Tiny Marsh Important Bird Area Conservation Plan

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Prepared for the Tiny Marsh Important Bird Area Stakeholders

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The following people, listed alphabetically by last name, were part of the Tiny Marsh IBA Steering committee. They have contributed considerable time and effort to the development of this conservation plan, and the conservation of Tiny Marsh:
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Figure 1. Black Tern: Bird Studies Canada

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1.0 Introduction

Camille was mesmerized by the aerial acrobatics of the elegant, sooty black birds swooping and darting in pursuit of flying insects over the expanse of open water. His eyes followed the ballet back and forth. "I wish I could fly," he told me, giving voice to my exact thoughts. If ever a bird made me want to fly, it had to be this species, a master of graceful and effortless flight. Later, reflecting on his first "birdathon," Camille confided that Black Tern was his favourite species and proceeded to put the images in his head onto paper.[1]

Perhaps the best location to observe the Black Tern in southern Ontario is Tiny Marsh. Tiny Marsh IBA is located in south-central Ontario, near Elmvale, approximately three kilometres inland from Nottawasaga Bay, the southernmost lobe of Georgian Bay. This conservation plan will take you to the 8.5 square kilometres of marshes, open water, bog, and upland forest, where the headwaters of the Wye River start. Hundreds of Black Terns use Tiny Marsh for nesting and feeding, along with an impressive range and number of wetland-dependent species. These species and their habitats are the focus of this conservation plan. The plan is intended to assist those responsible for or interested in the Tiny Marsh, its birds, and nature, with conservation planning, management, and actions well into the future.

This conservation plan is intended to be a "work in progress." Sections describing the site, its birds, and the institutional arrangements are presented in Chapters 3 to 7. Chapter 8 is about the stakeholder activity in the area, while Chapters 9 and 10 explore opportunities within the Important Bird Area (IBA) for conservation as well as identifying threats to the IBA species. Chapter 11 elaborates the conservation action plan, presenting the vision, goals, objectives, and strategies. The vision of the Tiny Marsh IBA follows:

The Tiny Marsh Important Bird Area will be conserved and managed to protect its populations of resident and migratory birds, as a place where birds can be monitored, studied, and enjoyed for the ecological, educational, and economic benefits to the people of Simcoe County and beyond.

Figure 1. Black Tern

[1] E. Cheskey

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. These associations seek 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 birds at sites falling under one or more of the following internationally agreed-upon categories:

- Sites regularly holding significant numbers of an endangered, threatened, or vulnerable species
- Sites regularly holding an endemic species, or species with restricted ranges
- Sites regularly holding an assemblage of species largely restricted to a biome
- 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

Location and description

Site: Tiny Marsh, CAON025N
Location: 44°36' N, 79°56' W

Tiny Marsh IBA is located in south-central Ontario, approximately three kilometres inland from Nottawasaga Bay, the southernmost lobe of Georgian Bay. Tiny Marsh lies within Tiny Township and along the northern boundary of the Township of Springwater, a municipality of urban and rural communities with a population of approximately 16,000 (Statistics Canada 1999), concentrated in two villages, Midhurst and Elmvale, and several hamlets. The IBA is approximately six kilometres northwest of the Village of Elmvale ,whose commercial district serves both its residents and a sizeable cottage community at Orr Lake and along the shores of Nottawasaga Bay.

The site encompasses the Tiny Marsh Provincial Wildlife Area, an 8.5 km^2 wetland of cattail and meadow marsh communities, interspersed with a few small areas of open water. Ten percent of the area is forested swamp. Tiny Marsh, together with Orr Lake, are the headwaters of the Wye River, which flows north-northeast into another IBA, the Wye Marsh Provincial Wildlife Area near Midland. The most extensive land use, approximately one half, is agriculture, while one-third of the municipality and its environs is forested. Tourism, ranging from golf to skiing and snowmobiling, is a major attraction in all seasons. Major employers are the County of Simcoe, Simcoe County District School Board, and the Province of Ontario. Local industry includes Bay Web Industries, GVS Sheet Metal, and Leitner BM Lifts.

This IBA lies within the Manitoulin-Lake Simcoe ecoregion. This ecoregion experiences warm summers and mild winters, with a mean summer temperature of 16.5°C and a mean winter temperature of –4.5°C. Locally, precipitation is in the range of 750-1,000 mm and is evenly distributed through the year. Prevailing winds from the west and northwest in winter bring ample lake-effect snowfall to the northern sections of Simcoe County, resulting in the county's designation as the "snowbelt" of central Ontario.

Much of the Simcoe Lowlands, including Tiny Marsh IBA, was submerged under glacial Lake Algonquin during the recession of the Wisconsin Ice Age. The soil composition of the IBA reflects its geological history: the carbonate-rich soil reflects the underlying bedrock of limestone; the clays and silts are a result of glacial lake formation and recession; and the accumulated organic matter is a product of its more recent history as marshland. Today, the Tiny Marsh IBA is one of the more productive marshes in Ontario, in part due to water level regulation.

Figure 2. Tiny Marsh Important Bird Area location map

Location

Tiny Marsh lies between the First and Third Concessions of Tiny Township. The Interpretive Centre is located on the First Concession, 4 kilometres west of Simcoe Road 6. In the summer, swimming opportunities are available a few kilometres away at Wasaga Beach.

