

**Dunnville Marsh
Management Plan**

May 1997

Preamble

The Dunnville Marsh property, situated at the mouth of the Grand River, was acquired from Canadian Pacific Rail Ltd. in early 1994. Its securement was made possible by the Nature Conservancy of Canada through funding provided from the Eastern Habitat Joint Venture of the North American Waterfowl Management Plan and the Great Lakes Cleanup Fund. The property, consisting of approximately 350 ha, contains marshlands, wetland swamps, agricultural fields, abandoned clearings and upland woodlands. The Grand River Conservation Authority was transferred ownership later in the same year.

The overall guiding principle and goal for the property strives "to preserve the lands as a natural area for the conservation and management of waterfowl, other wildlife and the natural communities." Towards these ends, a "Management Committee" and has been working towards the preparation of this management plan. This plan represents a significant contribution by the members of the Dunnville Marsh Management Committee.

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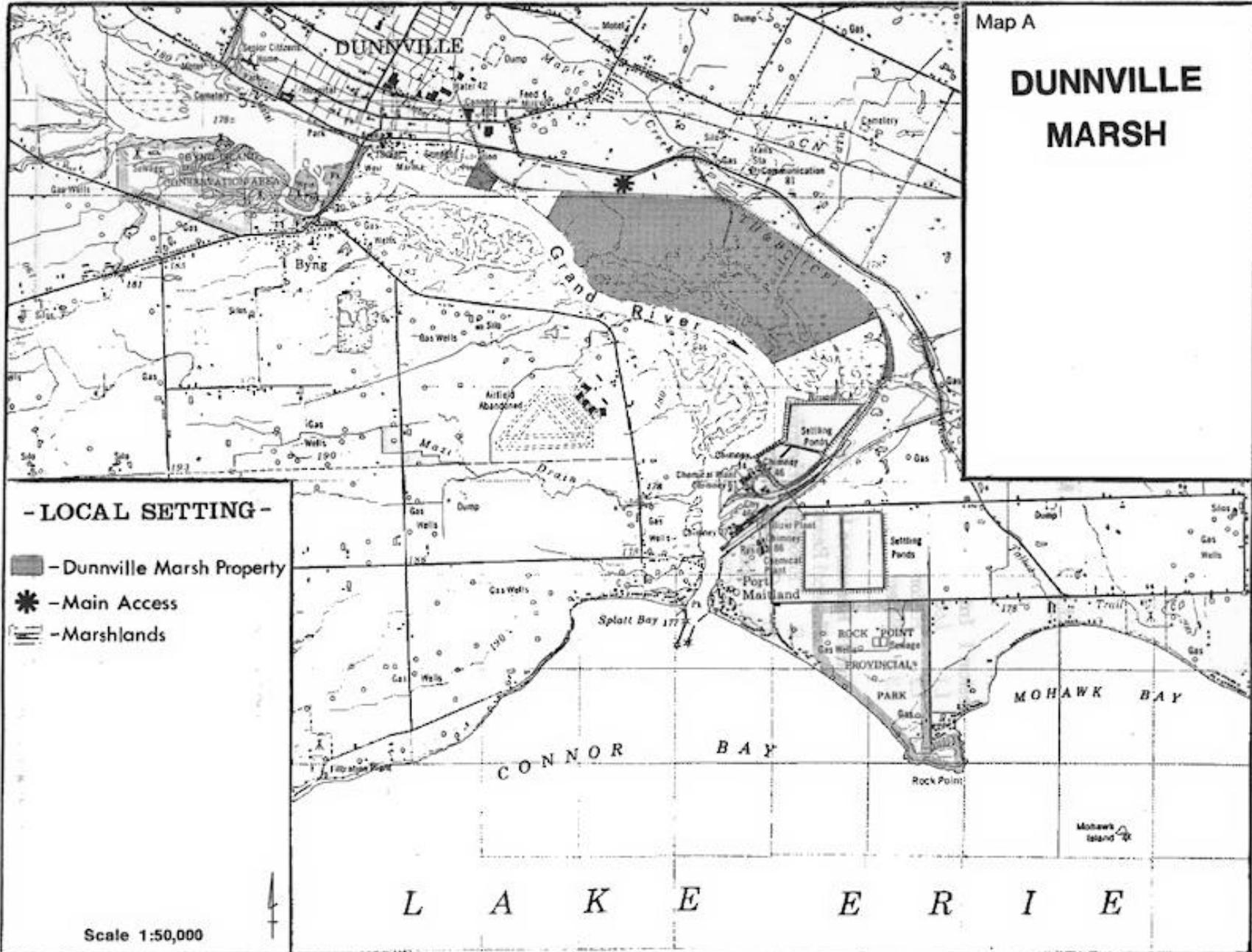
This committee was formed in 1994 to make recommendations and provide technical expertise towards the future management of the property. The public has been invited as well to participate in the planning process. This plan formally recognizes the efforts of all partners and participants plus provides the basis and framework for future, cooperative management efforts.

DUNNVILLE MARSH MANAGEMENT PLAN

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Map A

DUNNVILLE MARSH



Dunnville Marsh Management Plan

SECTION I - INTRODUCTION

I.1 Location

The Dunnville Marsh property is situated at the mouth of the Grand River just upstream of Port Maitland and Lake Erie. It is located within the Regional Municipality of Haldimand-Norfolk and the main access to the property can be located just off Regional Road #40 approximately 2.5 km east of Dunnville. The marshes can also be accessed by water from various boat launching facilities in the Port Maitland and Dunnville areas. The property is bounded by the railway allowance along the north and the Grand River along the south.

