande Prairie area of Alberta, today identified as an IBA of global significance for Trumpeter Swan (Hervieux 2000). Protection afforded this species under the Migratory Bird Convention Act during the twentieth century permitted recovery, so that by 2000 the known population has grown to approximately 20,000 (Canadian IBA Database 2000).

Three populations of Trumpeter Swans are recognized in Canada: Pacific Coast (16,000+), Western Canadian (2,500+) and Interior (900+) (ibid.). Contributing to the Interior population are flocks that originated from restoration projects such as the Wye Marsh program in Ontario and similar efforts in Michigan, Wisconsin, Minnesota, Iowa, Ohio, and South Dakota. Recent sightings of restored flocks have been made throughout the central United States and western Canada.

Although results of the restoration program are encouraging, the Trumpeter Swan is still at risk. Concern exists about the lack of migration in several wild and restored flocks. Responding to this concern, researchers at the University of Guelph and program cooperators in Ontario have successfully induced Trumpeter Swans to migrate following an ultra-lite aircraft from Sudbury, Ontario, to Muscatatuck National Wildlife Refuge, Indiana, a distance of 1,085 km (Lumsden 1999). For flocks that do migrate, the continued loss and degradation of wintering habitat throughout their range is of significant concern (Mitchell 1994).

Natural history

Mitchell (1994) summarizes the natural history of the Trumpeter Swan. Having migrated to ice-free waters in late fall or early winter, Trumpeter Swans often return in early spring before breeding ponds or lakes are ice-free. Breeding pairs often return year to year to the same territory and even to the same nest site. The territory size of breeding pairs ranges from one and a half to more than 100 hectares depending on the shoreline complexity and abundance of foraging resources (Mitchell 1994). The nest site is usually surrounded by water greater than 0.5 metres deep. Swans prefer bodies of water that are undisturbed, and have stable water levels. They avoid acidic, stagnant, or eutrophic waters. Nest sites include small islands, exposed hummocks, muskrat houses, beaver houses, floating platforms of human construction, or a foundation built by the breeding pair. The nest diameter may be as much as 1.5 metres. Water surrounding the nest may act as a moat, affording some protection from mammalian predators, access to forage, and water for the cygnets.

A breeding pair of Trumpeter Swans requires about 150 days to build a nest, lay four to six eggs, and raise cygnets to fledging. In the wild, double broods are unknown. Several factors affect their breeding biology: delayed maturation (pair bonding begins during the third or fourth winter), highly variable production, and high winter mortality. An adult swan may live as long as 24 years in the wild. In captivity, Trumpeter Swans have lived over 30 years. Some swans do not remate when a mate is lost; others may establish a new, monogamous relationship (ibid.).

Trumpeter Swans are predominantly herbivorous: adults forage on submergent and emergent vegetation (particularly roots and tubers), and pasture grasses, and supplemental feed such as grains where provided. Adults select the foraging sites for their young. Cygnets eat aquatic invertebrates and fragments of vegetation during their first five weeks. All ages of Trumpeter Swans are subject to predators although cygnets are susceptible to many more including Snapping Turtle (*Chelydra serpentina*), Great-horned Owl (*Bubo virginianus*), Raccoon (*Procyon lotor*), Mink (*Mustela vison*), and Red Fox (*vulpes vulpes*). Exposure and starvation, particularly in winter, affect all ages.

4.1.2 Least Bittern (*Ixobrychus exilis*)

The Least Bittern is the smallest (28-36 cm) and most inconspicuous of the herons. Its presence in the dense emergent vegetation which it favours is often revealed by its dove-like cooing, by a glimpse of its brief flight across the marsh, or perhaps when exposed in the “freeze” position – bill pointed skyward, feathers compressed and eyes in apparent contact with observer.

Distribution and abundance

The breeding range of the Least Bittern extends from southeastern Canada through the eastern United States, Mexico, Costa Rica, and well into South America. Its winter range south of regions with prolonged winter frosts, including the Atlantic coastal plain, Gulf of Mexico coastline, and regions to the south.

In Canada the Least Bittern nests in southern Manitoba and east to the Maritimes, including New Brunswick and possibly Nova Scotia. In Ontario it breeds predominantly south of the Canadian Shield. The large marshes of the lower Great Lakes continue to provide the most extensive habitat together with the smaller marshes that dot the landscape south of the Shield in the Peterborough area. Since the 1960s, a decline in numbers has been documented in several regions of Ontario, particularly in the south central region including Simcoe County. States bordering Ontario (i.e., Michigan, Ohio, and New York) have also experienced declines. Least Bittern is listed as a Species of Concern nationally, and Vulnerable in Ontario.

Natural history

The natural history of the Least Bittern is well described by Gibbs et al. (1992) and its status, particularly in Ontario, is well summarized by Sandilands and Campbell (1988). The Least Bittern selects freshwater (or brackish) marshes with tall, dense emergent vegetation, e.g., cattails, which may include clumps of woody plants over deep water up to one metre. Areas of open water occupying as much as 50 per cent of the marsh and interspersed throughout this vegetation are preferred. Least Bitterns avoid dry conditions and benefit from stable water levels. Breeding pairs are not strongly territorial and are usually solitary nesters but under ideal conditions appear to be loosely colonial (Sandilands and Campbell 1988). Nest density ranges from one to 15 nests per hectare; however, one nest per hectare appears to be typical.

The nest is an elevated platform with an overhead canopy built of emergent vegetation and sticks. The Least Bittern creates the canopy by pulling down and crimping the cattails surrounding the nest. The nest site is within the dense, tall stands of emergent vegetation well above the water level and usually less than 10 m from open water or from channels made by muskrats. The depth of water below the site ranges from 8 cm to almost 1 metre. Clutch size ranges from two to seven eggs, the usual number being three or four. The success rate from egg laying to fledged young, varying from 20 per cent to 73 per cent, depends upon the location of the nest within the cattail marsh: nests along the periphery of the marsh tend to be least successful (Gibbs, Read and Melvin 1992).

Least Bittern stalk their prey, predominantly small fish and dragonflies, along the open-water side of emergent vegetation. They cling to the vertical stems and shoots by grasping them with their long toes and curved claws. At particularly productive feeding sites, they may build foraging platforms that may become hunting platforms for young bitterns. These platforms and hunting techniques permit Least Bitterns to forage over marsh water as deep as that used by large herons (i.e., 25-60 cm deep) although most feeding occurs at the water's surface. The Least Bittern, in turn, is fed upon by snapping turtles (*Chelydra serpentina*) from below and Red-tailed Hawks (*Buteo jamaicensis*) and Northern Harriers (*Circus cyaneus*) from above. Marsh Wrens (*Cistothorus palustris*) are known to puncture Least Bittern eggs while American Crows (*Corvus brachyrhynchos*) raccoon (*Procyon lotor*) and mink (*Mustela vison*) take both eggs and nestlings.

Several factors threaten the breeding habitat of the Least Bittern and even the bird itself. The most serious threat is the destruction or loss of wetland. In southern Ontario, many wetlands have been converted to other uses, the major ones being agricultural reclamation and

urbanization. Since pre-settlement times, almost 70% of the Ontario wetlands south of the Precambrian Shield have been lost. Some of these wetlands would have provided habitat for Least Bittern. Wetlands that remain don't necessarily guarantee appropriate habitat for marsh birds. In agricultural areas, siltation from erosion and run-off containing pesticides may degrade nesting and/or foraging habitats. The habitat may also become degraded should Phragmites (*Phragmites*) and/or Purple Loosestrife (*Lythrum salicaria*) invade the marsh. Natural succession within a marsh makes it uninhabitable for Least Bitterns. High water levels may eliminate habitat. Storm water run-off from urban or agricultural areas appears to create conditions that make these bitterns vulnerable to parasitic nematode worms. Recreational activities may reduce either breeding or foraging success (Gibbs et al. 1992). Lastly, the coastal marshes without dykes, such as those at Matchedash Bay, become less suitable for Least Bitterns during periods of low lake levels when their marsh habitat is replaced by extensive mud flats. Global warming may result in lower Great Lakes levels, impacting coastal habitat quality and quantity.

4.1.3 Black Tern (*Chilidonias niger*)

This marsh tern is distinctive in breeding season with its black head and underparts and thus is readily identified when feeding over a marsh. Outside of this season, however, its plumage exhibits very little black at all.

Distribution and abundance

The Black Tern is a localized breeder, concentrating in areas of highly productive wetlands in Eurasia and North America. In Eurasia it breeds between the latitudes of southern Scandinavia and southern Spain, east through Europe to central Asia (del Hoyo 1996). In North America it breeds from the northern United States through central Canada. In Canada it breeds in appropriate habitat in a broad band from east of the coast ranges of British Columbia, across the Prairie provinces, through Ontario, and into southern Quebec. Its northern limit extends to Great Slave Lake. Since the late 1930s, it has extended its range east to the New Brunswick-Nova Scotia border marshes. In Ontario the Black Tern is absent from the northwest but occurs along the James Bay shoreline and sporadically through the rest of the province. The Black Tern winters in marine habitat along the coasts of Central and South America.