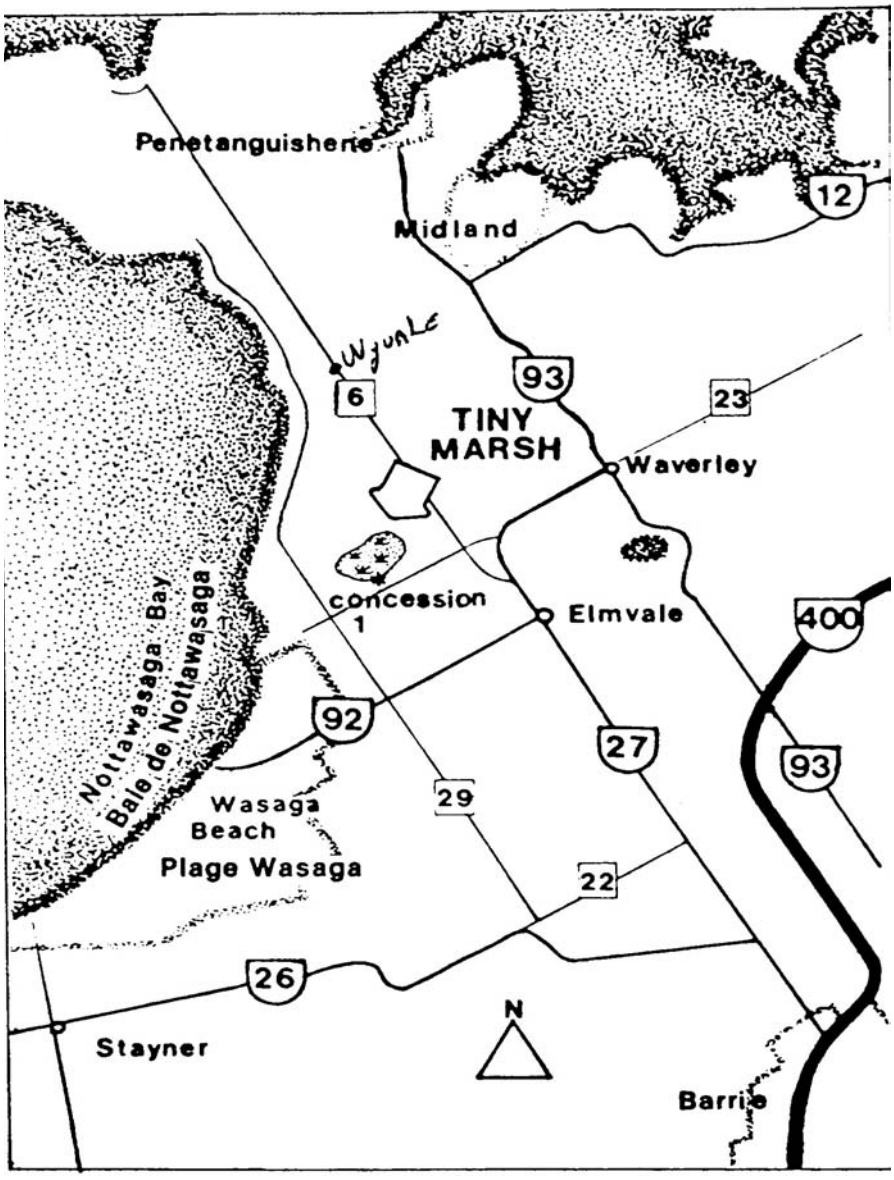

Figure 3. Tiny Marsh Provincial Wildlife Area and IBA boundaries

4.0 IBA Species Information

4.1 Why Tiny Marsh Is an Important Bird Area

Tiny Marsh IBA supports significant numbers of a variety of marsh bird species: Black Tern (*Chilidonias niger)*, Least Bittern (*Ixobrychus exilis)*, King Rail (*Rallus elegans)*, Pied-billed Grebe (*Podilymbus podiceps*), American Bittern (*Botaurus lentiginosus*), Sora (*Porzana carolina*), Virginia Rail (*Rallus limicola*), Common Moorhen (*Gallinula chloropus*), American Coot (*Fulica americana*), Mallard (*Anas platyrhynchos*), and Blue-winged Teal (*Anas discors*). In total, 250 species of birds have been reported in this Wildlife Management Area. The numbers of marsh birds breeding here and the numbers of waterfowl and land birds that stop over seasonally, particularly during migration, are all indicators of a healthy marsh.

The status of Black Tern is provincially Vulnerable. Between 1993 and 1996, an average of 148 Black Tern potential pairs were recorded in Tiny Marsh, with peaks of 156 in both 1993 and 1995. In 2000, 94 nests were reported (IBA steering committee, pers. comm.2000), and over 400 individuals counted during a July census (ibid.). These annual records represent a substantial number of the southern Ontario population. 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 (Canadian IBA Database 1999). Thus, the breeding population of Black Tern in Tiny Marsh IBA is of national significance.

Least Bittern is listed as a Species of Concern nationally and designated as Vulnerable in Ontario but occurs in significant numbers at Tiny Marsh with estimates of over 10 pairs present, representing approximately 1 percent of the estimated national population (ibid.). The Least Bittern survey in June 2000 recorded five birds on territory. In 1999, an adult King Rail with young was recorded at Tiny Marsh (Lyle Friesen, pers. comm. 2000); however, whether they are regular inhabitants is not known. King Rail is an Endangered Species both nationally and provincially. Red-headed Woodpecker (*Melanerpes erythrocephalus*), a species in decline, also nests at Tiny Marsh IBA. One or two pairs have nested in the IBA during the past 15+ years (Fletcher, pers. comm. 2001). The Red-headed Woodpecker is listed as Vulnerable provincially and as a species of Special Concern nationally. A total of 29 species recorded in Tiny Marsh IBA have been assigned Birds at Risk status in Ontario (Austen et al. 1994). Finally, 29 of the 30 species of marsh birds listed as Priority Species for Simcoe County occur at Tiny Marsh IBA (Bird Studies Canada 2000). Of these, 21 are known to breed (Tiny Marsh Bird Checklist 1994).

4.2 Natural History of IBA Species

4.2.1 Black Tern (*Chilidonias niger*)

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

4.2.1.1 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. In North America, it breeds from northern United States through central Canada. Specifically, 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. In August, after the young have fledged, terns gather for several weeks at favoured feeding sites on bays and open water of the lower Great Lakes, becoming semi-pelagic. Significant numbers are observed in the

western basin of Lake Erie from early to mid-August. From these waters, terns migrate singularly or in small groups inland through the United States (Dunn and Agro 1995, Whan 1999). The Black Tern returns to a pelagic lifestyle when it winters in marine habitat along the coasts of Central and South America.

In the 1930s, 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. Black Tern is listed as Vulnerable provincially and Not-at-Risk nationally (OMNR, 2001). Similar declines have occurred throughout North America and Europe since the 1960s (Dunn and Agro 1995). Although not globally threatened, many local populations are declining throughout its range (del Hoyo 1996).

4.2.2.2 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 five hectares in size, although those greater than 20 hectares are preferred provided that there are fairly extensive stretches of open water (Messier and Rail 1996). Drainage of wetlands such as these has occurred throughout North America and Europe for agriculture and urban and industrial development. Such wetland reclamation is implicated throughout the industrial world as a cause of the decline of this species.

Black Terns are semi-colonial, establishing colonies usually consisting of fewer than 20 pairs and rarely more than 100 (del Hoyo 1996). They often return to their natal colony to nest. Nesting occurs in dense emergent vegetation where 25-75 percent of the surface is covered with flooded emergent vegetation (cattails, bulrushes) although not so densely 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 surrounding water onto a pile. Nests may be constructed on a clump of dead reeds, cattail rootstalks, floating boards, or muskrat (*Ondatra zibethicus*) houses. The nest is usually located within 0.5-2 metres of open water. The site may have dead snags, shrubs, or posts for roosting. The nest is virtually at the water's surface, meaning that it may easily be destroyed by wind, wave action, 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 unique and appear to be adapted to a moist nest environment (ibid.).

Nest success of Black Tern is low, with usually only one chick raised per nest of two to three eggs. Nest success at Tiny Marsh appears to be much lower (see Holt et al., Appendix 3). Black Terns frequently re-nest, although if nesting is successful they usually raise only one brood in a season. The nest site may be abruptly abandoned when the emergent vegetation is altered by drought or flooding. These terns will vacate a site to choose another. One study observed that they can re-nest up to 42 kilometres 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, preferring to immerse only 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 Terns were often 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 Raven (*Corvus corax*), Northern Harrier (*Circus cyaneus*), and even large fish may prey upon adults. A variety of predators feed on chicks and eggs: Great-horned Owl (*Bubo virginianus*), Black-crowned Night-Heron (*Nycticorax nycticorax*), Great Blue Heron (*Ardea herodias*), Long-tailed Weasel (*Mustela frenata*), muskrats, minks (*Mustela vison*), Norway Rat (*Rattus norvegicus*), Northern Water Snake (*Nerodia sipedon sipedon*) and raccoons (*Procyon lotor*) (Dunn and Agro 1995, D.V. Weseloh, pers. comm. 2000). These terns can offer no defence 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 the 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. Ducks Unlimited Canada, which manage water levels at Tiny Marsh and numerous other dyked wetlands, do not draw down wetlands with abundant emergent vegetation, but use drawdowns to stimulate vegetation growth in wetlands devoid of emergents (Dave McLachlin, pers. comm.). Black Tern will readily accept both artificial or restored wetlands provided the wetlands are biologically rich (Dunn and Agro 1995).

4.2.2 Least Bittern (*Ixobrychus exilis*)

Least Bittern is the smallest heron (28-36 cm) and the most inconspicuous. Its presence in the dense emergent vegetation 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 the observer.

4.2.2.1 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 is best described in terms of temperature: south of regions with prolonged winter frosts, which include the Atlantic coastal plain, the Gulf of Mexico coastline, and regions to the south.

In Canada, the Least Bittern nests in southern Manitoba east to the Maritimes, including New Brunswick and possibly Nova Scotia. In Ontario, it breeds predominantly to the 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. In the late 1800s in Ontario, Least Bittern was locally common and abundant in marshes of the lower Great Lakes. 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.

The behaviour, habits, and habitat of this bird make determining population size and trends difficult to obtain and hence to analyse. For example, with the exception of Florida, Breeding Bird Surveys data have been too few to permit assessment of populations of Least Bittern in North America. The species' abundance ranges from rare to locally common. The consensus among North American birdwatchers and ornithologists, however, is that Least Bittern has not only declined over much of its range but has also been extirpated from some areas. In 1988, Sandilands and Campbell described the status of Least Bittern as Rare while in 1994, Austin and Cadman described the status in Ontario as Threatened. In 2000, Least Bittern is listed as a Species of Concern nationally and Vulnerable provincially.