The property is described as the southwest parts of Lots 6, 9-21, Range I from the Grand River, Town of Dunnville, Regional Municipality of Haldimand-Norfolk. It contains approximately 350 ha of upland woodlots, agricultural fields, abandoned clearings, wooded swamps, and cattail marshes. There are also several municipal drains that flow southerly through the property to the Grand River (Map A).

I.2 Historical Perspective

Prior to 1994, the property was owned by the Toronto, Hamilton & Buffalo Railway and its later owner, the Canadian Pacific Rail Ltd. The tracks were initially laid down in 1915 to serve a small rail yard at Port Maitland. Later in the early 1960s, the line also serviced a fertilizer manufacturing plant. The rest of the property was determined to be surplus to the operating requirements of Canadian Pacific.

Development on the land has been primarily limited to agricultural and recreational hunting activities. The wetlands form the major landuse which have periodically changed with the rise and fall of water levels of Lake Erie. The Moulton Gun Club has leased and maintained a shooting range and clubhouse to the north of the tracks in Lot 12. The club has previously excavated five duck hunting ponds and has maintained access trails to these sites for waterfowl hunting purposes. The remainder of the property has been either used for agricultural cash cropping or left abandoned. There have been no buildings constructed on the property to date. There also remains to be an outstanding native land claim on the property.

I.3 Recent Transactions

Ever since Canadian Pacific Rail Ltd. deemed most of their lands to be surplus, efforts were made to secure the wetlands and to determine appropriate public use and management. In early 1994, the Nature Conservancy of Canada acted as the securement agency and facilitated the transfer and purchase. Funding was provided from the Eastern Habitat Joint Venture of the North American Waterfowl Management Plan and the Great Lakes Cleanup Fund. The Nature Conservancy of Canada then entered into an agreement with the Grand River Conservation Authority whereby the GRCA would take title to the property and work

with the EHJV partners to develop a plan and manage the area.

A "Management Committee" has been formed with representatives from the Town of Dunnville, the Six Nations, the Dunnville Bioregion, the EHJV, the Nature Conservancy of Canada, and the Grand River Conservation Authority. This committee performs a consultative review function and since its formation has renegotiated the agricultural lease with the local farmer, continued with the hunting arrangements with the Moulton Gun Club, and secured a legal land access to the property. It is presently preparing and approving this management plan for the area.

SECTION II - RESOURCE INVENTORY

II.1 Physical Resources

I) Topography/Hydrology

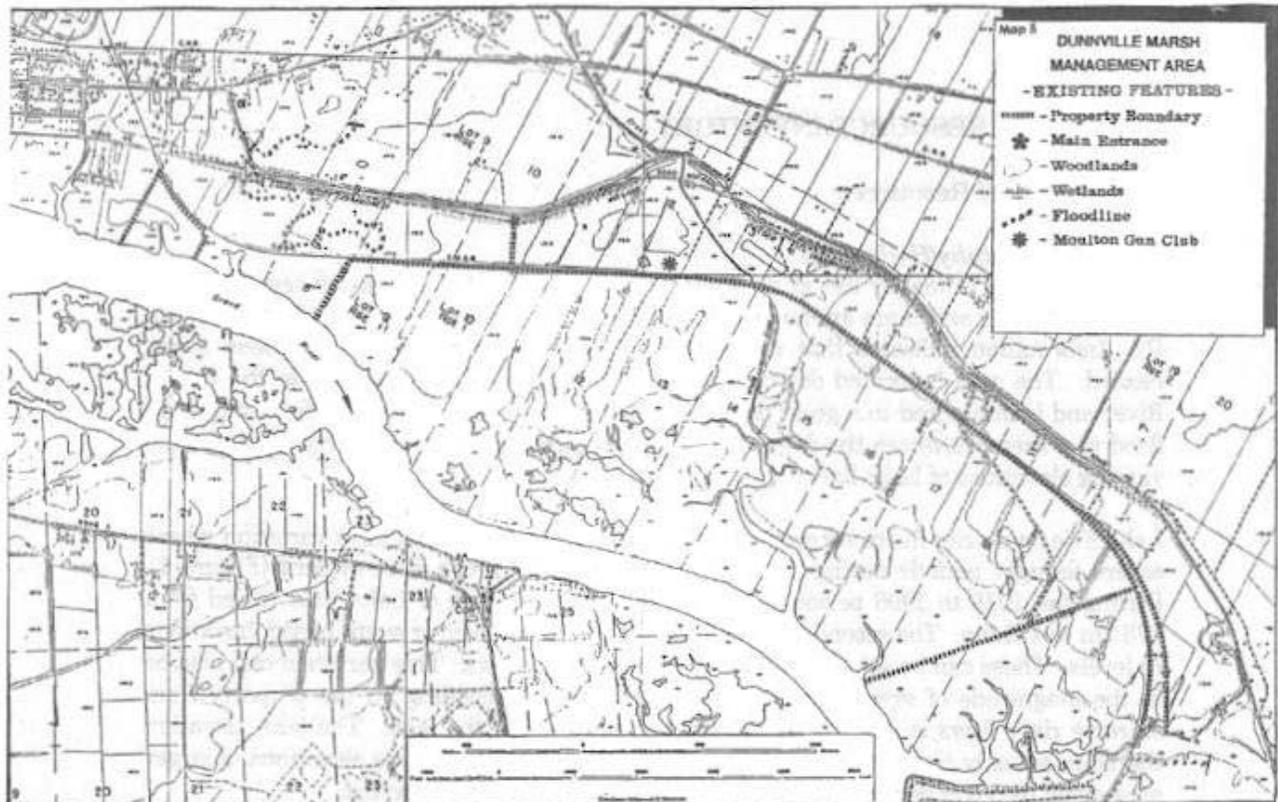
The property is primarily flat at an average elevation of 175m. It slopes very gently to the Grand River and there are no hilly, steep slopes or complex topography features (Map B). Information indicates that the entire property is floodplain and has been zoned hazard. The area is located downstream of the Dunnville Dam adjacent to the Grand River and is influenced to a great degree by Lake Erie. The river during flood stage can flood vast areas; however, the dominant driver of hydrology on the property would be the varying elevations of Lake Erie.