In the 1930s, the Black Tern occupied every extensive marshland in Southern Ontario (Austen et al. 1994). Surveys undertaken since the 1960s indicate declines in Black Tern at several marshes. As a result, the Black Tern was listed as threatened (ibid.). Similar declines have occurred throughout North America and Europe since the 1960s (Dunn and Agro 1995). Although not globally threatened, many local populations are vulnerable and declining throughout its range (del Hoyo 1996). Considered Not At Risk nationally, the Black Tern is designated Vulnerable in Ontario.

Natural history

The natural history of Black Tern is thoroughly summarized by Dunn and Agro (1995). The habitat of the Black Tern includes freshwater marshes, sloughs, wet meadows, and swamps. This species breeds in cattail and bulrush marshes of at least 5 ha, although those greater than 20 ha are preferred provided that there are fairly extensive stretches of open water (Messier and Rail 1996). Drainage of wetlands throughout North America and Europe for agriculture and urban and industrial development has caused declines of this species.

Black Terns are semicolonial, establishing colonies of usually fewer than 20 pairs and rarely more than 100 (del Hoyo 1996). They often return to their colony of birth to nest. Nesting occurs in dense emergent vegetation where 25-75 per cent of the surface is covered with emergent vegetation (cattails, bulrushes) although not so dense as to prevent a canoe from being forced through it (Dunn and Agro 1995). A nest is “assembled” by collecting masses of floating vegetation from the surrounding water in a pile. Nests may be constructed on a clump of dead reeds, cattail rootstalks, floating boards, or muskrat (*Ondatra zibethicus*) houses. Nearby there are often dead snags or posts for roosting. The nest, usually located within 0.5-2 metres of open water, is virtually at the water’s surface level and can be easily destroyed by wind or changing water levels. The water depth below the nest is usually 0.5-1.2 metres but may be less. The eggshells of Black Tern are adapted to a moist nest environment (ibid.).

Nest success is low, with usually only one chick raised per nest of two to three eggs. Black Terns frequently re-nest, although they usually raise just one brood in a season. The nest site may be abruptly abandoned when the emergent vegetation is altered by drought or flooding. Terns readily vacate a site to choose another. One study observed that Black Tern will re-nest up to 42 km away (ibid.).

The primary foods of Black Tern are dragonflies, damselflies, and other marsh insects taken on the wing. Other foods include small fish, crayfish, and molluscs, provided that they may be taken at the surface, for this tern rarely dives, but immerses its bill. Feeding may occur two to five kilometres from the colony at adjacent marshes or nearby meadows. Before pesticide use on agricultural lands, Black Tern often were observed foraging for insects behind ploughs and over grain fields. Ehrlich et al. (1986) suggest that in the upper midwest United States, reduced hatching success may be due to agricultural contaminants. On wintering grounds along the coasts of central and South America, exposure to contaminants may be affecting the terns.

Black Terns are subject to several predators in their marsh habitat. Common Ravens (*Corvus corax*), Northern Harriers and even large fish may prey upon adults. A variety of predators feed on chicks and eggs: the Great-horned Owl, the Black-crowned Night-Heron (*Nycticorax nycticorax*), the Great Blue Heron (*Ardea herodias*), the long-tailed weasel (*Mustela frenata*), the muskrat, the mink, the Norway rats (*Rattus norvegicus*), the northern water snake (*Nerodia sipedon sipedon*) and raccoons (Dunn and Agro 1995, D.V. Weseloh pers. comm. 2000). These terns can offer no defense against the mostly nocturnal predators listed above. Predators, particularly raccoons, may increase as the water level drops below 30 cm. Small colonies are subject to highest levels of predation (del Hoyo 1996).

Wetlands managed for waterfowl are suitable for Black Tern colonies provided that flooding or drawdowns do not negatively affect either emergent vegetation or nesting materials and provided that water levels remain stable throughout the nesting season. Black Tern will readily accept both artificial or restored wetlands provided they are biologically rich (Dunn and Agro 1995). A wetland drawdown will be undertaken by agencies such as Ducks Unlimited Canada, should the need arise, for instance a situation that has resulted in the loss of significant portions of the emergent macrophyte community. Drawdowns should not impact Black Terns, in that the management procedure would be undertaken only when the tern habitat has degraded significantly or disappeared entirely (Dave McLachlin, pers. comm. 2001).

5.0 Other Elements of High Conservation Value

Wye Marsh IBA is one of three IBAs in the south Georgian Bay lowlands, the others being Matchedash Bay IBA and Tiny Marsh IBA. Wye Marsh is a regionally significant wetland because it contains fen communities and a cranberry bog. Bog communities arise along the base of slopes at the periphery of the marsh. Springs along the slopes yield cold, low-nutrient water that supports these fen and bog communities where several orchid species grow. Streams generated by these springs provide habitat for Brook Trout. The marsh lake offers nurseries for fish, insects, reptiles, and amphibians as well as birds.

Wye Marsh IBA provides a significant representation of the region's birds, herptiles, mammals, and plants. A total of 222 bird species have been recorded in Wye Marsh, of which 64 species have been confirmed as nesting. Thirty species of marsh birds are deemed Priority Species in Simcoe County (Bird Studies Canada 1999). Of the 44 Priority Species that have been recorded in the IBA, 24 breed, and 18 of these are marsh birds. Marsh nesting birds of note include the American Bittern, the Virginia Rail, the Sora, and the Marsh Wren. Fourteen species of waterfowl use this IBA as a migration staging area.

Specific landforms within the IBA, relics of the lower Lake Algonquin and Lake Nipissing shorelines, are designated as a regionally significant earth science Area of Natural and Scientific Interest (ANSI). The glacial outwash deposits of sand and gravel that form the slopes of the valley act as a very significant recharge zone for Wye Marsh and the deeper aquifers of the region (Reid 1997). As a backdrop for the IBA, the upland forests not only add scenic value but also are classed Category 1 Environmental Protection Areas. Like marshland everywhere, this wetland provides water retention, purification, and nutrient uptake functions.

6.0 Land Ownership and Use

The federal government owns the National Wildlife Area and Wye Marsh Wildlife Centre that is operated by Friends of Wye Marsh Inc. The Ontario Ministry of Natural Resources owns the Wildlife Management Area.

6.1 Land Use

Historical

Wye Marsh IBA lies within Huronia, the land of the Huron people or Wendat, whose literal translation is “one land apart or one island” (Wainio et al. 1973). Huronia is an “island” in the sense that this region of central Ontario was in pre-European times surrounded by vast swamps and open water. Huronia is bordered on the west by Georgian Bay, on the north by the Severn River and Matchedash Bay, to the east by Lakes Couchiching and Simcoe and to the south by Orr Lake and Tiny Marsh. This “island” of well-drained soils – about 880 km² – provided protection from the Iroquois, transportation routes via canoe, hunting and fishing, and a source of water for the Huron villages.

Huronia has been the focus of extensive historical study and archaeological work; some of the first contact between Amerindians and Europeans in North America occurred here (ibid.). Wye Marsh, although unnamed, appears on the 1660 map of Du Creux, the *Tabula Novae Franciae*. Wye Lake is described in the Jesuit *Relations* with reference to a Huron Village along the banks of the Wye River near Wye Lake. The largest known Huron village was situated just west of the Wye River and between Tiny Marsh and Wye Marsh (Wainio et al. 1973). An estimated 330 kilometres of trails linked the four tribes of the Huron nation and all their villages (Sainte-Marie among the Hurons 2000). The Jesuit mission, established in 1639, was the central base for the missions in Huronia and was located on the northeast corner of Wye Lake. In 1940, this site was purchased by the Jesuits and excavated thoroughly. Today, Sainte-Marie among the Hurons lies just outside the Wildlife Management Area. Operated by the Ontario Ministry of Tourism, Sainte-Marie among the Hurons serves to explain and remind visitors today of the cultural heritage of Huronia and the Huron people.

Contact with Europeans in the 1600s brought change to virtually all aspects of Huron life. Between 1635 and 1645, smallpox and other infectious diseases and raids by the Iroquois on the weakened villages of the Huron nation, resulted in near annihilation of the Hurons. By 1650, the Jesuit missionaries had repaired to Quebec accompanied by the few remaining Hurons. No human settlement occupied these lands about Wye Marsh for the next 150 years.

European settlement of this region began in the early 1800s with the establishment of a naval base at Penetanguishene. The region was opened with the construction of the Penetanguishene Road from the northern end of Lake Simcoe to Penetanguishene, crossing the Wye River at Wyebridge. For a while, Wyebridge, with its grist and lumber mills along the river, was the business centre of Simcoe County. Water levels allowed large boats to transport people and goods from Wyebridge to Georgian Bay. Deforestation increased fluctuations in water levels, and feeder streams dried up. By the mid-1860s, Midland was the second largest lumber town in Canada, second only to Ottawa. Log booms caused significant soil erosion along the Wye River and to present-day Wye Lake. For most of the 1900s, until the mid-1960s, Wye Marsh was privately owned and served as a hunting preserve.