4.2.2.2 Natural history

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

The nest of the Least Bittern is an elevated platform with an overhead canopy built of emergent vegetation and sticks. The canopy is created 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 metres from open water or from channels made by muskrats. The depth of water below the site ranges from eight centimetres to almost one 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 varies from 20 to 73 percent, depending upon the location of the nest within the cattail marsh. Nests along the periphery of the marsh tend to be least successful (Gibbs et al. 1992).

Least Bitterns 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 later become hunting platforms for young bitterns. These platforms and hunting techniques permit the birds 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 sepentina*) from below and Red-tailed Hawks (*Buteo jamaicensis*) and Northern Harriers from above. Marsh Wrens (*Cistothorrus palustris*) are known to puncture Least Bittern eggs, while American Crows (*Corvus brachyrhynchos*) raccoons and minks 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 percent of the Ontario wetlands south of the Precambrian Shield have been lost. Some of these wetlands would have provided habitat for the Least Bittern. Wetlands that remain don't necessarily guarantee appropriate habitat for marsh birds. In agricultural areas, siltation from erosion and runoff containing pesticides may degrade nesting and/or foraging habitats. The habitat may also become degraded by Purple Loosestrife (*Lythrum salicaria*), and/or *Phragmites* invading the marsh. Natural succession within a marsh makes it uninhabitable for Least Bitterns. High water levels may eliminate habitat. Storm water runoff from urban or agricultural areas appear to create conditions that make these bitterns vulnerable to parasitic nematode worms (Gibbs et al., 1992). Recreational activities may reduce either breeding or foraging success.

4.2.3 King Rail (*Rallus elegans*)

About the size of a small domestic chicken, the King Rail is a large, long-billed marsh bird that is more often heard than seen. A brief glimpse of this rail may be insufficient for the inexperienced observer to identify it, for in appearance the King Rail is quite similar to the more common Virginia Rail but considerably larger.

4.2.3.1 Distribution and abundance

The King Rail inhabits marshlands throughout much of eastern North America from the Gulf of Mexico to the Great Lakes regions, from the Atlantic coast west to the Great Plains of the continent. Populations also exist in the Greater Antilles and interior of Mexico. In Canada, this rail is found only in southern Ontario. While some populations in the southern U.S. coastal wetlands are doing well (Wemer 1997), elsewhere this rail is in serious trouble, and populations have been in severe decline since the 1940s. This has been the case for inland populations in the midwest: Ohio, Michigan, Iowa, and Missouri. This decline is particularly noteworthy in Ohio, where in the early part of the twentieth century the King Rail was the most abundant breeding rail in some of the Lake Erie marshes in that state (Friesen 1999).

Likewise in Ontario, anecdotal accounts indicate that the King Rail was a common breeder 100 years ago in the large marshlands of western Lake Erie and Lake St. Clair. Results from the Ontario Breeding Bird Atlas, 1981-85, indicate that the King Rail had become very rare in this breeding area with the exception of Walpole Island marshes, considered the main breeding location in Ontario. Although atlas data are inconclusive about the population trend in Ontario, population numbers have declined in many parts of North America. Breeding Bird Surveys recorded a significant decrease from 1966 onward with the King Rail being Blue Listed from 1976 to 1982. The King Rail is endangered in all states bordering Lake Erie except New York, where it has always been rare.

In 1997, an intensive search for King Rails was undertaken in southwestern Ontario. A total of 32 King Rails were located on territory in seven marshes, and more than 50 percent of the rails

found were in Walpole Island marshes (Friesen, 1999). The 1981-85 atlas survey suggests a breeding zone from Bruce Peninsula east to Kingston, with several possible but no confirmed breeders. Marshes scattered across this region plus remaining fragments in southwestern Ontario may yet provide suitable habitat. Tiny Marsh IBA is along this Bruce Peninsula to Kingston corridor.

4.2.3.2 Natural history

The natural history of the King Rail is described by Meanley (1992) and Reid et al. (1995). The habitat of the King Rail is the habitat of the muskrat (Meanley 1992). In wildlife refuges, two key components of this habitat are evident: densely vegetated sites with tussocks in shallow water for nesting and dry patches or swales of tall, dense vegetation for brood foraging and hiding during the mid-day (del Hoyo 1996). Even shallow water in broad roadside ditches with cattails or shrub swamps or upland fields near water may provide habitat.

The King Rail builds its nest in a clump of emergent vegetation, usually up to 30 cm above the highest watermark. Nest success is significantly related to both water depth and distance to open water. Clutch size is 10 to 12 eggs, and the large brood remains with the adult pair for at least 30 days after hatching. Initially, the parents feed the young, but by six weeks, the young are feeding themselves, although they remain in the company of their parents (Meanley 1992). While King Rails are omnivores, crayfish and aquatic insects are their main food. Foraging is mainly diurnal and always within a few steps from cover.

Raccoons, Red Fox (*vulpes vulpes*), Striped Skunk (*Mephitis mephitis*), and minks prey on King Rails, especially their nests. Both the Great Horned Owl and Northern Harrier prey upon adults. In marshes close to human habitation, cats and dogs may kill adult rails, since the birds are slow to flush (Reid et al. 1995).

With the exception of Walpole Island, the heart of Ontario's King Rail population, where Ducks Unlimited Canada (DUC) has no managed wetlands, almost all the remaining King Rails in southern Ontario have been observed in or near DUC projects (Wemer 1997). DUC managed marshes are maintained in hemimarsh conditions, i.e., about half diverse marsh of emergent vegetation and half open shallow water. Marsh succession can ultimately proceed to a lockup stage that results in an old and stagnant marsh choked with vegetation that accumulates most of the marsh nutrients (Pittaway 1997). Pittaway (1999) argues that many of Ontario's marshes are in lockup stage and are unsuitable for many marsh species. Meanley (1992) suggests that the best opportunity for long-term survival for the King Rail is on managed waterfowl refuges. Many factors impact negatively on King Rails. In general these factors include: water depth greater than 25 centimetres; chemical contaminants that reduce crayfish and aquatic insects; high numbers of mammalian predators which cause nest failure, particularly in fragmented marshes; and *Phragmites* and Purple Loosestrife (*Lythrum salicaria*), which compromise the quality of the habitat.

5.0 Other Elements of High Conservation Value

Managing water levels permits Tiny Marsh to maintain a high biodiversity and makes it one of the best marshes in Ontario to observe waterfowl and marsh birds. Each spring, thousands of waterfowl and other migratory birds stop over at Tiny Marsh IBA to feed and rest before continuing on to nesting grounds in the boreal forests, arctic, and grasslands of Canada. Tiny Marsh has 1,500 resident ducks and 800 resident geese. Peak migration numbers are 4,000 ducks and 1,000 geese (Lake St. Clair Technical Committee of the Ontario Eastern Habitat Joint Venture 2000). Common waterfowl species include Mallard, Wood Duck (*Anas sponsa*), Blue-winged Teal, Northern Pintail (*Anas acuta*), Green-winged Teal (*Anas crecca*), Ring-necked Duck (*Aythya collaris*), Lesser Scaup (*Aythya affinis*), Common Goldeneye (*Bucephala clangula*), Bufflehead (*Bucephala albeola*), Canada Goose (*Branta canadensis*), and others.

In the year 2000, a pair of Trumpeter Swans (*Cygnus buccinator*) nested at Tiny Marsh for the first time in recorded history (Middleton, 2001 pers. comm.).

With over 250 species observed in this IBA, Tiny Marsh provides both stopover for a large number of migrant songbirds and breeding habitat for more than 60 species. Tiny Marsh IBA provides habitat for a variety of medium-sized to large mammals: Red Fox, minks, White-tailed deer (*Odocoileus virginianus*), muskrats, and beavers (*Castor canadensis*). Several species of rare plants are found within the IBA (M-T-M Conservation Association 1999).

6.0 Land Ownership and Use

6.1 Land Ownership

Tiny Marsh IBA encompasses the Tiny Marsh Provincial Wildlife Area that is owned by the Ontario Ministry of Natural Resources.

6.2 Land Use

Tiny Marsh IBA was the first provincially owned and managed wetland in Ontario. It is one of 33 Provincial Wildlife Areas that provide for recreational day use by Ontario residents. The Midhurst District of the Ministry of Natural Resources oversees the MTM Conservation Association Inc. (MTM) which manages the Tiny Marsh Provincial Wildlife Area.