Lake Erie levels can fluctuate on two time scales. There is the long term variation where severe drought periods during the mid 1930s and early 1960s were evident (Figure 1). During the 1918 to 1996 period, the mean monthly elevation of Lake Erie varied from 173.2m to 175.0m. The second time scale considers the up term or event based variations in levels. These can be set up by wind or extreme river flows. This variation can also be in the magnitude of several metres. Also the extent of flooding on the property from extreme river flows is affected by the current elevation of the lake. The lake elevation therefore actually controls outlet of river flows. For higher Lake Erie elevations, a larger area along the river downstream of the Dunnville Dam would be flooded.

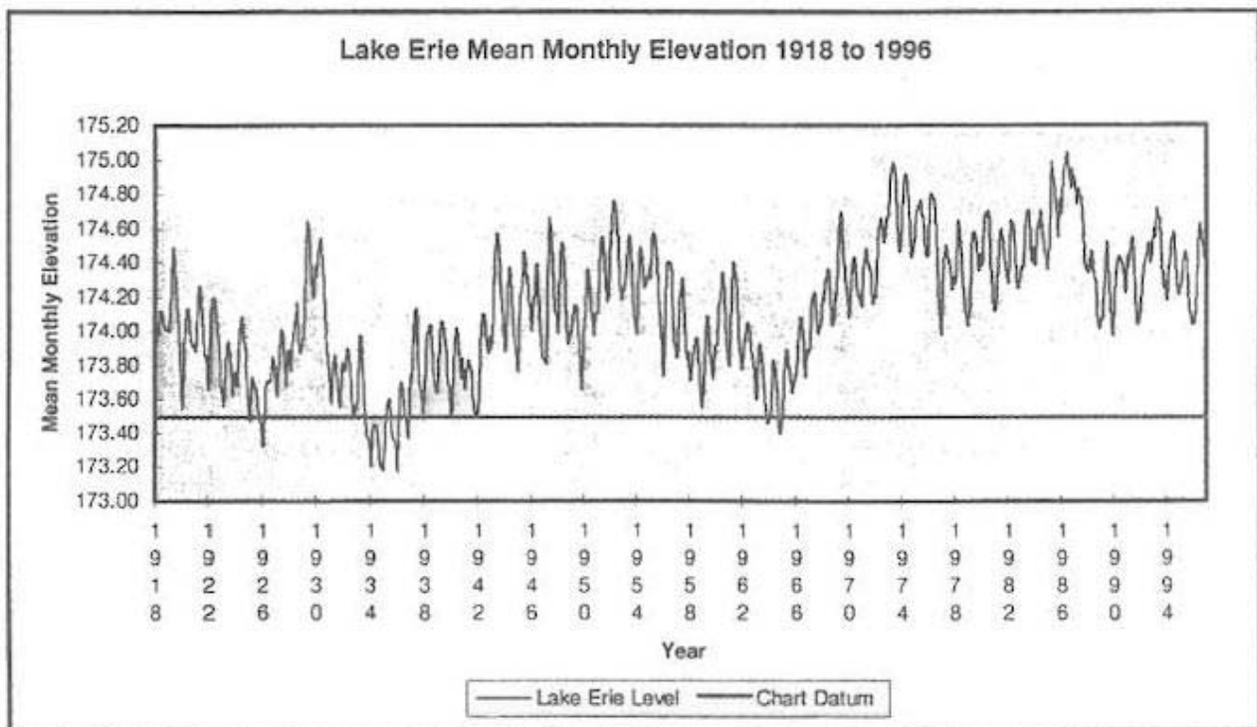
Flooding events of the wetlands along the river have changed over the past century and therefore these wetlands are constantly evolving. These flooding characteristics of the river were severely altered when the settlers cleared the forests and drained large wetland areas upstream. This tended to increase both the frequency of flood events from extreme river flows and the amount of sediment delivered to the marsh. For extreme lake events or extreme river flows, the flood elevations can vary from 174.6m to 176.3m. This demonstrates how the property must be regarded with respect to management.

ii) Geology/Geomorphology

The geological formations existing in the general area are shown on Map C. The bedrock underlying the lower Grand River in the immediate vicinity of the Dunnville Marsh property consists of sedimentary rock formations of the Paleozoic Age. The composition of the bedrock is indicative of its origin as ancient marine sediments. The bedrock types also form a series of narrow belts running parallel to the Grand River and include the Bois Blanc formation of the Lower Devonian Period consisting of cherty limestone. This formation is estimated to be 374 million years old. There is also the Bertie formation of the Upper Silurian Period consisting of dolostone which underlies the Grand River and is estimated to be 395 million years old.