Current

In 1967, Canada's Centennial, a series of wildlife centres across the country were conceived to assist Canadians in interpreting and appreciating their natural environment. In June 1970, Jean Chretien, Minister of Indian Affairs and Northern Development, officially opened the Wye Marsh Wildlife Centre, the first to be established in Canada (*Free Press Herald* 1970). Federal funding for this facility ceased in 1984. However, in 1985, a dedicated group of local people, including the Midland-Penetanguishene Field Naturalists, established a non-profit charitable organization, Friends of Wye Marsh Inc., to administrate and continue the environmental work of the centre (Bob Whittam, pers comm. 2000).

Today over 3,000 members and donors with an operating budget of approximately \$700,000 maintain a year-round facility that offers educational and interpretive programs to more than 35,000 visitors annually (Heming, pers. comm.). Facilities include boardwalks, viewing platforms, a display hall, theatre, gift shop, snack bar, and washrooms.

Recreational activities also attract a significant number of visitors to Wye Marsh. Cross-country ski trails are maintained and used under an annual Land Use Permit. Hunting and fishing are traditional activities. Since the early 1970s, the number of hunters has declined from 250 to 300 a year to 60 to 90 a year. Fishing was described as very good in the mid-1980s. However, the drawdown in 1990 and recent low water levels have contributed to an increase in vegetation density and a decrease in fishing. Trapping has occurred in Wye Marsh for many years with an annual harvest of 500 to 900 muskrat and 20 to 40 beaver. Since 1994 muskrats have declined drastically for unknown reasons (*ibid.*).

7.0 Conservation Management Achieved at the IBA Site

7.1 National Wildlife Area and Provincial Wildlife Management Area

The portion of the IBA encompassing the National Wildlife Area is owned and was initially managed by the Canadian Wildlife Service and protected under the Canada Wildlife Act of 1973. The purpose of a National Wildlife Area is to conserve essential habitat for migratory birds (Environment Canada 2000). The Friends of Wye Marsh Inc. assumed management of the Wildlife Centre and National Wildlife Area in 1985 following budget and staff reductions by the federal government. Until 1996 the adjacent provincial Wildlife Management Area within the IBA was managed by the Ontario Ministry of Natural Resources with input from Friends of Wye Marsh Inc. and Ducks Unlimited Canada. In 1998 a custodial agreement was reached among Friends of Wye Marsh Inc., the Ontario Ministry of Natural Resources and Ducks Unlimited Canada. A steering committee comprised of representatives from these partners, together with Environment Canada, is responsible for making decisions about the types of activities permitted in the Wildlife Management Area (Wye Marsh Stewardship Fact Sheet 1999). In future, management opportunities including surveys, inventories, and research studies will be implemented and maintained by the Wye Marsh Stewardship Resources Committee (Stewardship Program 2000).

7.2 Environmentally Significant Designations

A portion of the valley's slope south of the marsh is designated as a regionally significant earth science Area of Natural and Scientific Interest. This area contains bluffs representative of shorelines of glacial lakes Algonquin and Nipissing. Over 170 hectares of the valley's slopes within the IBA are covered with semi-mature hardwood forests that provide habitat for forest-interior species (Reid 1997). These forests are designated as Significant Woodlands in the Tay Township Natural Heritage Strategy Study. No development is permitted within these forests which are classified within Category 1 Environmental Protection Areas. As well, some of the vegetation communities within the wetlands of the IBA are regionally significant, e.g., sedge fen and cranberry bog communities.

7.3 Marsh Management

Marsh management within Wye Marsh IBA has included water-level regulation (ibid.). In 1972, the Ontario Ministry of Natural Resources (OMNR) replaced a dam at the lower end of the marsh that had previously responded to seasonal flood levels on the Wye River and fluctuations in the water levels of Georgian Bay with the present water control structure. In 1986 the OMNR entered into a 99-year agreement with Ducks Unlimited Canada to improve habitat for migrating waterfowl. Their management strategies have included opening channels in the floating mats of vegetation encircling Wye Lake, drawdowns to reduce aquatic vegetation, construction of two cells, or ponds, and restoration of portions of the former river channel. Cooperation with area landowners has resulted in upstream riverbank improvement by reducing bank erosion.

Formerly a lake of submergent vegetation, Wye Lake has become interspersed with dense emergent and submergent communities (ibid.). Cattails are the primary emergent vegetation. Sections of the marsh exhibiting "lockup" (dense stands of overgrown cattails) require ongoing management of water levels if marsh conditions are to be optimal for waterfowl and other marsh wildlife (Pittaway 1997, Reid 1997). Muskrat activity within a marsh can be beneficial by reducing cattail density (Weller 1997). In recent years muskrat numbers in Wye Marsh have been significantly reduced, possibly due to disease. Damage by muskrats to dykes has caused washouts in the marsh. Management projects affecting the wetlands of the IBA have considerable involvement and input from Friends of Wye Marsh Inc., Ducks Unlimited Canada, and the Ontario Ministry of Natural Resources.

7.4 Trumpeter Swans

Since 1989 Wye Marsh Wildlife Centre has been a cooperator in the Trumpeter Swan restoration program. Wye Marsh has been one of the most important release sites of Trumpeters raised by cooperators elsewhere. The centre now cares for and monitors over 80 Trumpeter Swans in the marsh and surrounding area, which represents about one-third of Ontario's Trumpeter Swan population (Wye Marsh Wildlife Centre 2000). The number of nesting wild

swans continues to increase within the IBA and some pairs are establishing nesting territories in wetlands outside of the IBA.

7.5 Wildlife Management

Wildlife management has been ongoing at Wye Marsh since the 1970s, involving both government agencies and local naturalist and service clubs (Reid 1997). Management activities include the erection of Osprey nesting platforms, and Wood Duck and Eastern Bluebird nest boxes. Forest management has been minimal; in 1993 selective cutting was undertaken in a stand of maples, and some cutting of white cedar has taken place as recently as 1999 (IBA Steering Committee, pers. comm. 2001).

7.6 Watershed Issues

Since the 1960s Severn Sound has had problems with poor water quality resulting from an excess of algal growth, a response to an oversupply of phosphorus from point and nonpoint pollution sources. In 1985 the International Joint Commission, the agency responsible for issues concerning the Great Lakes, identified Severn Sound as one of 43 Areas of Concern with respect to water pollution. In response to this concern, in 1993, government scientists working closely with the local Public Advisory Committee developed the Severn Sound Remedial Action Plan (SSRAP). The goal of this plan was to restore the water quality of the Severn Sound watershed monitored through implementation of programs such as open water monitoring, rural non-point source control and tributary rehabilitation. One of the major tributaries within the watershed is the Wye River whose headwaters include Tiny Marsh IBA. Any potential threat involving soil erosion, or chemical and bacterial runoff from agricultural sources to either Tiny Marsh IBA or Wye Marsh IBA should be addressed by this Remedial Action Plan. The SSRAP's Implementation Office is located at the Wye Marsh Wildlife Centre.

In 1997 the Severn Sound Environmental Association (SSEA) was founded on the recognition that ongoing community involvement was required to achieve and maintain the watershed as a healthy ecosystem. The SSEA involves eight municipalities, Friends of Wye Marsh Inc., and federal and provincial agencies. This association is regarded as a model for implementing remedial action plans operating around the Great Lakes. SSEA has achieved much toward the goal of a healthy environment and it is expected that Severn Sound will be de-listed as an Area of Concern in the near future. Funding for the Remedial Action Plan began with a five-year Canada-Ontario agreement in 1994. A replacement program, the Great Lakes Sustainability Fund, provides continued funding during the next five years (McAndrew 2000).

7.7 Education and Outreach

Wye Marsh Wildlife Centre offers an outstanding array of activities and opportunities to inform, educate and entertain visitors (www.wyemarsh.com). Over 35,000 people annually visit this IBA to enjoy and learn about the marsh community. Recreational opportunities such as canoeing and cross-country skiing are offered for all ages. The centre offers a wetlands' viewing

tower and a trail system on a floating boardwalk and along earthen dykes. A display hall, classrooms, and a theatre provide opportunities for learning about the marsh community. The centre offers canoe excursions with Wye Marsh Centre naturalists providing close-up experiences in the marsh. Binoculars may be borrowed free of charge.

7.7.1 Friends of Wye Marsh

Friends of Wye Marsh Inc. offers a variety of programs designed to provide learning opportunities in a natural setting all-year round. Youth programs include one for parents and tots, a badge program for brownies, guides, cubs, and scouts, as well as 20 education programs for all elementary grades. Adult programs include Cygnus Nature Trips and Wye Marsh Wildflower Gardeners. Wye Marsh Woodcarvers Association is a special-interest group that hosts the annual Canadian Wildlife Carving Championships at Wye Marsh Wildlife Centre.

Friends of Wye Marsh, Inc. has formed a number of partnerships. One between Friends of Wye Marsh, Inc. and Severn Sound Environmental Association and Remedial Action Plan has expanded into the Trumpeter Swan restoration program (see section 10.1). Together with Sainte-Marie among the Hurons, the Wildlife Centre offers a canoe adventure to explore both the natural and cultural history of the Wye Valley. Friends of Wye Marsh Inc. is an active partner in the Midland-Penetanguishene Tourism Consortium that serves visitors around the world. This is an opportunity through the World Wide Web to inform a large number of people about the significance of wetlands and to share the success of the Trumpeter Swan restoration program in Ontario.