6.2.1 Historical

Tiny Marsh IBA lies within Huronia where some of the first contacts and interrelationships between Amerindians and Europeans were established. Samuel de Champlain first visited the region in 1615. His narrative accounts, maps, and the writings of the Recollet and Jesuit priests and missionaries provide accounts of the cultural and, to a limited extent, the biological history of this region.

On these early maps, present-day Tiny Marsh is assumed to be Lacus Anaouites, located on the southern boundary of Huronia (Wainio et al. 1973). Huronia was an area of approximately 800 km². Looking at a map of Huronia today, one can visualize how the waters of Georgian Bay and Lake Couchiching, together with rivers and marshlands, literally surrounded the villages and lands of the Hurons. These waters provided transportation routes, protection from enemies, hunting and fishing opportunities, drinking water, and irrigation for their crops.

In the mid-1600s, raiding parties of Iroquois virtually wiped out the Hurons who were significantly reduced in numerical strength by exposure to smallpox and other infectious European diseases. In June 1650, the surviving Hurons withdrew to Quebec with the remaining missionaries, leaving Huronia deserted for the next 150 years.

European settlement began in some parts of Huronia in the early 1800s, although Tiny Township and vicinity were not settled until after 1865. Throughout the Huron period and through the period of early settlement into the early twentieth century, Tiny Marsh and vicinity were home for Red Fox, beavers, Snowshoe Hare (*Lepus americanus*), porcupines (*Erethizon dorsatum*), and muskrats. Settlers used the area extensively for hunting and fishing. Muskrat houses numbered in the thousands even though the animals were trapped regularly. During migration, as many as 5,000 ducks would stop over. Since cranberries grew in great abundance, the marsh was locally referred to as Cranberry Lake. By 1900, beavers were all but extirpated. Loss of beaver dams caused the "lake" to be reduced in water level to that of a marsh.

In many parts of Ontario in the late nineteenth century, marshes were drained to create agricultural lands. However, attempts to drain Tiny Marsh were mostly unsuccessful. The marsh simply presented poor agricultural opportunities. Drainage and damming occurred over a 60-year period during the first half of the 1900s. Through the efforts of Ducks Unlimited and their partners, these dams were extended and dyked. The marshland has been re-flooded and water levels are maintained by a series of dykes, ponds, and ditches. During World War II, the Royal Canadian Air Force used the marsh as a target-practise range. In 1954, the Humber Gun Club, an affiliate of the Ontario Federation of Anglers and Hunters, proposed to refill the marsh and restore the water level to create an animal sanctuary. The concessions on the marshlands were purchased in 1967 from Tiny Township and local landowners. With government funding and a contribution of more than $1,000,000 from Ducks Unlimited Canada, dykes, islands, ponds and ditches were constructed.

6.2.2 Current

The upland portions of Tiny Marsh consist of natural habitat and agricultural fields which are leased to local farmers for hay production. In 1980, with the assistance of Ducks Unlimited Canada, the marsh was divided into three cells for water level management. Ducks Unlimited Canada manages water levels in the cells for MTM Conservation Association. Today, naturalists, hunters, nature photographers, canoeists, hikers, and fishermen visit Tiny Marsh. Opportunities to view, photograph, and study a diverse number of bird species are provided both for nearby residents and tourists. On average, 10,000-12,000 people visit Tiny Marsh IBA annually, 8,000-8,500 of them with an interest in viewing nature. Waterfowl hunting draws 500-800 hunters

annually, while approximately 500 hunters engage in upland game hunting (Lake St. Clair Technical Committee of the Ontario Eastern Habitat Joint Venture 2000).

There are 25 kilometres of trails with a self-use trail guide, four observation towers, a marsh viewing mound, a wildlife blind, and a boardwalk. An interpretive centre houses displays of plant and animal life of the marsh while a theatre is open to the public in spring and summer and to groups by appointment throughout the year. The MTM Conservation Association conducts ongoing research and management projects to improve wildlife populations and their habitat. Fur-trapping occurs annually in the late fall and early spring.

7.0 Conservation Management Achieved at Tiny Marsh

Tiny Marsh is managed as a multipurpose recreation area by MTM Conservation Association, a volunteer non-profit organization. MTM manages and maintains three provincial Wildlife Management Areas (Marl Lake, Tiny Marsh, and Matchedash Bay) in partnership with the Ontario Ministry of Natural Resources and Ducks Unlimited Canada. The association co-operates with 18 affiliate organizations which include naturalists, anglers, hunters, hikers, photographers, canoeists, educators, agriculturalists, and dog-trainers, all of whom acknowledge that land management is best served by combining their efforts. MTM supports programs that benefit the natural resources and the environment. As well as the day-to-day management of the three Wildlife Management Areas, the association involvement ranges from school education programs, delivered by Bluewater Interpreters, to habitat management.

Tiny Marsh is classified as a provincially significant wetland, and as such is accorded protection under provincial policy. Tiny Marsh and adjacent wetlands, Matchedash Bay, and Marl Lake are significant stopover sites along two North American flyways, the Atlantic and the Mississippi. Research is ongoing at Tiny Marsh to enhance habitat for wildlife and improve wildlife populations within the area. Management practices include controlling water levels for waterfowl habitat. Nest boxes have been put up for Wood Ducks and Hooded Mergansers. Trapping of furbearers, particularly muskrats, is done in late fall and early spring. Upland habitats are actively managed. Food plots and feeding stations are maintained for certain wildlife. Hedgerows are planted and brushpiles maintained to provide cover for Ring-necked Pheasant and upland game. A section of Tiny Marsh is designated as sanctuary (see Figure 3) in which hunting and other recreational activities are prohibited. A banding program has been set up to learn about migration habits of the waterfowl utilizing the marsh. Part of the marsh is designated as sanctuary and out of bounds to hunting (see Figure 1). Hunters are not permitted to use motorboats or permanent hunting blinds. A blind for viewing and photographing wildlife is available.

Tiny Marsh IBA is a Provincial Wildlife Area and, as such, activities are regulated and may be restricted. Hunting practices established at Tiny Marsh pose no direct threat to IBA species since Black Terns, Least Bitterns, and King Rails have migrated before the season opens. Muskrat trapping occurs before bitterns and rails arrive in spring and does not begin in fall until after both

species have migrated south. American Coots, considered to be rare in Ontario (Austen et al. 1994), remain into the fall hunting season.

Tiny Marsh is within the Severn Sound watershed, an area of 1,000 km^2. In response to nuisance algae growth within the watershed, caused by oversupply of phosphorus, the Severn Sound Remedial Action Plan was undertaken to rehabilitate the Severn Sound ecosystem. One of the major tributaries within the watershed is the Wye River, whose headwaters include Tiny Marsh. Any potential threat involving soil erosion and agricultural chemical runoff to Tiny Marsh should be addressed by this Remedial Action Plan.

8.0 Stakeholders

The following are major stakeholders within this IBA. There are undoubtedly other stakeholders who are not mentioned. The authors regret any omission.

MTM Conservation Association

MTM Conservation Association, a volunteer non-profit organization, manages and maintains three provincial Wildlife Management Areas, Marl Lake, Tiny Marsh, and Matchedash Bay, in partnership with the Ontario Ministry of Natural Resources and Ducks Unlimited Canada.

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. DUC constructed and manages the dykes and water control structures for MTM at Tiny Marsh, and sits on the MTM management committee.

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 Tiny Marsh Provincial Wildlife Area, and sits on the Management committee of MTM that manages Tiny Marsh along with Matchedash Bay and Mud Lake. 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,

CWS develops innovative approaches that are 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). Migratory birds are the responsibility of the Canadian Wildlife Service in Canada. The CWS has been using Tiny Marsh as a control site for colonial bird monitoring (Weseloh, pers. comm.). The CWS web page is: http://www.on.ec.gc.ca/wildlife_e.html

Bluewater Interpreters

Bluewater Interpreters, through contract with MTM Conservation Association, offer year-round, hands-on, curriculum-based programming concerning Tiny Marsh, from primary to OAC level to the region's schoolchildren, as well as to the general public.