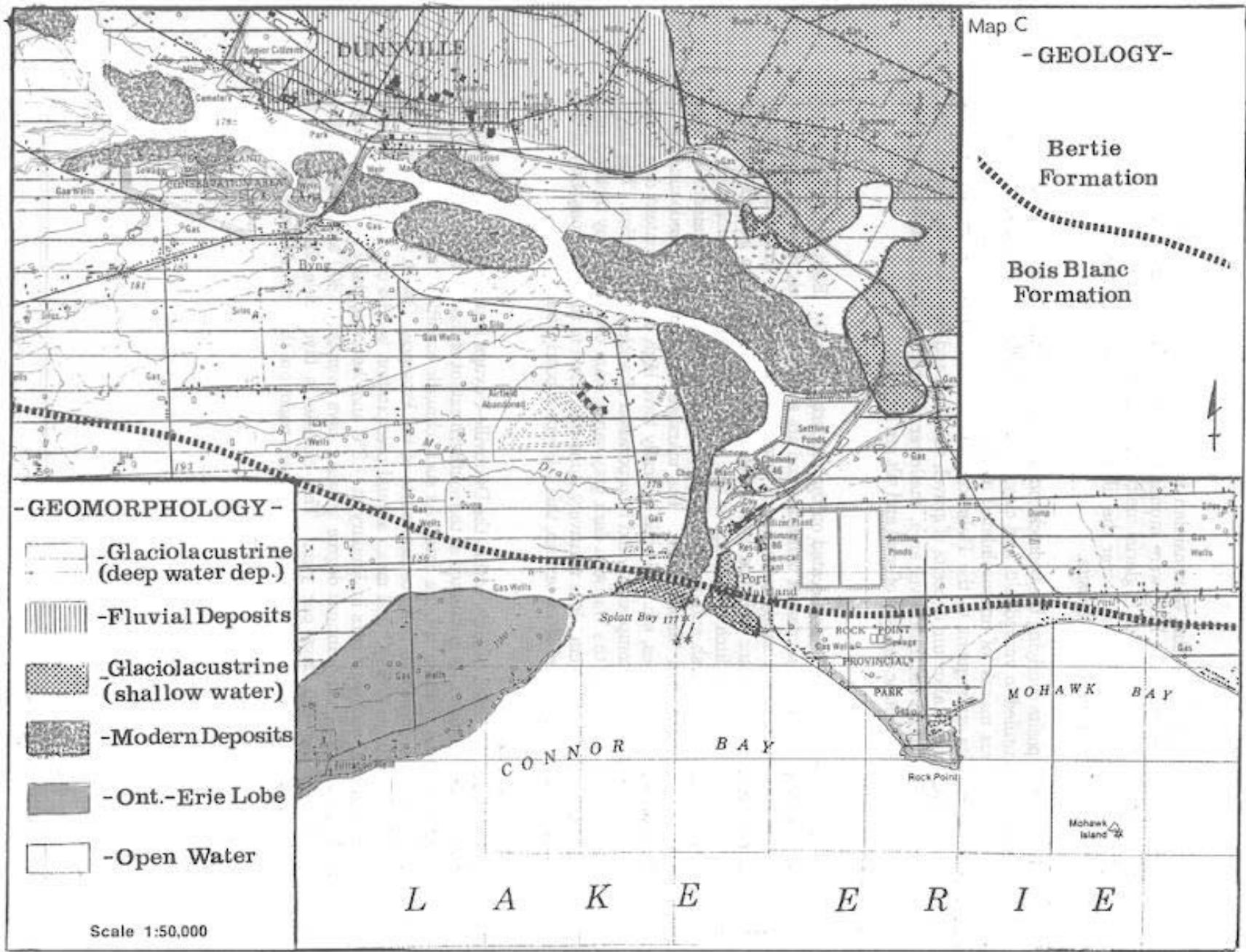


MAP B



Source: Environment Canada Mean Monthly Lake Erie Elevation at Port Colborne

Figure 1



During the recession of the Wisconsin ice sheet, approximately 17,000 years ago, inland areas around Lake Erie were inundated by a series of large glacial lakes that formed from the accumulation of glacial meltwater. The deep deposits of lacustrine clays, silts and sands were laid down over the till by these lakes and represent the parent materials of the modern soil deposits.