Through all of these programs, Friends of Wye Marsh Inc. generates a strong knowledge base and awareness about the natural environment and an enthusiasm for Wye Marsh itself. With more than 300 volunteers, Friends of Wye Marsh maintains its support base through a progressive recruitment program.

As well as fund-raising for the Trumpeter Swan program, Friends of Wye Marsh Inc. hosts several events to raise funds to support other programs of the Wye Marsh Centre. Media sponsors include the New VR (Barrie) television station, area radio stations, CHAY and KICX, and the *Midland Mirror* and the *Free Press* newspaper. Other sponsors include local businesses, SSEA, and the Simcoe District School Board, among others.

8.0 Stakeholders

Friends of Wye Marsh Inc.

This charitable non-governmental organization manages the Wye Marsh Provincial Wildlife Area and operates the Wye Marsh Wildlife Centre, a National Wildlife Area, through agreements with the provincial and federal governments. The Wye Marsh Wildlife Centre web page is: <http://www.wyemarsh.com/>

Ducks Unlimited Canada

Ducks Unlimited Canada (DUC) is a private non-profit, charitable organization dedicated to the conservation of wetlands for the benefit of North America's waterfowl, wildlife, and people. The web page for Ducks Unlimited Canada is www.ducks.ca.

Ministry of Natural Resources

Owner of much of the land base, this provincial agency is ultimately responsible for the management activity within much of this IBA. The OMNR core business is to “manage forests, fish, wildlife, Crown lands and waters, aggregates, fuel resources, and provincial parks and protected areas sustainably, so as to provide environmental, social and economic benefits. Sustainable development recognizes and supports the needs of society in a way that is consistent with the ecological capacity of the natural environment. The programs within the core business of natural resource management strive to achieve a balance between use and protection and ensure a broad range of values is recognized, through open decision-making and integrated delivery” (OMNR web page). The OMNR owns the Wye Marsh Provincial Wildlife Management Area, which comprises the balance of the IBA. The OMNR web page is <http://www.mnr.gov.on.ca/MNR/>

Canadian Wildlife Service

The Canadian Wildlife Service contributes to the conservation of wildlife and natural habitats through research, monitoring, enforcement, management, and partnership programs. Working in cooperation with the province of Ontario and other government and non-government organizations, innovative approaches are developed and applied to conserve and restore critical remaining natural areas through programs such as the Great Lakes Wetlands Conservation Action Plan and the management of National Wildlife Areas and Migratory Bird Sanctuaries. (Canadian Wildlife Service web page) The portion of the IBA encompassing the National Wildlife Area is owned and was initially managed by the Canadian Wildlife Service and protected under the Canada Wildlife Act of 1973. Migratory birds are the responsibility of the Canadian Wildlife Service in Canada. The CWS web page is: http://www.on.ec.gc.ca/wildlife_e.html

Recreational Users

Among the range of users of Wye Marsh are waterfowl hunters, canoeists, fishermen and women, and observers of nature.

Local residents

There are many permanent and seasonal residences adjacent to Wye Marsh. Midland, Port McNicholl, Victoria Harbour and Wyebridge are the towns that are within close proximity.

Townships of Tay, Township of Tiny, and the Town of Midland

The IBA is bordered by three municipalities that regulate land use through various by-laws and official plans.

Field Naturalists

Three Field Naturalist clubs exist close to the IBA – the Penetanguishene/Midland Field Naturalists, the Orillia Field Naturalists, and the Brereton Field Naturalists. Wye Marsh is a popular destination for naturalists across Ontario.

Severn Sound Environmental Association

The Severn Sound Environmental Association (SSEA) was founded on the recognition that ongoing community involvement was required to achieve and maintain the watershed as a healthy ecosystem. The SSEA involves eight municipalities, Friends of Wye Marsh Inc., and federal and provincial agencies. This association is regarded as a model for implementing remedial action plans operating around the Great Lakes. SSEA initiates projects and acts as a partner with federal, provincial, municipal and private agencies, Severn Sound landowners and community groups to continue restoration work and monitoring in the area.

9.0 Opportunities

Mention Wye Marsh to local people and naturalists, and they think of the Trumpeter Swan. Trumpeter Swan has become strongly associated with the surrounding community as well. In 2001, construction begins near Pier 9 of the town dock in Midland to display a stainless steel sculpture of a Trumpeter Swan with mirror finish, 10.7 metres in height with a wingspan of 7.3 metres, designed and sculpted by artist Ron Hunt (Rebecca Jelley, pers. comm. 2000). Hudson Leavans provided the vision for this project, which is being constructed from steel donated by Kindred Industries Ltd. of Midland on land provided by the Town of Midland. Wye Marsh Wildlife Centre will head up the coordination and fund-raising of the project. This sculpture will symbolize the civic pride that the community has in the restoration of the Trumpeter Swan in Ontario and in eastern North America.

The Friends of Wye Marsh Inc. rely upon community volunteers for fund-raising, pond maintenance and monitoring of the swans. The “Adopt a cygnet” program is a fund-raising initiative targeted directly to support the restoration. Individuals, organizations, businesses, and schools, both elementary and secondary, have sponsored Trumpeter Swans. An annual auction and dinner also raises funds for the program.

Trumpeters raised at Wye Marsh are leg-banded and assigned a numbered, yellow wing tag to permit tracking of their movements. Swan spotters are encouraged to report their Trumpeter Swan sightings, while volunteers monitor the swans within the IBA as well as at wintering sites at the western end of Lake Ontario. The North Simcoe Veterinary Services, the Midland OSPCA Wildlife Centre, and the University of Guelph Wild Bird Clinic assist the Wildlife Centre with the health and care of the swans when necessary (ibid.).

A measure of the success of the program is the nesting of Trumpeter Swans not only within the IBA but in adjacent wetlands as well. Perhaps the IBA designation of Wye Marsh can serve to enhance the restoration program, and would signify to adjacent landowners and the local community the importance of wetland conservation to the program’s continued success. Swans and the IBA can also develop public awareness and interest in wetlands and the environment. Involving local landowners in a landowner stewardship program would contribute to the goal of the North American Waterfowl Management Plan (NAWMP), which is to increase the number of nesting Trumpeter Swans.

Some IBA species are excellent subjects to monitor and serve as indicators of marsh health (e.g., Black Tern, Least Bittern). The monitoring surveys of these IBA species could offer opportunities to the public to learn how and why biologists undertake population studies and why habitat conservation is so vital to these species.

Developing or expanding programs based upon IBA species would offer opportunities to create awareness about threatened species and the vital role habitat conservation plays in reversing population declines and in preventing extinction. Through Internet links, Wye Marsh would be able to exchange information with other IBAs such as Grand Prairie IBA that have been established to conserve Trumpeter Swan habitat. IBA species at Wye Marsh require not only breeding areas in this marsh but also a chain of migrating stopovers and suitable wintering grounds if they are to survive. Internet linkage of IBAs could enhance protection opportunities of these key habitats throughout the range of an IBA species. Communication links would provide incentive and encouragement to IBA participants.

10.0 Threats

Three real or potential threats have been identified within the IBA.

10.1 Toxic Pollution

Ingestion of lead shot, first recognized at Wye Marsh in 1991, has resulted in the illness and death of over 30 Trumpeter Swans and has been identified as a critical threat to this IBA species. In 1993, five years after the first captive swans arrived, Wye Marsh was designated a non-toxic shot zone under the Migratory Birds Convention Act. Of long term concern, however, has been the lead shot in the sediment remaining from pre-1993 hunting seasons. Lead shot as well as lead fishing sinkers have long been a threat to dabbling ducks, geese, and swans that ingest the shot and sinkers for use as grit or food, as they are similar in size and shape to plant seeds. Swans with their long necks are able to reach into sediments unavailable to other waterfowl. Lead shot has accumulated after years of trap shooting near the foot of William Street, and hunting presents a critical threat to Trumpeter Swans that can continue for decades. Research by Friends of Wye Marsh Inc. and SSRAP, funded by the Cleanup 2000 Fund, led to the design and field testing of a device that sinks lead pellets into sediments below a depth of 10 cm. This action makes the pellets unavailable to waterfowl, including swans. From this research, Normrock Industries Inc. developed a mechanical vibrator to sink pellets in areas of the marsh known to have a high concentration of them.

While extensive testing had proven that the device was effective, it is anticipated that the most accurate assessment of the effectiveness of the remedial activity will be provided by swans that utilize the treated areas. Since 1997, studies and monitoring of lead poisoning issues in the swans were undertaken, supported by Environment Canada's Great Lakes Cleanup Fund, North Simcoe Veterinary Services, University of Guelph Wild Bird Clinic, and the Canadian Cooperative Wildlife Health Centre. However, it should be noted that a complete assessment of the project benefits is constrained by a small swan population. Additional studies and

monitoring will be beneficial in evaluating the long-term effectiveness of the remedial activity in reducing the incidence of lead poisoning in Trumpeter Swans as the population increases. Continued monitoring of swan survivorship and lead related illness will be carried out through the Friends of Wye Marsh Inc. The area proximate to historical trap shooting presents the greatest potential risk to swans, and deserves the most intensive study.