Recreational Users

Among the range of users of Tiny Marsh are school groups, waterfowl hunters, naturalists, recreational walkers, and local residents.

Township of Tiny

The IBA is within Tiny Township. Municipalities are given responsibility by the province for many aspects of governance such as land use planning and regulation and maintenance of roads and other services. Municipalities regulate land use though a zoning bylaw in the Official Plan.

Field Naturalists

Three Field Naturalist clubs exist within a short distance of the IBA – the Orillia Field Naturalists, the Penetang/Midland Field Naturalists, and the Brereton Field Naturalists. Tiny Marsh is a popular destination for nature observation by members of these clubs. Club members have contributed significantly to the Black Tern and Least Bittern Study.

9.0 Opportunities

A core of skilled naturalists lives within a relatively short drive of Tiny Marsh. Many of these naturalists were involved in the Black Tern and Least Bittern Surveys in 2000 (see Appendices 2 and 3). These surveys employed a standard protocol and obtained baseline data that will provide future reference to the relative abundance of these species as well as the number of Black Tern nests. The methods also provide insights into assessing the nesting success of Black Terns by determining the ration of adults to young (Holt, M. and J. Broadfoot, 2000). Continuing this monitoring program will be of great value in future years.

The second Ontario Breeding Bird Atlas will result in relatively intensive surveys of the breeding birds across the province. This enhanced level of birding should increase the knowledge of species living in and near Tiny Marsh, whether they are breeding, and how abundant they are.

The IBA species breeding within Tiny Marsh IBA attract Ontario birdwatchers, naturalists, and nature photographers, especially in late spring and early summer. Tiny Marsh is one of two marshes in Ontario whose managed water levels have contributed to a healthy marsh and to the

presence of a diverse marsh bird community (Pittaway 1997). Each April, MTM Conservation Association hosts the annual Waterfowl and Migratory Bird Viewing Day. The public has an opportunity to visit different sections of the marsh and learn first-hand bird identification and the natural history and status of the marsh's bird life from experienced naturalists and birders of the Orillia, Midland, and Brereton (Barrie) Naturalist Clubs. In 1999, this viewing day coincided with the Elmvale Maple Syrup Festival, bringing the importance of Tiny Marsh to the attention of a wider audience.

Bluewater Interpreters offers year round, hands-on, curriculum-based programming concerning Tiny Marsh to elementary and secondary school children as well as the general public. The environmental education program attracts 1,000-2,000 participants annually (Lake St. Clair Technical Committee of the Ontario Eastern Habitat Joint Venture 2000). These programs are offered both at Tiny Marsh and in classrooms. The Interpretative Centre offers seasonal programs that serve to introduce people to the marsh through guided nature walks as well as slide shows and displays. Bluewater Interpreters, for example, offer a live reptile and amphibian display that has over a dozen specimens.

The marsh bird IBA species thrive in a hemi-marsh condition and, in marshes such as Tiny Marsh, maintaining such conditions requires sound management skills and practices. The opportunity exists to instruct both schoolchildren and the general public about marsh management for wildlife including IBA bird species.

Tiny Marsh IBA offers opportunities to view, photograph, or study birds for residents and tourists. Enhancing these opportunities by the development of infrastructure and promotional materials could benefit the local tourist-based economy and raise the profile of the marsh as an ecological treasure.

10.0 Threats

Disturbance of nesting or roosting birds is a potential problem, particularly due to the multi-use nature of Tiny Marsh. However, disturbance is low at present, and MTM is taking measures to minimize potential causes of disturbance within the IBA (IBA Steering Committee, pers. comm. 2001). A considerable portion of the marsh is zoned as sanctuary and is out of bounds in all seasons (see Figure 1).

Purple Loosestrife (*Lythrum salicaria*) is a non-native plant that grows at low levels in the marsh. Elsewhere in Eastern and Southern Ontario, this garden escapee of Eurasian origin is highly invasive of wet and damp areas, to the detriment of native vegetation. At Tiny Marsh, it is removed manually and has not had a significant impact on the wetland.

Chemical pesticides and fertilizers from agricultural land surrounding Tiny Marsh are a potential source of pollution, given that some of the surrounding lands drain into Tiny Marsh, which in turn drains into the Wye River.

11.0 The Action Plan

The following action plan lays out the basics for bird conservation in the Tiny Marsh Important Bird Area. The vision, goals, and objectives were developed over several meetings with the IBA Steering Committee. Bulleted strategies or actions follow each goal and objective. It will be in the interest of the Steering Committee and stakeholders to prioritize these goals, objectives, and actions. Implementation will be led by MTM Limited, the managers of Tiny Marsh, and will depend on the availability of resources and people. The suggested group or person responsible for implementation is listed in brackets, followed the Action's priority: H=high, M=moderate, L=low.

11.1 Vision

The Tiny Marsh Important Bird Area will be conserved and managed to protect populations of resident and migratory birds, as a place where birds can be monitored, studied, and enjoyed for the ecological, educational, *economic, and recreational benefits to the people of Simcoe County and beyond.*

11.2 Goals and Objectives.

1. *Protect and conserve significance of Tiny Marsh for Black Terns, Least Bitterns, and other marshbirds and waterfowl*

   A. Continue to manage water levels to obtain suitable conditions for Black Tern and Least Bittern (hemimarsh conditions)

      - Formalize management objectives with managing agencies and organizations (DUC, MTM, MNR, and other stakeholders) (M)

   B. Create conditions with a variety of water depths to maximize habitat diversity for wading birds, while not compromising Objective 1A

      - Investigate the potential for management of one cell as a seasonal shorebird and wading bird stopover (DU, MTM) (L)

   C. Avoid activities near breeding or feeding habitat that could conflict with species of concern during breeding season

      - Produce a management plan for Tiny Marsh that addresses the issue of user conflicts (MTM) (H)

      - Develop educational signage to inform visitors of area's significance (MTM) (ongoing)

- Produce a fact sheet and other materials on Black Tern and Least Bittern for circulation to Stakeholders and users of Tiny Marsh (MTM) (ongoing)

D. Determine populations of species of conservation concern (e.g., Least Bittern, Black Tern, King Rail)

- Conduct surveys to determine breeding population of Black Tern and Least Bittern (MTM) (Ongoing – see Appendices 2 and 3)

E. Establish monitoring system to track species of conservation concern

- Set up protocol for surveys in subsequent seasons (MTM, CWS, MNR, Bird Studies Canada, Trent University) (done)
- Arrange for volunteers to conduct surveys (MTM) (done)
- Send copy of results to NHIC after each season (MTM) (H)

F. Develop a database of relevant information on birds at Tiny Marsh

- Determine how survey results are to be stored and shared (MTM) (ongoing)
- Gather and compile historical information on birds observed at or near Tiny Marsh, and enter information in data bank (MTM) (ongoing)
- Establish a data management function on site (MTM) (ongoing)

G. Determine if and how water level management practices influence Black Tern and other marsh bird populations

- Promote research on this with relevant agencies and institutions (CWS, DU, MTM) (ongoing)

2. *Protect landbird populations within the IBA*

A. Assess woodland and meadow/grassland habitat on a regular basis for significant landbirds (e.g., Red-headed Woodpecker) and habitat conditions

- Communicate with atlassers during Breeding Bird Atlas to focus effort (point counts) and breeding searches on these areas and species of conservation concern (MTM CWS, Atlas regional coordinator and atlassers) (H)
- Conduct annual woodland surveys for Red-headed Woodpecker. Identify nesting, or potential nesting trees and assure that no logging or disturbance to the habitat occurs (MTM) (H)

3. *Reduce or eliminate potential for disturbances during breeding season*

A. Coordinate management practices more effectively between participating parties (users) to avoid potential conflicts

- Develop a timeline information poster to communicate user activities to the public throughout the year (MTM) (M)
- Develop in the management plan a zoning plan for Tiny Marsh that includes a no-entry area (MTM) (done)

4. Promote Tiny Marsh IBA to for ecotourism and education

A. Develop resources and programs that support and promote the IBA and its values

- Develop a "birding guide" to the region, featuring Tiny, Wye, and Matchedash IBAs and other areas of interest (local naturalist clubs, FON, OFO, DU) (M)
- Develop on-site infrastructure to facilitate bird observation such as a series of blinds (MTM, CWS, MNR) (M)
- Develop on-site signage about Black Terns. (MTM, DU) (H)
- Develop an education program (unit) with Bluewater Interpreters and interested local educators around species at risk, such as Black Terns (Bluewater Interpreters, MTM, local educators, FON) (M)

12.0 Evaluation

Planning in complex circumstances should include a system of 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 are a fundamental part of the planning process. The FON and its national partners are committed to supporting IBAs in plan implementation. Local stakeholders have already invested in the IBA and have a stake in its success.