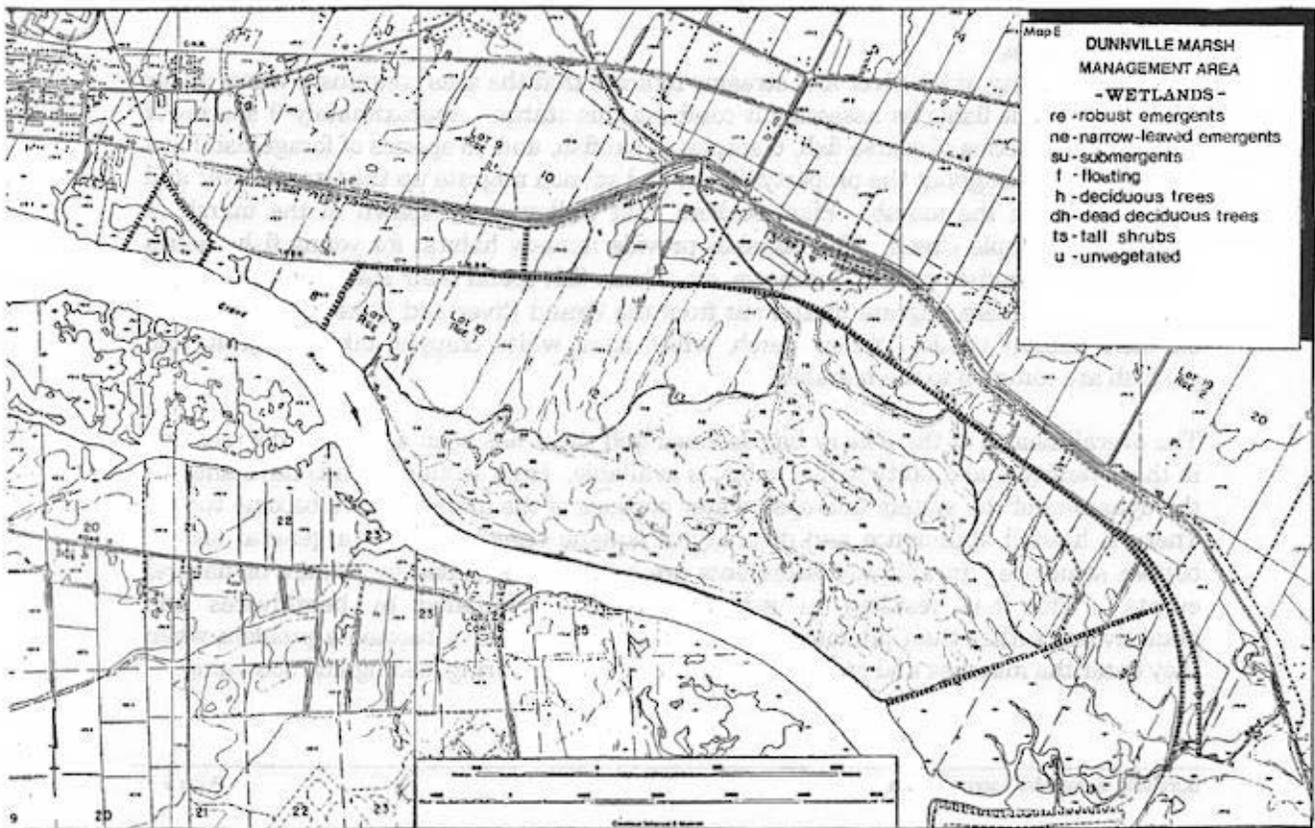
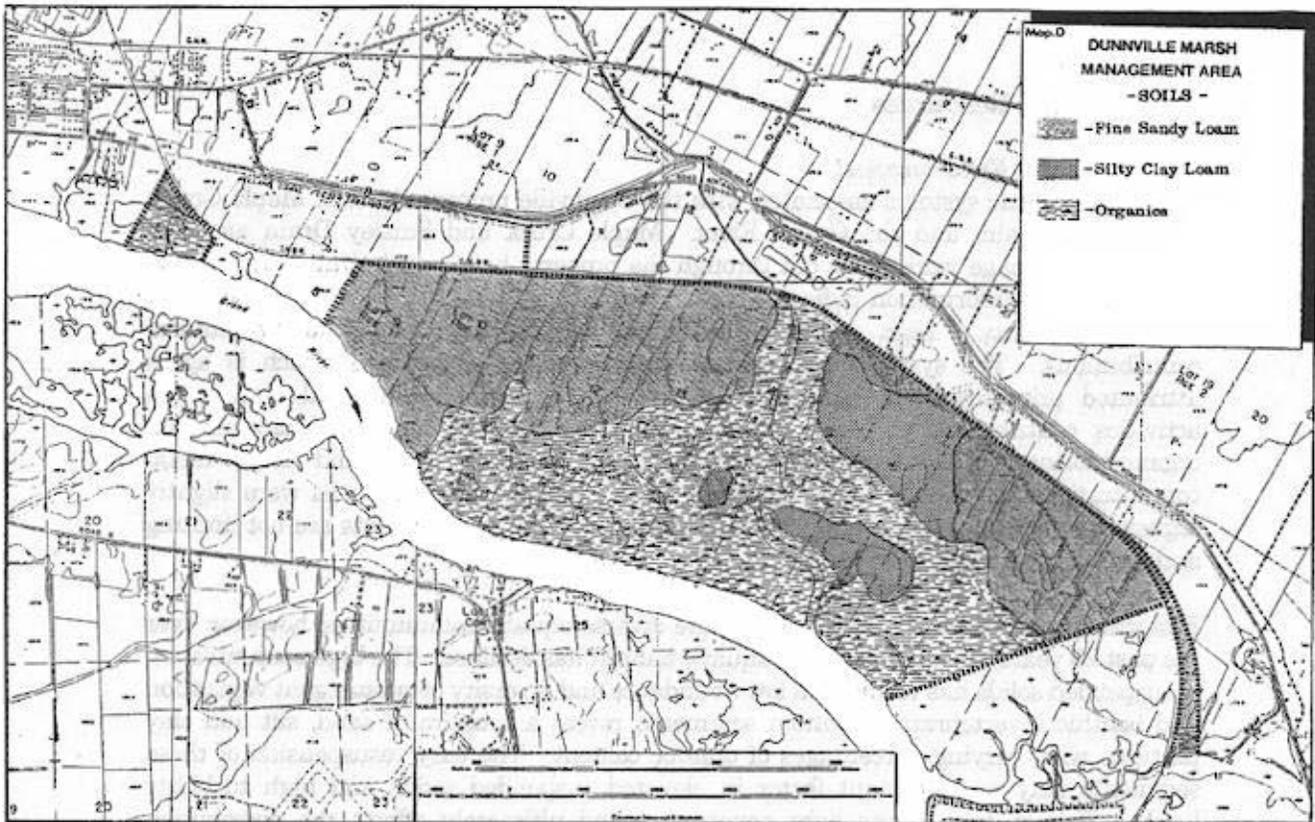
The glacial deposits overlying the bedrock consist of glaciolacustrine deep and quiet water deposits of stratified to varved silts and clays. The brown limestone bedrock is overlain by a continuous mantle of unconsolidated material that varies in depth from 10-23m. Recent deposits subsequent to the Pleistocene/Quaternary Geological impacts include modern fluvial and alluvium deposits of gravel, sand, silt and clay along the Grand River corridor. Back from the main river area, shallower water glaciolacustrine deposits, near shore beach and deltaic deposits of sand and silt are located.