10.2 Habitat Degradation

A moderate concern to this IBA is the increase in sedimentation and nutrient loading from agricultural development upstream along the Wye River, which flows into Wye Marsh. Soil erosion negatively impacts upon water quality, particularly when agricultural soils contain fertilizers, pesticides, or manure.

Non-native vegetation can out-compete native vegetation upon which local wildlife depends for food and shelter. Purple Loosestrife and Phragmites both pose threats to native vegetation in Wye Marsh. There is an ongoing control program to arrest the spread of Purple Loosestrife in the marsh. Historically, wild rice has been an important waterfowl food source in this marsh. Early in the 1900s, carp, a non-native fish, have significantly reduced the amount of wild rice and contributed to the decline in waterfowl numbers. Currently, Ducks Unlimited Canada manages water levels to promote this waterfowl food source. Agricultural development may also have contributed to the loss of wild rice and to the increase in cattails.

Problems arising from drainage and damming caused by muskrats and possibly beavers are localized threats that could destabilize water levels within the marsh (Bob Bowles, pers. comm. 2000). Muskrats tunnel into earthen dykes, which can lead to dyke failure. Beavers are dam builders. Their dams can effectively dry up areas downstream, resulting in loss of open water habitat. Fluctuating water levels during the breeding season can impact nesting success of marsh birds such as Black Tern and Least Bittern.

10.3 Inbreeding of Swans

Given the relatively small size of Trumpeter Swan populations and the likelihood that many of them are related to each other, genetic inbreeding poses a serious problem to this species' ultimate success. A genetics study conducted on the swans several years ago indicated strong evidence of inbreeding, reflected in relatively low rates of egg hatching (Marsolais and White 1997, Lumsden 2001).

11.0 The Action Plan

The following action plan lays out the basics for bird conservation in the Wye Marsh Important Bird Area. The vision, goals, and objectives were developed over several meetings with the IBA Steering Committee. The IBA partnership is encouraged to establish a priority for undertaking or implementing the objectives and actions. Implementation and timeline will depend upon the interest and commitment of stakeholders, as well as the availability of resources. The suggested group responsible for implementation is listed in brackets, followed by the action's priority: H = high, M = moderate, L = low.

Vision

Wye Marsh Important Bird Area is striving to promote, conserve, and enhance the wetland and woodland habitat to support wetland species and migrant birds, and maintain a significant habitat where birds can be studied, monitored, and enjoyed. Our focus is to maintain and enhance the Wye Marsh wetland for Trumpeter Swan, Black Tern, Least Bittern, and other birds by respecting the habitat and species diversity of the entire IBA.

Goals, Objectives, and Actions

1. *Maintain habitats that support viable and healthy populations of breeding marsh birds, including but not limited to Trumpeter Swan, Least Bittern, and Black Tern.*
 - a) Work with Ducks Unlimited Canada (DUC) to optimize habitat quality for the benefit of significant marsh species through water level management, building and maintenance of nesting structures, and invasive species control.
 - Create more “hemi-marsh”¹ conditions through water level management. (DUC, Wye Marsh Wildlife Centre, MNR). (ongoing)
 - Enhance vegetation diversity and decrease cattail density through water level management and manipulations. (DUC) (ongoing)
 - b) Encourage investigations to evaluate how to reduce the availability of lead shot to the swans.
 - Assess the effectiveness of mechanical vibrating device for sinking lead pellets beyond the reach of foraging swans. (Wye Marsh Wildlife Centre) (ongoing)
 - Sample and monitor sediment to identify distribution and density of lead pellets in the marsh. (Wye Marsh Wildlife Centre, DUC, SSRAP) (H)
 - Continue to monitor health of local swans, and treat any that show signs of lead poisoning. (Wye Centre) (H)

¹ A hemi-marsh is a marsh system with approximately 50 per cent emergent vegetation and 50 per cent open water. The distribution of vegetation and open water is ideally patchy (as opposed to one half of the area as open water and the other half marsh).

- Support efforts to inform fishermen about the hazards to wildlife posed by lead sinkers and encourage compliance to laws about the use of lead shot. (IBA partners) (M)
- c) Undertake stewardship and management activities to maintain and enhance populations of Black Terns.
- Establish platforms and structures to encourage nesting of Black Tern, as recommended in Appendix 3 (Jermyn, 2000). (Wye Marsh Wildlife Centre) (H)
2. *Maintain habitats that support viable and healthy populations of breeding forest birds while respecting habitat diversity.*
- a) Protect existing forest cover within the IBA.
- Formalize this objective in Wye Marsh Provincial Wildlife Area Management Plan. (Wye Marsh Wildlife Centre) (M)
- b) Promote old growth forest within the IBA.
- Identify areas of old growth, or areas most suited to succeed to old growth, and manage accordingly. (Wye Centre, OMNR) (M)
- c) Promote forest restoration on the Wye River watershed through the Severn Sound RAP and the municipal planning process.
- Encourage private and public landowners to maintain and enlarge forested areas. (SSRAP) (ongoing)
 - Promote riparian woodlands and cover to enhance water quality of Wye River. (SSRAP) (ongoing).
3. *Maintain and promote habitats that support migrating birds.*
- a) Enhance conditions for migrating waterfowl.
- Consider waterfowl stopover habitat in management decision for marsh and adjacent lands. (Wye Centre, DUC) (M)
- b) Promote front and back yard bird habitat (that uses native plant species) to visitors to the Wye Marsh Wildlife Centre through displays and demonstrations.
- Maintain demonstration plots and gardens, and supporting information and materials, in the centre. (Friends, Wye Centre) (ongoing)
4. *Develop communication strategy and actions to promote bird conservation among partners, stakeholders, and to the public.*
- a) Develop print and electronic materials to communicate new and relevant bird conservation information.
- Produce concise version of this plan for distribution. (Wye Centre) (M)
 - Make plan available on stakeholder web pages. (Wye Centre, FON, CNF, DUC, SSRAP) (M)

- b) Engage stakeholders in the consideration and implementation of this plan.
 - Attend partner/stakeholder meetings to provide updates on progress and implementation. (Wye Centre) (H)
 - c) Promote this plan to the public.
 - Work with media on significant conservation stories. (Wye Centre, Stakeholders) (M)
 - d) Have a standing chair for the IBA steering committee. (Steering Committee) (H)
 - Appoint a chair. (Steering Committee) (H)
 - Have the chair take responsibility for calling meetings and preparing the meeting agenda. (Steering Committee) (H)
5. *Respect the site's natural diversity of habitats and existing conservation policies and initiatives.*
- a) Implement IBA objectives and actions through existing mechanisms as much as possible.
 - Infuse and integrate this Action Plan into the Wye Marsh Stewardship Committee's action plan. (Wye Marsh Stewardship Committee, SSRAP) (H)
6. *Support monitoring and research on populations of significant species and their habitats to inform management and stewardship activity.*
- a) Assess habitat for species of concern.
 - Assess the quality and quantity of habitat for Black Tern, Least Bittern, and Trumpeter Swan. (DUC, Wye Centre, SSRAP) (ongoing)
 - Assess habitat trends through time (to determine status of suitable habitat for significant species). (DUC, CWS) (ongoing)
 - Consider recognizing Sturgeon Bay and Hog Bay as satellite IBAs. (SSRAP, DUC, FON, BSC, CNF) (M)
 - Undertake Marsh Monitoring program in Wye Marsh. (DUC, Wye Centre, SSRAP) (H)
 - b) Conduct inventories and monitoring of populations of significant species.
 - Conduct biophysical inventory of entire site. (Stewardship committee, SSRAP) (ongoing)
 - Raise funds for inventory. (Stewardship committee) (ongoing)
 - Support and promote detailed breeding bird atlassing within the Wye Marsh, including abundance counts. (Regional Coordinator, Steering Committee) (ongoing)
 - Examine relationships between nest location and habitat characteristics of Trumpeter Swan, Black Tern, and Least Bittern. (Wye Centre, DUC) (ongoing)
 - Undertake regular standardized monitoring of Black Tern and Least Bittern, following methods described in Appendix 3 (Jermyn, 2000). (Wye Centre) (H)
 - c) Monitor movements, natality, and mortality of Trumpeter Swan within and outside of the IBA.