MTM will oversee implementation of these actions. As a first step, MTM and other partners should establish priority actions and develop a time-frame for implementation. During the summer of 2000, a good step was taken to establish monitoring protocols, and undertake research on Black Terns and Least Bitterns (see appendices 2 and 3). Continuation of these activities, and implementation of others, will depend on availability of resources and the interests and energy of the stakeholders. An annual update on the conservation plan implementation would be of great value to the CNF, FON, and BSC.

As Tiny Marsh IBA has joined the global family of IBAs, information on the IBA will be incorporated into BirdLife's global IBA database. This database will be used to report on conservation progress in IBAs. The information required 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 within the IBA

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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 programmes. 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

The Canadian Nature Federation (CNF) 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

The mission of Bird Studies Canada (BSC) 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. Least Bittern Survey, Tiny Marsh and Matchedash Bay

The Least Bittern (LEBI) is a small, shy member of the heron family. COSEWIC (Committee On The Status Of Endangered Wildlife In Canada) lists the Least Bittern as a species of Special Concern. The low numbers of Least Bitterns in Ontario are primarily the result of loss of wetland habitat.

A monitoring program for Least Bitterns was conducted at Tiny Marsh & Matchedash Bay between May 29 to June 19, 2000. There were two monitoring routes at both sites. Each route consisted of 10 observation/listening stations placed approximately 250 metres apart in suitable habitat. At each station tape-recorded calls of Least Bittern were used to aid in detection. Three surveys approximately a week apart were conducted on each route. The results are shown in the table below.

	TINY MARSH West Cell	TINY MARSH South/East Cell	MATCHEDASH BAY Brereton Cell	MATCHEDASH BAY Thiffault Cell
SURVEY 1 May 29 – Jun 2	0 no LEBI seen or heard	0	0	5
SURVEY 2 Jun 5 – Jun 8	1	2	5	10
SURVEY 3 Jun 12 – Jun 19	2	3	6	5
DOMINANT VEGETATION	Bullrush, Cattail (*Scirpus, Typha*)	Cattail, Bullrush, Sedge (*Typha, Scirpus, Carex*)	Cattail (*Typha* spp.)	Cattail (*Typha* spp.)
WATER DEPTH	15 – 92 cm	15 – 77 cm	14 – 39 cm	0 – 11 cm

This year the main marsh at Matchedash Bay experienced very low water levels due to low levels in Georgian Bay/Lake Huron. It was interesting to observe the difference in green-up between the main marsh & the Brereton Cell on June 7. New cattail growth was seen throughout the Brereton cell showing a 99 percent green-up. The main marsh area was still mostly brown with very little new cattail growth: only 10 percent green-up. Also birdsong and activity was much greater in the Brereton Cell than in the main marsh area.

Three teams conducted the Least Bittern surveys. At Tiny Marsh Andy Fletcher and Melanie Radder looked after both routes. The Brereton Cell at Matchedash Bay was surveyed by Sid and Dorothy Hadlington and Margo Holt. Pat and Jim Woodford surveyed the Thiffault Cell at Matchedash Bay, which appears to be the Least Bittern capital with a high of 10 birds.

Margo Holt

Appendix 3. Final Report by the MTM-IBA Committee

Citation:
Holt, M & J. Broadfoot. 2000. *Least Bittern & Black Tern Monitoring Report for Tiny Marsh & Matchedash Bay Provincial Wildlife Areas.*
M-T-M Conservation Association

Abstract: Field studies were conducted to assess Black Tern (*Chlidonias niger*) and Least Bittern (*Ixobrychus exilis*) populations at Tiny Marsh and Matchedash Bay. Point count data were collected for Least Bittern at Matchedash Bay (Thiffault and Brereton cells) and at Tiny Marsh between May 29 and June 19. LEBI point counts were lowest at Tiny Marsh (0.133 responses/station) and highest at Thiffault (0.667 responses/station). Point count responses were intermediate at Brereton (0.367 responses/station). Black Tern point counts were conducted only at Tiny Marsh. An average of 5.28 adult Black Terns was observed during six surveys conducted between June 12 and July 27. Point count data collected during four surveys between July 18 and July 27 indicated a ratio of 8.5 flying juveniles per 100 adult Black Terns. Black Tern nest surveys conducted in six sections of Tiny Marsh between June 10 and June 18 resulted in a count of 95 nests and 432 flying adults. An average of 2.32 eggs was observed per Black Tern nest. The implications of these results and plans for future data gathering are discussed.

Introduction

Black Tern (BLTE) and Least Bittern (LEBI) surveys were conducted at Tiny Marsh and Matchedash Bay during the year 2000 field season. Both of these birds are species of conservation concern – BLTE, listed as vulnerable in Ontario by COSSARO and not at risk nationally by COSEWIC in 1996; LEBI, listed as nationally vulnerable by COSEWIC in 1988. Consequently the MTM Conservation Association has great interest in developing methods to monitor their abundance and distribution. Black Tern surveys have been conducted in the past at Tiny Marsh, first by MNR and then by volunteers from MTM. These surveys related to counts of flying adults made in June during most years. Observers traversing habitat in canoes counted flying terns. Sampling effort varied in terms of areas of the marsh surveyed and the number of observers. No similar BLTE surveys were conducted at Matchedash. Information on LEBI was not gathered according to any formal protocol.

During the 1999 summer field season researchers from the Canadian Wildlife Service conducted a series of feasibility studies at Tiny Marsh related to BLTE nesting success. Results from this study indicated what appeared to be a relatively low nest success (percentage of young reaching fledgling age). High levels of predation by Northern Water Snakes (*Nerodia sipedon sipedon*) and gulls (*Larus* spp.) was suggested as a possible explanation (Weseloh, pers. comm.). About this time, MTM became involved in the Important Bird Areas (IBA) conservation planning process. Associated with this IBA process was the planning of field surveys of BLTE and LEBI to be conducted at Tiny Marsh and Matchedash Bay. The field surveys were designed to provide

results that were reproducible over time and collected with consistent sampling intensity. This was seen as being important in terms of using data to assess trends in abundance. Additional surveys were designed to assess BLTE recruitment (ratio of flying young to adults). This later survey was seen as valuable in light of the results of CWS nest success studies conducted in 1999 indicating a relatively low survival rate of young BLTE.

This report presents the methods and findings of BLTE and LEBI field studies conducted at Tiny Marsh (both BLTE and LEBI surveys) and Matchedash Bay (LEBI surveys only) during the year 2000 field season.

Acknowledgments

The following volunteers helped with this years BLTE surveys: Margo Holt, Pat Woodford, Jim Woodford, Sid Hadlington, Dorothy Hadlington, Andy Fletcher, Betty Macpherson, Jim Macpherson, Jim Forest, Barry Chapman, Kip Campbell, Melanie Radder, and Jim Broadfoot. Three teams conducted the LEBI surveys as follows: Andy Fletcher and Melanie Radder at Tiny Marsh; Sid and Dorothy Hadlington along with Margo Holt at the Brereton Cell, Matchedash Bay; and Pat and Jim Woodford at the Thiffault Cell, Matchedash Bay. Thanks to all!

Methods

Study Areas

Surveys were conducted at Tiny Marsh (44°36' N, 79°56' W) and Matchedash Bay (44°40' N, 79°45' W).