iii) Soils

There are two main soil types located on the property (Map D). Both are derived from calcareous glaciolacustrine parent materials and are generally poorly drained. The main soil type consists of fine sandy loam and is located back from the Grand River on the higher ground. The other soil type consists of a silty clay and loam located primarily along the stream and ditch outletting to the river. The large remaining part of the property consists of marsh and organics situated along the flat, poorly drained, low area of the Grand River and Maple Creek. The marshes are comprised predominantly of cattails, sedges, bulrushes, etc. All soils typically have high organic content due to the nature of deposition, decomposition and incorporation of wetland vegetation. The major soil type is described as the Wauseon dark grey sandy loam overlying grey mottled sand and clay at about 30-60 cm. It is relatively stone free. Due to the impermeability of the subsoils and the low relief of the terrain, this soil type is poorly drained.

iv) Climate

The property is located entirely within the Dunnville-Cayuga Ecoregion of Site District 72 of Southern Ontario. It is situated at the southern extent of the Grand River Watershed along the northern shore of Lake Erie. As such, climatic conditions are moderated and milder than the northern more central parts of the Province. On an annual basis, the mean temperature is 8.9°C and mean annual precipitation is 86.4 cm. The mean daily minimum temperature occurs in January at -7.8°C and the mean daily maximum occurs in July at 27.8°C. The annual degree growing days averages 3,800 and the frost-free period averages 150 days per year. This climate is favourable for the growth of Carolinian species characteristic of more southern regions of the United States.



II.2 Natural Resources

I) Aquatic Environment

The three aquatic systems associated with the Dunnville property include Maple Creek, the Paisley Drain, and the Grand River. Maple Creek and Paisley Drain are both municipal drainage works that cut through the property before outletting to the Grand River. Current information indicates that the aquatic systems are highly enriched with low water clarity. High sediment loads are derived from upstream agricultural contributions. The systems also contain high levels of phosphorus which is again attributed primarily from agricultural uses; with municipal, industrial, and urban activities contributing to lesser extents. Bottom sediment analysis indicates that organochlorine pesticide concentrations are below detection limits and heavy metal concentrations are mostly below threshold levels. Arsenic concentrations were slightly higher than the landuse criterion. Micronutrients within the sediments are not limiting and are not considered to be toxic.

Historically, the Dunnville Marsh had quite diverse aquatic communities; however, over the past 20 years, the quality of this aquatic habitat has declined. The high concentration of suspended solids has resulted in low abundance and diversity of submergent vegetation and benthic invertebrates. Bottom sediments reveal a mixture of sand, silt and clay particles with varying percentages of organic content. The easy resuspension of these sediments play an important factor in elevated suspended solids and high turbidity levels. This in turn limits light penetration and ultimately affects the distribution patterns of aquatic vegetation and biomass production.

ii) Fisheries

The water quality of the river and streams indicate that the area contains a warm water fishery. Current fisheries assessment confirms this status. Approximately 9 species of gamefish, 11 species of coarse fish, 6 species of panfish, and 18 species of forage fish have been located throughout the property. Trout and salmon migrate up the Grand River and tend not to use the marsh. Pike, suckers, and walleye may spawn in the marsh or upstream in Maple Creek. The marshes provide nursery habitat for young fish species such as bass, sunfish, catfish, minnows, etc. Some fish spend their entire lifespan in the marsh, while others migrate in and out from the Grand River and Lake Erie depending on their habitat needs. Yellow perch, white bass, white crappie, lake sturgeon, and goldfish are common to the marshes.

The overall health of the fishery has declined and there has been a gradual degradation in the diversity, and quality of fish habitats available. High sediment loads have affected the dynamics of the system and open water portions of the marshes have become turbid. There is limited abundance and diversity of aquatic vegetation, and a general lack of bottom structure. In addition, sediments are easily resuspended by human or natural events. This has resulted in fish communities dominated by benthivores and planktivores rather than predators. Also, abundant carp have become a problem when they enter the marshes and resuspend bottom sediments during feeding and spawning.

iii) Wetlands

The lower Grand River supports an important system of wetland plant communities that extends from Dunnville to Lake Erie. This area constitutes the largest wetland complex along the north shore of Lake Erie east of Long Point. It consists of a series of five large riparian and riverine wetlands that are representative of the still water environment. One of these sections of marsh totalling approximately 200 ha, is contained within the boundaries of the Dunnville property (Map E). The property also contains one of the few remaining undisturbed riparian wetlands forests in the region.

The most abundant plant community is the cattail marsh. Associated with these robust emergents include limited amounts of narrow-leafed and broad-leafed emergents, floating and free floating plants such as sedges, arrowhead, pickerelweed, waterlily, and duckweed. There is also limited amounts of submergent vegetation such as pondweeds. Purple loosestrife has invaded the marshes to a great extent. This has caused a large scale reduction in wetland biodiversity in the general area.

From a wetland ecosystem perspective, the fluctuating water levels have played a major role in determining the extent, form, distribution, and health of the marshlands. Historical data indicate that as recently as the 1930s, the marshes were farmed for hay production. Farm machinery greatly simplified the surface grades, and reduced the heterogeneity of the former wetland features. Also, the high loadings of fine silts and clays from excessive soil erosion within the watershed and the loss of supply of coarser sediment have created a disruption in the sediment transport and storage equilibrium of the marsh ecosystem.