- Support and develop a volunteer-based monitoring system for Trumpeter Swans, led by Wye Marsh Wildlife Centre. (Wye Marsh Wildlife Centre). (H)
- Encourage radio tracking (via satellite) for some of the swans to better understand their movements. (CWS, IBA partners) (L)
- Encourage a study on the genetic fitness of the Wye Trumpeter Swans. (Wye Marsh Wildlife Centre, CWS). (M)

7. *Create recreational opportunities for community interest in birds.*

- a) Facilitate access to Wye Marsh for nature observation.
 - Enhance access, trails, signage, and other infrastructure to encourage birding opportunities and interest at Wye Marsh. (Stewardship Committee) (ongoing)
- b) Develop events and share information with specific groups to raise the profile of Wye Marsh and build positive relationships.
 - Develop birding events that raise the public profile of the IBA. (Naturalists Clubs, Steering Committee) (M)
 - Communicate information on IBA to local fish and game clubs. (IBA steering Committee) (H)
 - Invite local fish and game club involvement in IBA activities. (IBA steering Committee) (H)

12.0 Evaluation

Meaningful planning in complex circumstances requires a system for evaluating progress, rethinking goals and objectives, and revising actions. This iterative approach to planning means not only that the plan is open to revision but also that evaluation and revision is a fundamental part of the planning process. Many of the objectives and actions fall within the mandates of existing agencies and organizations such as the Wye Marsh Wildlife Centre and Ducks Unlimited Canada. Some of the actions require outside resources and funds for implementation. The IBA steering committee partnership should consider periodic (e.g., annual) meetings to review the plan, set priorities, and consider how resources can be found for implementation.

The FON and its national partners are committed to supporting IBAs in plan implementation. Local stakeholders in the Wye Marsh IBA have a stake in its success. To be of value, this plan needs to be revisited periodically.

After the draft plan is completed, the IBA stakeholders, in particular the Wye Marsh Wildlife Centre, will inherit the task of implementing as much of the action plan as is possible. Implementation is largely dependent on the availability of resources. An annual update on the conservation plan implementation would be of great value to the CNF, FON, and BSC. As the Wye Marsh IBA has joined the global family of IBAs, information on it will be incorporated into BirdLife's Global IBA database. This database will be used to report on conservation progress in IBAs. The information required for reporting is listed below:

- ❑ summary of general progress by the stakeholders group;
- ❑ update on actions, objectives, and goals;
- ❑ changes in actions, objectives, and goals (explain why changes were needed);
- ❑ any changes in threats affecting the IBA species and site;
- ❑ copies of any media coverage or materials produced;
- ❑ an updated list of groups involved in the stakeholder group;
- ❑ successes and failures.

Keys to plan implementation and revision:

- Determine resources required for implementing each action;
- Confirm responsibilities for actions;
- Prioritize actions based on resource availability and resolve or mandate of the person/group identified as responsible.

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Personal Communications

Bob Bowles	2000
Rob Dobos	2000
Michelle Hudolin	2000
Rebecca Jelley	2000
Kate Jermyn	2000
Harry Lumsden	2001
Dave McLachlin	2000
Bob Whittam	2000

Appendix 1 IBA Program Partners

BirdLife International

A pioneer in its field, BirdLife International (BL) is the first non-government organization dedicated to promoting world-wide interest in and concern for the conservation of all birds and the special contribution they make to global biodiversity. BL operates as a partnership of non-governmental conservation organizations, grouped together within geographic regions (e.g., Europe, Africa, the Americas) for the purpose of planning and implementing regional programs. These organizations provide a link to on-the-ground conservation projects that involve local people with local expertise and knowledge. Currently 20 countries are involved in the Americas program throughout North, Central, and South America. For further information about BirdLife International, check the following web site: <http://www.birdlife.net/>.

The Canadian Important Bird Areas Program has been undertaken by a partnership of two lead agencies. The Canadian Nature Federation and Bird Studies Canada are the Canadian BirdLife International partners.

The Canadian Nature Federation (CNF)

The Canadian Nature Federation is a national conservation organization with a mission to be Canada's voice for the protection of nature, its diversity, and the processes that sustain it. The CNF represents the naturalist community and works closely with our provincial, territorial, and local affiliated naturalists organizations to directly reach 100,000 Canadians. The strength of our grass-roots naturalists' network allows us to work effectively and knowledgeably on national conservation issues that affect a diversity of ecosystems and human populations in Canada. The CNF also works in partnership with other environmental organizations, government and industry, wherever possible. Our approach is open and cooperative while remaining firm in our goal of developing ecologically sound solutions to conservation problems. CNF's web site is <http://www.cnf.ca>.

Bird Studies Canada (BSC)

The mission of Bird Studies Canada is to advance the understanding, appreciation, and conservation of wild birds and their habitats, in Canada and elsewhere, through studies that engage the skills, enthusiasm, and support of its members, volunteers, staff, and the interested public. BSC believes that thousands of volunteers working together, with the guidance of a small group of professionals, can accomplish much more than could the two groups working independently. Current programs collectively involve over 10,000 volunteer participants from across Canada. BSC is recognized nation-wide as a leading and respected not-for-profit conservation organization dedicated to the study and understanding of wild birds and their habitats. BSC's web site is <http://www.bsc-eoc.org/>.

Federation of Ontario Naturalists

The Federation of Ontario Naturalists (FON) protects Ontario's nature through research, education, and conservation action. FON champions wildlife, wetlands, and woodlands and preserves essential habitat through its own system of nature reserves. FON is a charitable organization representing 15,000 members and over 105 member groups across Ontario. FON's web site is <http://www.ontarionature.org>.

Appendix 2 Final Report: Swan Program – Wye Marsh IBA 2000 by Michelle Hudolin

Introduction

The Trumpeter Swan was extirpated from eastern Canada primarily due to hunting pressure and habitat loss. Biologist Harry Lumsden began a provincial reintroduction program in the early 1980s to re-establish the Trumpeter Swan in its former habitat and range. With prime wetland habitat, and archaeological evidence confirming the historical presence of Trumpeters in the Wye Valley, Wye Marsh Wildlife Centre became a cooperator in the restoration of this magnificent species.

Wye Marsh obtained its first captive breeding pair of Trumpeters in 1988. The subsequent raising and release of cygnets combined with the release of young birds from other breeders into Wye Marsh has greatly contributed to the Ontario reintroduction effort. Now, more than a decade later, the centre is caring for and monitoring over 70 Trumpeter Swans in Wye Marsh and the surrounding area, accounting for a significant proportion of the Trumpeters in the province.

Project Focus

Updating information on the Trumpeter Swan population was identified as one of the priorities of the Wye Marsh Important Bird Area (WMIBA) Conservation Plan, which is still in progress. To fill some gaps in nesting records, an extensive search was conducted to find nests, with follow-up visits made to compile data on the number of eggs, hatchlings, and fledglings. This provided critical information on the nesting success of Trumpeter Swans within WMIBA. Previous records suggest that Trumpeter Swans are also utilizing surrounding wetlands outside the WMIBA, and additional documentation of swan movements to and within these areas was recorded. As well, Trumpeter Swans were monitored for general health throughout the project.

Results and Achievements

Four Trumpeter Swan nests were found in the Wye Marsh waterfowl sanctuary, including the nest of the Wye Marsh Wildlife Centre's captive breeding pair. The nest of the captive pair contained eight eggs, five of which hatched. All five cygnets fledged. The other three nests combined contained 23 eggs, 12 of which hatched; however, only five of these cygnets fledged. Snapping turtles, mink, and raccoons are the chief predators of cygnets, especially during the four to six weeks of life, when most of these losses occurred. There was one nest somewhere on the west side of Wye Marsh, but the exact location of the nest could not be found. At least one cygnet hatched to this pair, but as it was not observed during an aerial survey at fledging time, it presumably did not survive.

At least six pairs of Trumpeter Swans nested outside the WMIBA. General nesting locations are known, but no counts were conducted of eggs, since most pairs were not discovered until after the young had hatched. One pair nested in a beaver pond near Penetang, a second pair in Hog Bay, and a third in Tiny Marsh. A fourth pair successfully nested in a pond near Sturgeon Bay but deserted the area several weeks after the eggs hatched. The birds walked overland to

Sturgeon Bay and spent the remainder of the summer there. Presumably the original pond could not support the food demands of a growing family. A fifth nesting pair used wetlands near Warminster, but again the nest location was not determined. In mid-summer a single adult was seen in Matchedash Bay with two cygnets. As no further reports have indicated the other adult is present, it is probably dead. Combined, these six pairs produced at least 28 cygnets, 16 of which were known to be alive at fledging time.

When Wye Marsh began reintroducing Trumpeters, there were no indications that lead poisoning would be a problem for the swans. However, since 1991 there have been over 30 cases of lead poisoning in Trumpeter Swans. This has had a significant impact on the success of Wye Marsh's reintroduction efforts. Waterfowl occasionally ingest spent lead shot, mistaking it for grit, resulting in poisoning that often causes death. It appears Trumpeters may be more prone to lead poisoning than other waterfowl since their long necks enable them to reach deep into the sediment where shot may be found. After the illness and death of several swans, a ban restricting the use of lead shot in hunting was established, but research concluded that lead shot would continue to be available for decades, due to its slow sinking rate into the sediment.

During the summer of 2000 two Trumpeter Swans in Wye Marsh showed distinct signs of lead poisoning. The two birds were yearlings, and radiographs and blood samples confirmed the diagnosis in both instances. Fortunately, treatment with "leadidate" and antibiotics was initiated early, and both birds responded reasonably well. Repeat radiographs and blood samples were helpful in determining when the birds had made a satisfactory recovery. Although it is not known where the swans picked up the lead pellets, low water levels in the area are thought to be a contributing factor, bringing lead previously lying in deeper water areas within reach of the birds.