Tiny Marsh is comprised of cattail and meadow marsh communities interspersed with open water. Water levels at Tiny Marsh are managed by Ducks Unlimited Canada. Water levels can be manipulated independently in three dyked cells. All cells were flooded during surveys. The surrounding upland habitat was approximately 50 percent agriculture. Thirty percent of the landscape was forested. Matchedash Bay represents a large and diverse wetland subject to water level fluctuations associated with Georgian Bay (long-term water level fluctuations and short-term, wave induced "flooding"). Field studies were conducted in dyked cells (Thiffault and Brereton) managed by Ducks Unlimited Canada. Both cells were under flood conditions at the time of surveys. Water levels in the main marsh were low. The surrounding upland habitat at Matchedash presented about 50 percent forest cover. Agriculture was present but was practised on less than 20 percent of the landscape.

Both study areas lie within the Manitoulin-Lake Simcoe ecoregion. This ecoregion experiences warm summers and mild winters, with a mean summer temperature of 16.5°C and a mean winter temperature of -4.5°C. The region receives about 750 to 1,000 mm precipitation which is evenly distributed through the year. Prevailing winds from the west and northwest in winter result in the development of "lake effect" snowfalls that result in significant snow accumulations particularly during early winter.

The region was submerged under glacial Lake Algonquin during the recession of the Wisconsin Ice Age (about 10,000 years ago). Soils reflect the regions geological history: the carbonate-rich soils were developed from the underlying limestone parent material (bedrock); the clays and silts are a result of glacial lake formation and recession; and the accumulated organic matter is a product of its more recent history as marshland.

Survey Techniques

Point Counts

A monitoring program for LEBI was conducted at Tiny Marsh and Matchedash Bay between May 29 to June 19, 2000. There were two monitoring routes at both sites. Each route consisted of 10 observation/listening stations placed approximately 250 metres apart in suitable habitat. At each station tape recorded calls of LEBI were played for three minutes (3-15 second recordings of LEBI calls separated by 45 second intervals). Call responses were listened for during a two-minute period. The number of LEBI seen or heard was recorded. Three surveys, approximately a week apart were conducted on each route between May 29 and June 19.

Point counts were also used to sample BLTE at Tiny Marsh. We used the same point count stations that were set up to sample LEBI. The point count method employed 20 stations set up with a minimum distance of 250 metres between them. The number of terns observed within a semi-circle of 100 m radius from the station were counted for a period of five minutes. The point counts were done on June 12 and 13 and July 18, 19, 26, and 27. Point counts conducted in July were used to sample both flying adults and juveniles (to be used as an index of recruitment). Note: Casual observation of flying young and adult BLTE were conducted from Tiny Marsh's dyke system on July 24 and 29.

The following information was collected once at each point count station: water depth, average vegetation height, average stem density, and species composition of most abundant plants (Table 1).

Black Tern Nest Survey

Tiny Marsh was surveyed intensively by crews of two observers using canoes between June 10 and 18. The marsh was segregated into six sampling areas, and one crew was assigned to each area. Observers recorded the total number of flying adult BLTE seen within their sampling area and the number of nests and eggs per nest. Maps were provided so observers could mark the location of nests.

Data Analysis

Field data were entered to digital files using Microsoft Excel (Version 7.0). The Excel workbook BLTE_Point_Count_2000.xls contains BLTE point count and nest survey data while the workbook file LEBI_Point_Count_2000.xls contains LEBI point count data. Summary data and parametric statistical tests were done using Excel. Non-parametric statistical tests were done using NCSS 97.

Frequency plots of data were inspected for correspondence to a normal distribution. Those data that conformed to "normality" were analysed using standard parametric statistical techniques. Those data that were clearly not normally distributed were analysed using non-parametric procedures – the Mann-Whitney U test for differences among medians. Statistical tests were evaluated using $\alpha = 0.05$ as the rejection criteria (i.e. tests with $P > 0.05$ were assumed not significant).

Table 1. Habitat and water conditions at point count stations used to assess BLTE and LEBI populations at Tiny Marsh and Matchedash Bay during year 2000 field surveys.

Location	Point Count Station #	Water Depth - cm	Vegetation Height - cm	Stem Density (#/sq.m)	Species
Tiny Marsh	1	61	0-91	<100	White and yellow waterlily, bulrush
Tiny Marsh	2	91	0-91	<100	Yellow waterlily, cattail
Tiny Marsh	3	60	0-60	<100	Cattail, yellow waterlily
Tiny Marsh	4	46	0-91	<100	Pondweed, white waterlily, bulrush
Tiny Marsh	5	60	0-60	<100	Pondweed, white waterlily, bulrush
Tiny Marsh	6	46	0-20	<100	Pondweed, pickerelweed
Tiny Marsh	7	31	0-91	<100	Bulrush, ywllow waterlily, pondweed
Tiny Marsh	8	60	0-60	<100	Pondweed, bulrush
Tiny Marsh	9	60	0-90	<100	Pondweed, bulrush
Tiny Marsh	10	15	0-60	<100	Bulrush, sedge, pondweed
Tiny Marsh	11	31	0-46	<100	White waterlily, grasses
Tiny Marsh	12	15	60	>100	Grasses
Tiny Marsh	13	15	0-51	<100	Grasses/sedges, yellow waterlilly
Tiny Marsh	14	60	0-91	<100	Cattails, white waterlily
Tiny Marsh	15	60	0-60	<100	Bulrush, white waterlily, pickerelweed
Tiny Marsh	16	60	0-91	<100	Cattail, white waterlily
Tiny Marsh	17	60	0-122	<100	Pondweed, cattail
Tiny Marsh	18	76	0-91	<100	Bulrush, cattail, white waterlily
Tiny Marsh	19	60	0-91	<100	Cattail, white waterlily
Tiny Marsh	20	60	0-91	<100	Cattail, white waterlily
Brereton	11	21	water	NA	Cattail – 15 m across
Brereton	12	14	170	>100	Cattail
Brereton	13	14	190	62	Cattail
Brereton	14	30	water	>100	Cattail
Brereton	15	39	water	>100	Cattail
Brereton	16	18	200	>100	Cattail
Brereton	17	18	water	NA	Cattail – 15 m across
Brereton	18	28	water	NA	Cattail – 15 m across
Brereton	19	0	91	>100	Cattail
Brereton	20	0	65	>100	Cattail
Thiffault	1	8	100	34	Cattail (Typha x glauca)
Thiffault	2	8	70	5	Cattail (Typha x glauca)
Thiffault	3	10	0	0	Grasses
Thiffault	4	1.5	170	30	Cattail
Thiffault	5	7.5	200	50	Cattail
Thiffault	6	11	100-200	40	Cattail
Thiffault	7	0	100-160	8	Mostly dead vegetation
Thiffault	8	0	150	30	Same as station # 7
Thiffault	9	0.5	150	40	Grass, cattail
Thiffault	10	0.1	150	20-40	Cattail, grass

Results of Black Tern Surveys at Tiny Marsh

BLTE Nest Survey

Tiny Marsh was segregated into six sections to conduct nest surveys. Each section was surveyed once between June 10 and June 18. Surveys were conducted by groups of two volunteers using canoes.

A total of 432 flying BLTE and 95 BLTE nests was observed. A correlation was evident between the count of flying adult Black Terns and the number of nests found ($P < 0.05$, Figure 1). Data for this relationship were compiled for each cell sampled in the marsh ($n = 6$).

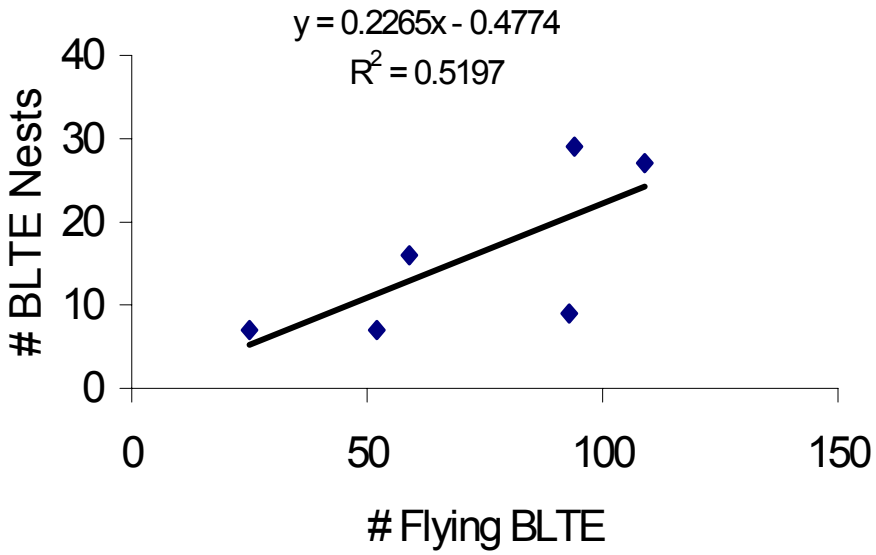

Figure 1. Relationship between counts of flying Black Terns and Black Tern nests observed during June 2000 canoe surveys.