These resulting imbalances have caused problems which have physically contributed to biological instabilities, poor habitat quality, simplified community structure, low productivity, and reduced biodiversity. These factors, combined with the introduction of non-native invasive species such as carp and purple loosestrife, etc., have left the marshes in a somewhat degraded state.

iv) Wildlife

The lower Grand River system represents a varied and somewhat productive habitat for wildlife. The wetlands provide breeding, cover, and food requirements for an assortment of mammals, birds, reptiles, amphibians, and invertebrates. The Dunnville property likely supports most of the species known in the region. The area is considered to be locally significant for waterfowl production and staging. The species that have appeared here are primarily dabbling duck species such as mallard, green-winged teal, blue-winged teal, and black duck. Peak observance of these species normally occurs from March to mid-April in the spring, and from mid-September to early December in the fall. Waterfowl harvest data have also included wood duck, pintail, canvasback, redhead, goldeneye, bufflehead, wigeon, old squaw, gadwall, ring-necked duck, Canada goose, snow goose, scoter, merganser, and scaup species.

An extensive list of other bird species has been inventoried at the site. Surveys reveal that the cattail marshes are dominated by marsh wren, red-winged black bird, swamp sparrow, Virginia rail, and common yellowthroat. Other species of note include American bittern, robin, black tern, bobolink, common grackle, common tern, green-backed heron, great blue heron, killdeer, ring-billed gull, sora rail, spotted sandpiper, willow flycatcher, greater yellowlegs, bank swallow, Caspian tern, purple martin, cedar waxwing, turkey vulture, double-crested cormorant, golden eagle, red-shouldered hawk, and black-crowned night heron. In total, 64 bird species have been tallied. Very little information to date has been collected on the interior-core woodlot habitats or the open agricultural and abandoned grasslands, and hedgerow areas.