Volunteers continue to be an integral part of the swan program at Wye Marsh. From May through to September, volunteers contributed over 200 hours towards the swans, feeding them and monitoring their movements. In addition, countless others monitored swans outside of Wye Marsh, providing additional records of their movements, habits, and breeding success.

Recommendations

Continued monitoring of the swans, both as individuals and breeding pairs, needs to continue. Lead poisoning is still an issue in Wye Marsh birds, and evidence suggests it could be for many years to come. Therefore, diligent monitoring of movements, natality, and mortality should remain high priorities of the WMIBA project.

The nearby wetlands in Hog Bay and Sturgeon Bay seem to be suitable nesting locations for Trumpeter Swans. Both areas have been used for several years by both breeding and non-breeding pair-bonded birds. They may also be suitable for other species of conservation concern, such as the Black Tern that is currently utilizing areas like Wye Marsh. Consideration should be given to recognizing these two areas as IBAs, as their close proximity to Wye Marsh and Matchedash Bay may make them important in the future for growing populations of Trumpeter Swans and Black Terns.

Appendix 3 Nesting Habits and Success of Black Terns in Wye Marsh 2000

By Kate Jermyn

Introduction

In Ontario the Black Tern (*Chlidonias niger*) population has been declining for the past 30 years, making it a species of conservation concern. Breeding Bird Survey data estimate that over this time period 75 per cent of the population has been lost (McCracken 2000). According to the Committee on the Status of Endangered Wildlife in Canada, Black Terns were designated not at risk in 1996. However, it has been recommended that they be listed as Vulnerable in Canada and are of particular concern in Ontario (Alvo and Dunn 1996). It has been recommended that they be listed as Threatened and as Vulnerable in Ontario (USFWS 2000, Neuman and Blokpoel 1997). They are also protected under the Migratory Birds Convention Act. The loss of wetlands used during nesting has been suggested as a major cause of this decline as Black Terns are an obligate marsh-nesting species and do not adapt well to nesting in other areas (McCracken 2000).

In Wye Marsh specifically, declining numbers may be due to lack of appropriate nesting habitat, caused by the large amount of dense cattail mats. They usually avoid dense vegetation stands for nesting. They prefer a hemi-marsh area with about a 50/50 water to vegetation ratio. In Wye Marsh, because of the density of the cattails and the narrowness of channels between mats, it is difficult to find open water areas with small, low patches of vegetation that are suitable for Black Tern colonies.

The main objective of this project was to determine the population of Black Terns nesting, their reproductive success, and nesting habits, within Wye Marsh in 2000. Secondly, it was to find out where in the marsh these pairs were nesting and to evaluate the condition of the habitat at the colony. The conditions examined were the presence of invasive species, water depth, and presence of suitable unused nesting habitat. A third objective was to determine whether there were any other significant species, such as the provincially rare and nationally vulnerable Least Bittern (*Ixobrychus exilis*), nesting in the marsh that could be added to the Wye Marsh IBA list.

Study Area

The study site included all areas of the Wye Marsh that were accessible by either canoe or waders (Figure 1). Wye Marsh is located between the large town of Midland to the north and the smaller community of Wybridge to the south. The marsh lies on the Wye River, which empties into nearby Georgian Bay. The marsh has recently been designated a continentally significant wetland by the Important Bird Area program, through BirdLife International, Bird Studies Canada, and Canadian Nature Federation. It is 1,000 hectares in size and bordered by upland, which acts as a buffer zone to nearby towns and factories. The water regime is managed by Ducks Unlimited and there are berms and water level controls in two smaller management cells, one at the south end, the Preston Cell, and one at the north, Wye Marsh Wildlife Centre. The marsh is mostly made up of large floating mats of cattails and thick aquatic plant growth. Because the cattail mats are floating, drawdowns and refloodings have little effect in controlling

the cattail growth. The management cell at the north end is a waterfowl feeding sanctuary and supports a Trumpeter Swan (*Cygnus buccinator*) reintroduction program as well as large populations of Canada Geese (*Branta canadensis*) and other waterfowl. Hunting is permitted outside the waterfowl sanctuary; however, the use of motorized boats is prohibited in the entire marsh. There is also a Black Tern colony in nearby Tiny Marsh. Least Bitterns have also been recorded at Tiny Marsh as well as in Matchedash Bay.

Methods

The Black Tern census was done by a nest count from a canoe. Each nest found was marked with a stake and the nest material, nest contents, and dominant plant species was recorded. The nests were visited once every two to four days for five weeks. The first visit and nest discovery was on 3 June and the last visit for egg/chick counting was on 7 July. On each visit the number of eggs or chicks was recorded, as well as any changes to the nest or area that had occurred. GPS coordinates were taken at each nest and then mapped. The vegetation survey was also done by canoe and consisted of identifying plant species at each nest and the relative abundance of those species. Plants were identified within a one metre radius of each nest. The water depth at each nest was recorded using a weighted tape measure. This was not done for nests found in the Preston Cell due to the small number of nests there and the difficulty of accessing them. On both the nest count and the vegetation surveys, notes were taken on any other species seen, the location, numbers seen, and any nests found. On a few days a tape was played at various points in the marsh to try to get replies from Least Bitterns, Virginia Rails (*Rallus limicola*), King Rails (*Rallus elegans*), and other potentially nesting species. Two separate trips were also made to search for Least Bitterns, one along the berm in the Preston Cell, the other up the Wye River to Hall's Pond.

Results

Black Tern nest locations

A total of 45 nests was recorded, and there were more seen but unreachable as the water was too shallow for canoe but the bottom too mucky for waders. The data collected, together with the nests seen but unreachable, give a realistic estimate of the population of between 50 and 60 nests. Thirty-seven nests were revisited and monitored. The nests were divided into three clusters, Wye Cluster 1 (WC1) with 25 nests, 23 of which were monitored; Wye Cluster 2 (WC2) with 11 nests, all monitored (Figure 2); and the Preston Cell (PC) with 8 confirmed nests, not monitored. There were also two solitary nests. Nests were not monitored for several reasons: they could not be found again, already had chicks when found, or were seen from a distance and were unreachable.

Black Tern nesting materials

In WC1, there were 20 nests made from cattails, one made from cattails and bulrushes, and four made from floating mud and aquatic plants. In WC2 there were three nests made from cattails, six made from cattails and bulrushes, one made from bulrushes, and one made from mud

and aquatic plants. In PC all the nests were made with cattails and reed canary grass. One of the lone nests was made of mud and bulrushes, the other out of cattails and bulrushes, constructed on an upturned cattail root.

Dates of Black Tern hatch/laying

The first definite sign of hatching that was found in WC1 was a chick on 12 June at nest 16. In PC it was nest P1 with three chicks and nest P4 with two chicks on 15 June. In WC2 it was two eggshells in nest 20 and 1 egg shell in nest 21 on 16 June. This puts the earliest laying of a confirmed hatched egg at approximately 23 May for nest 16, assuming a 21-day incubation period from the first egg. The first disappearance of an egg was on 10 June when nests 9, 11, and 12 were all found empty. If these did hatch and were not washouts or predated, then the approximate date of laying was 19 May. Approximate dates of hatch and laying are in Table 1.

Black Tern nest success

The average clutch size for all nests was 2.78 (N = 42). All nests had either two or three eggs (Table 2). WC1 had an average clutch size of 2.91, with 21 out of 23 monitored nests having three eggs and two nests having two eggs each. The remaining two nests already had chicks when discovered, and clutch size could not be determined. WC 2 had an average clutch size of 2.72, with eight nests having three eggs and three nests having two eggs. In PC, the average clutch size was 2.25, with three nests having two eggs and one nest with three eggs. Two of these nests had chicks when discovered, but in one case there were three and no sign of any eggs, and in the other there was one newly hatched chick and one unhatched egg, so the clutch sizes for those two nests are postulated to be three and two respectively. Of the two lone nests, one had three eggs and the other two eggs, and as it was not revisited, it is not possible to determine total clutch size.

Table 2: Black Tern Clutch Size

Nest area	# nests	# of eggs/clutch			clutch size
		<i>1e</i>	<i>2e</i>	<i>3e</i>	
WC1	25	0	21	2	2.91
WC2	11	0	8	3	2.72
PC	8	0	3	1	2.25
LONE	2	0	1	1	2.50
TOTAL	45	0	33	7	2.78

Out of all the monitored nests, 11 were confirmed to have hatched, and nine more probably hatched. The eggs in those nine disappeared at the same times as the 11 confirmed hatched nests (Figure 3), with the nest staying untouched, which means they were likely not washouts. As well, the parents of these nests were still around on the day of disappearance and were very aggressive, which is indicative of chick presence. All nine of these nests had been incubating for

at least 18 days. Of the unmonitored nests, three were confirmed to have hatched as they had chicks when discovered. The rest of the nests (17) were either washouts, predated, or hatched during the two to four day period they were not checked. Of these, eight were confirmed washouts; the nest was completely gone. In most of the washouts, floating cattail “islands” had obliterated the nests. The fate of the rest, nine nests, is unknown – the nest was still intact, but eggs were missing. This could have been due to predators or to hatching as chicks are precocial and can leave the nest quickly at a parent’s alarm call. Great Blue Herons (*Ardea herodias*), Snapping Turtles (*Chelydra serpentina*), and Water Snakes (*Nerodia sipedon*) were seen in the nesting area, although in one case the parent was incubating within 1.5m of a basking Snapping Turtle with no concern. There is also muskrat (*Ondatra zibethicus*) activity in the area and this could account for some of the destruction of nests. As parents will remove eggshells from the nest within 15 minutes of hatching, chances of finding hatched eggshells is small (Agro and Dunn 1995). Hatched eggshells were only found near three nests, and only with thorough searching of the area. In total, 18 chicks were seen at 11 nests (Table 3). Because the nests were not enclosed it is not known if all chicks fledged. Only two fledglings were seen, and these were not in the vicinity of any known nest.