We observed an average of 2.32 eggs/nest (SD = 0.890). The number of eggs per nest did not differ among the six sampling areas (ANOVA, $P = 0.4896$).

BLTE Point Count Survey

On average, 5.28 flying adult Black Terns were observed per station on six surveys conducted between June 12 and July 27 (SD = 4.551, n = 60, minimum = 0 , maximum = 22).

The July surveys were designed to sample flying juvenile Black Terns as well as adults. An average of 0.425 flying juvenile Black Terns was observed per station during four surveys

conducted between July 18 and July 27 (SD = 0.7808, n = 40). During the same time period an average of 5.00 flying adults were observed per station (SD = 4.646, n = 40). These data indicate an average ratio of 8.5 juveniles per 100 adults (= 0.425/5.00 x 100). Casual observations made from Tiny Marshes dykes of flying adult and juvenile Black Terns on July 24 and 29 indicated a ratio of 52.5 juveniles per 100 adults.

Least Bittern, Tiny Marsh and Matchedash Bay

LEBI Point Count Survey

Tiny Marsh data indicated an average of 0.133 Least Bittern call responses per station (SD = 0.6687, n = 60, minimum 0, maximum 2). Least Bittern abundance appeared to be higher within the Thiffault cell at Matchedash Bay than at Tiny Marsh with an average call response of 0.667 per station (SD = 1.0613, n = 30, minimum = 0, maximum = 4) (Mann-Whitney U, P = 0.00163). No differences in call response were evident among Tiny Marsh and Matchedash Bay's Brereton cell (mean call response 0.367/station, SD = 0.6687, n = 30, minimum = 0, maximum = 2) (Mann-Whitney U, P = 0.0654) or among Matchedash Bay cells, Brereton, and Thiffault (Mann-Whitney U, P = 0.2406).

Discussion

Black Tern Surveys, Tiny Marsh

Year 2000's BLTE surveys at Tiny Marsh represented a significant move forward for MTM in terms of its approach to monitoring. By employing point count methods, MTM will be able to reproduce this year's results spatially (same stations used through time) and in terms of sampling effort. This will allow MTM to track changes in BLTE abundance over time. Segregating the marsh into six sections for the purposes of conducting flying adult and nest surveys and assigning a single crew of two observers to each section will help establish reproducible nest survey results with consistent effort as well. Again, MTM will be able to use yearly data as an index to BLTE nest abundance.

BLTE point count data proved to be reasonable for analysis in that very few observation sessions resulted in zero counts and the data showed a clear "central tendency" (contrast this with LEBI point count survey data, see discussion below). Consequently, summary data can be comfortably reported in terms of mean, standard deviation, etc., and data can be analysed using parametric statistical techniques. This statement applies most strongly to flying adult BLTE data. Minor "distribution" problems were observed for flying juvenile data collected in July (more zero count records).

The correlation between flying adults counted and the number of BLTE nests found was reasonably strong. In this approach to analysis we assumed that data from each sampling area represented an independent count. This is probably realistic, even though BLTE can easily traverse the entire marsh relatively quickly, since counts were made by observers on different days, flying adults counted were those that mobbed observers when they neared nest sites (presumably local birds involved), the survey in each cell was only conducted once (no chance of learning to mob approaching survey crews based on past experience), and observers did not spend long in nest sites (low chance of drawing additional BLTE from other areas of the marsh).

With additional years of data we will be able to assess differences in the ratio of flying adult BLTE to BLTE nests within different areas of Tiny Marsh. This information, when combined with habitat data, may shed light on conditions that represent low or high quality nesting habitat.

The interest in finding the relationship between flying BLTE and number of BLTE nests stems from a desire to be able to convert data collected in the past at Tiny Marsh as simply the number of flying adult BLTE to an estimate of number of nests. Also, the ratio of flying adults to nests may indicate either the strength of a given years breeding effort and/or an ingress/egress of BLTE to/from other wetlands. This year's estimate of the ratio of flying BLTE to nests was 4.55. The implication is that, like in most bird populations, there is a large pool of unmated adults in the population. The ratio of unmated BLTE may change for various reasons, including changes in marsh habitat (availability of suitable nest sites, changes in food availability, etc.), increases in local breeding population, and an influx of BLTE from other marshes. By tracking this ratio through time, MTM may be able to contribute to the understanding of BLTE nesting dynamics. Since some of the cells at Tiny Marsh are drawn down periodically, as part of Ducks Unlimited long-term marsh management, conditions exist to evaluate the response of BLTE to reduced nest site availability. Interesting questions emerge: Will the number of adult BLTE occupying the marsh during the breeding season decline and the proportion of the population breeding remain the same, or will the number of adult BLTE remain the same and the proportion breeding decline? Records of both flying adult BLTE and BLTE nests will allow understanding of these aspects of BLTE spatial behaviour and population dynamics.

The results of our BLTE recruitment study are interesting but difficult to evaluate. It appears that the marsh only recruited about 8.5 juveniles per every 100 adults into the population in mid-July 2000. With no comparative data, little can be made of this statistic other than to infer relatively heavy losses of BLTE during the egg stage, newly hatched stage, and/or pre-flight stage. This heavy loss was indicated during 1999 field surveys conducted at Tiny Marsh by the CWS (Weseloh, pers. comm.). Whether this level of recruitment is low and indicative of a declining population can be partly answered using an age-structured BLTE population model. The question to be asked of the model would be: is this level of recruitment sustainable given the rates of mortality expected in the adult population? It is not known if a suitable model exists or if the adult mortality data needed to run such a model are available.

Least Bittern, Tiny Marsh and Matchedash Bay

The year 2000 point count surveys represent MTM's first attempt to monitor LEBI populations at either Tiny Marsh or Matchedash Bay. Consequently, no local comparative data are available.

The point count method developed appeared suitable to the task in that LEBI responses were recorded. However, the number of responses at each station was typically zero. This presents considerable difficulty when attempting to analyse these data. The proportion of zero counts resulted in a highly skewed frequency distribution from which to derive descriptive statistics. This situation typically results when surveys are applied to sample items having relatively low abundance. It undoubtedly plagues point count sample designs applied to many relatively rare organisms. From an analytical standpoint, the implication of skewed distributions is failure of the assumption of normality, making invalid the application of parametric analytical procedures and

description of central tendency and variance using the arithmetic mean and variance. At times, transformations applied to raw data result in a normal distribution. Common transformations applied to our data failed to "normalize" it. The result of all this is that the estimates of mean responses per point count station that we report are not strictly valid. We need to follow the lead of the current Breeding Bird Atlas group in terms of its analytical approach to point count data, since their data will also be problematic for some species.

Aside from the difficulties noted in the analysis/description of point count data noted above, our results do provide MTM with a starting point to the assessment of trends in LEBI and BLTE abundance. Data collected in 2000 were clearly robust enough for us to make conclusions related to the abundance of LEBI among sampling areas (even when using non-parametric tests). This result is encouraging and suggests that the point count approach has definite merit. A weakness of 2000's LEBI survey related to the quality of recordings. Observers all reported that recordings had poor quality and that tape players were inadequate. There is a definite need to purchase high quality recordings and players for the next field season.

Habitat Observations

In 2000, the main marsh at Matchedash Bay experienced very low water levels due to low levels in Georgian Bay/Lake Huron. It was interesting to observe the difference in green-up between the main marsh and the Brereton Cell on June 7. New cattail growth was seen throughout the Brereton Cell showing a 99 percent green-up. The main marsh area was still mostly brown with very little new cattail growth, only 10 percent green-up. Also bird song and activity was much greater in the Brereton Cell than in the main marsh area.