Table 3: Fate of Black Tern Nests and Estimated Hatching Success: N (%)

Total number of nests seen	45
Number of nests monitored	37 (82.2)
Number of nests known to have hatched:	
at least 1 egg	11 (24.4)
more than 1 egg	7 (15.6)
Number of nests probably hatched:	
at least 1 egg	9 (20.0)
Number of nests obliterated	8 (17.8)
Number nests where eggs gone, no adults present	17 (37.8)
Total number of eggs	115
Number of eggs known to have hatched	21 (18.3)
Number of young known to have been produced	18
Estimated hatching success	48.6%

Least Bittern

Tapes of Least Bittern calls were played at various locations around the marsh while searching for Black Tern nests, in the channels on the way to the colony, up the Wye River as far as Wyebridge, and in the Preston Cell. As well, Least Bitterns were spotted on a few occasions when they were flushed from presumed nests or fishing spots. No nests were actually found, but in one case a pair was flushed from an area in the Preston Cell, and it is probable that they were nesting there. In total, 11 separate Least Bitterns were seen or heard in Wye Marsh, two of which were a pair. These sightings were far enough apart to be certain that there were 10 separate territories rather than the same individual moving around in the territory (Figure 4). The fact that

the channels through the marsh are very winding combined with the density of the cattails makes Wye Marsh an ideal area for these secretive birds.

Vegetation

The three Black Tern nesting clusters were all fairly similar in their vegetation makeup; however, there were some slight differences. The dominant plant species for all three areas was cattail (*Typha spp.*) which made up 80-90 per cent of the nesting areas. Cattail was used in construction of 78 per cent of the nests. It was most dominant in WC1 and least dominant in PC. Narrow-leaved cattail (*T. angustifolia*), broad-leaved cattail (*T. latifolia*), and the hybrid (*Typha X glauca Godron*) were all present in the marsh. Around the nesting areas the hybrid species was the most common, as it is in the rest of the marsh. The narrow-leaved cattail grew mainly along the Wye River area and the broad-leaved cattail only in small pockets around the marsh. Other main vegetation species in immediate nesting areas were hard-stem bulrush (*Scirpus acutus*), found in both WC1 and WC2 and used in 22 per cent of the nests, and reed-canary grass (*Phalaris arundinacea*), found only in PC but used in all the nests in that area, 9 per cent overall. Yellow pond lily (*Nuphar variegatum*) was quite prominent in the beginning of the study but was replaced by fragrant white water lily (*Nymphaea odorata*) in mid-summer. The fragrant white water lily was the most dominant floating aquatic plant in all three areas. Other emergent species that were present but not numerous included common burreed (*Sparganium emersum*), common reed (*Phragmites australis*), and pickerelweed (*Pontederia cordata*). Purple Loosestrife (*Lythrum salicaria*) was seen in the channels leading to the nest locations and was abundant along the Wye River, but there was none in the immediate nesting areas. Other floating aquatics include duckweeds (*Lemna spp.*) and pondweeds (*Potamogeton spp.*), but neither was as abundant as the white water lily. Submergent vegetation was quite prominent and often difficult to paddle through. There were large mats of dead submergent vegetation that were used as bases for 11 per cent of the nests. These consisted of mainly milfoils (*Myriophyllum spp.*), coontail (*Ceratophyllum demersum*), common bladderwort (*Utricularia vulgaris*), and white water crowfoot (*Ranunculus longirostris*).

Water depth

The average water depth at WC1 was 0.9m. At WC2 it was slightly deeper with an average of 1m. The water measurements were taken at the end of the study, and it should be noted that the water levels were raised slightly over the summer. According to Dunn and Agro (1995), the typical water depth at Black Tern nests was 0.5-1.2m. Therefore, the water levels in the marsh should not be affecting the population of Black Terns. As well, choice of nest sites depends more on vegetation density and nest substrate availability than water depth (Dunn and Agro 1995).

Other bird species

A total of 50 bird species was seen or heard in the marsh and along the Wye River while searching for and monitoring the Black Tern nests (Appendix 1). The most common species, i.e., species seen or heard almost every trip out, were Red-winged Blackbird (*Agelaius phoeniceus*), Marsh Wren (*Cistothorus palustris*), Tree Swallow (*Tachycineta bicolor*), Common

Yellowthroat (*Geothlypis trichas*), Ring-billed Gull (*Larus delawarensis*), Common Moorhen (*Gallinula chloropus*), American Coot (*Fulica americana*), Mallard (*Anas platyrhynchos*), Wood Duck (*Aix sponsa*), Canada Goose (*Branta canadensis*), and Trumpeter Swan (*Cygnus buccinator*). Some species were also observed nesting or with young of the year. Because nests and young were not looked for specifically, and sightings were by chance, this should not be used as a total of nesting species in the marsh. The species observed nesting or with young were Red-winged Blackbird, Marsh Wren, Tree Swallow (utilizing nest boxes), Barn Swallow (*Hirundo rustica*), Sora (*Porzana carolina*), Mallard, Wood Duck, Canada Goose, and Trumpeter Swan.

Recommendations

Dates of study

As there were already full three clutch nests when the colony was discovered, it would be better to start any similar studies in earlier in May to guarantee the discovery of nests and cluster locations before the first egg is laid. The first egg was most likely laid between 18 and 21 May, so nest searching should start around 15 May.

Black Tern nest platforms

It has been documented that Black Terns respond well to the addition of nest platforms to an already existing nesting area (Blokpoel et al. 1998). The design most preferred by the birds is the Wire Mesh platform, with a PVC pipe frame and wire mesh centre, as it is the most natural looking when vegetation is woven through it and substrate placed on top. It also does not dry out over the nesting season, preventing the vegetation from blowing away and destroying the nest, which happens with some wooden platform designs. The hatching success was not compromised by use of this platform as compared to natural sites (Blokpoel et al. 1998). The difficulty in using platforms in Wye Marsh would be transportation of the platforms to and from the nesting areas, as the nesting area is difficult to get to. It would be ideal to have semi-permanent structures that could be left in over the winter and then refreshed with new vegetation each year. Of course, this would require a person to go out each year and re-weave the vegetation each spring. To ease transportation, the structures would need to be smaller than those used by Blokpoel et al. (1998) and two anchors should be used to prevent loss of nest platforms over the winter.

The addition of vegetation, both living and dead, and mud would be done each year using substrate found in the nesting area, thus making the initial transportation easier. One concern with the Wire Mesh platform is the addition of non-natural materials to the marsh area. As long as the platforms are anchored well to prevent loss, built from non-toxic materials, and cleaned up every spring, this should not be a problem. Another concern is that the platforms themselves might move during the winter and then no longer be in the nesting area. With the amount of movement of the cattail islands throughout the summer, this is a distinct possibility. The time spent moving them, then finding and moving them back, might be more than simply bringing them back and forth each fall and spring. It would be best then to try out a few platforms the first

year and leave them out to see what kind of effect the ice has on them during the winter. It could then be determined which is the best course of action. There are also wooden designs but these tend to dry out and lose their vegetation, making the nests susceptible to wind, waves, predators, and simply rolling off the platform. The wooden structures are also more attractive to other animals, particularly muskrats, and less attractive to Black Terns (Blokpoel et al. 1998).

Least Bitterns

The success of the Least Bittern survey indicates that there are Least Bitterns in Wye Marsh and that there are significant numbers of them. The survey this year found 10 territories, but many more may exist. There is no previous data on Least Bitterns within Wye Marsh. The best way to determine a better population estimate would be to start earlier, before the nesting season next year, when the birds are more vocal. This would allow for determination of territories before nesting and establish where to search for nests. The taped calls worked well in early June, but the responses were reduced later on in the month, and in July as the birds became less vocal and were raising young. The best method would be to do all the Wye channels, Wye River area, and Preston Cell throughout May and early June in the early morning, which is the time of day the birds appeared to be most vocal. Then, after areas with responses are determined, go back to the response site and do a thorough search of the area for a nest. A habitat evaluation should also be done once nests are actually found to determine where and in what type of area they are nesting. It would be difficult and time consuming to determine absolute abundance of Least Bitterns as they are difficult to spot and Wye Marsh is difficult to navigate. A relative abundance figure determined through call-playback might be adequate to estimate the population.

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