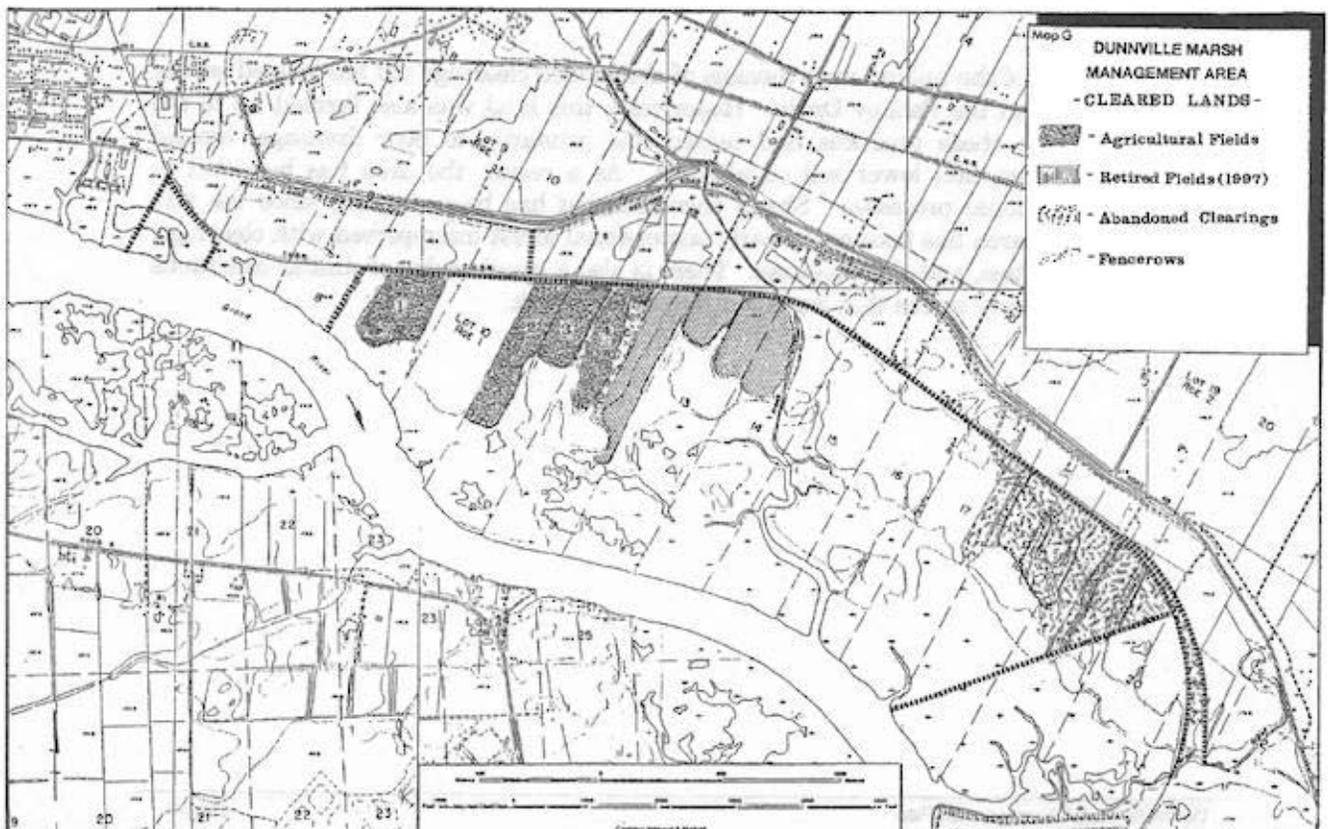
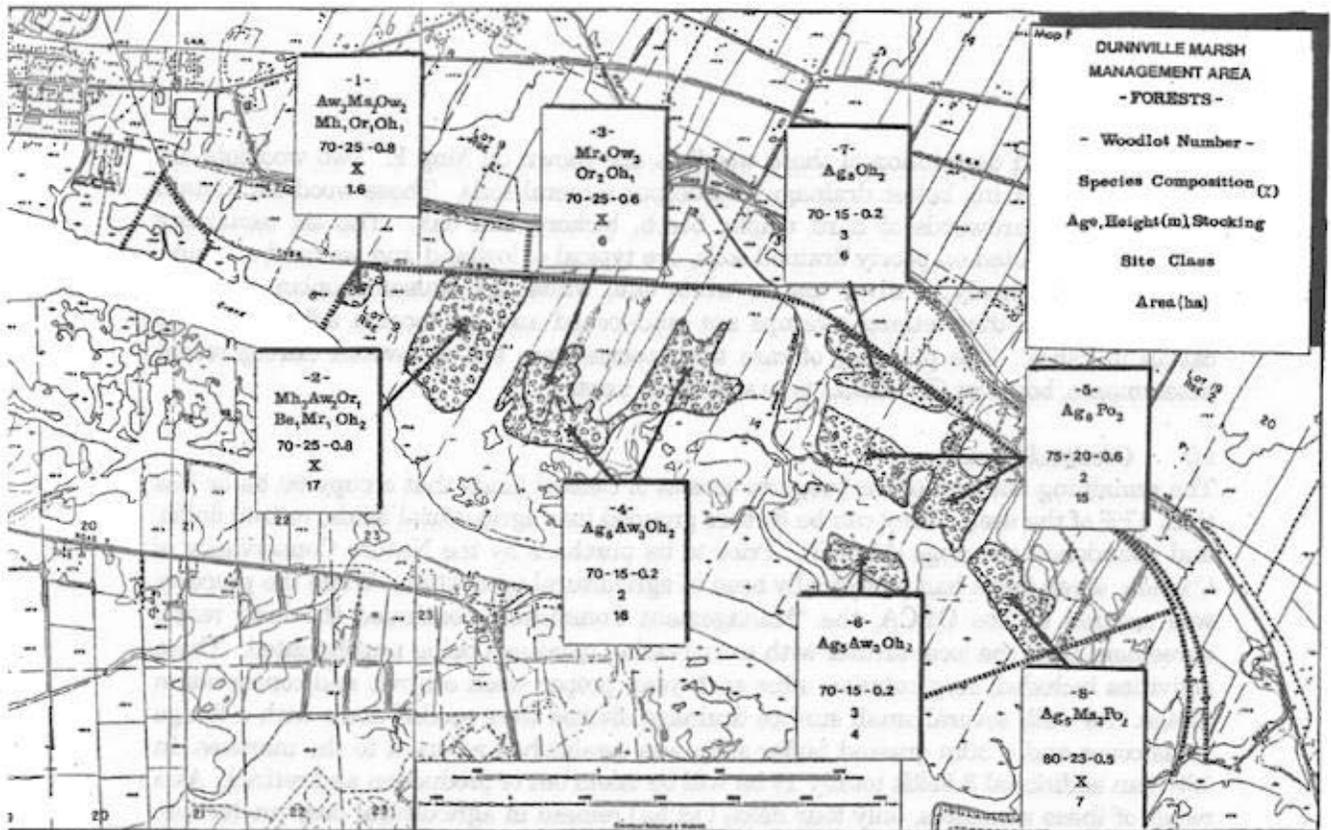
Of notable importance is the nesting and feeding habitat of a Provincially endangered species; the bald eagle. The isolated wooded swamps presently contain a nesting location for this species along the north shore of Lake Erie. Careful management must be applied to this site to ensure its protection.

The property also supports local populations of mammals. The muskrat is especially abundant here and is harvested by local trappers. Raccoon, mink, and beaver have also been observed along the Grand River. Other species observed foraging in the marsh include the skunk, and the red fox. Deer frequent the area as the marshes provide suitable over-wintering and spring rearing areas. Other mammals of note include grey squirrel, red squirrel, cottontail rabbit, coyote, and opossum.

The area likely supports most of the reptile and amphibian species known to the region. The shallow pools and quiet littoral zones provide breeding habitats for a variety of herpetofaunal species including leopard frog, green frog, bull frog, and spring peeper. The more open deeper waters are preferred by the painted turtle, snapping turtle, Blanding's turtle, and northern water snake. Further inventories will be required to reveal the full variety of species utilizing the area.

v) Forests

This part of the region was settled around 1800 and lumbering was the main industry during those early days when the land was being cleared for settlement and agriculture. The forests were again harvested in the early 1900s and during the 1940s for construction materials and firewood. It is believed that no harvesting has taken place over the past 50 years. Much of the Dunnville property was wooded, however today only eight remnant woodlots totalling 73 ha or 20% remain. Only one woodlot contains trees of a suitable size that would attract commercial harvest interests, while the remaining woodlots are in poor condition due to the absence of past management, restricted access, and poor drainage. The forests are generally over 70 years old, average 25m in height and have varying percentages of stocking. They are located in the Deciduous Forest Region and are typical of woodlots found throughout the Niagara Peninsula.



The location and description of these woodlots are shown on Map F. Two woodlots are upland types; having better drainage and deeper mineral soils. These woodlots contain characteristic hardwoods of hard maple, beech, hickory, and oak. The six remaining woodlots are located on poorly drained soils, are typical of lowland and wetland swamps, and consist primarily of silver maple, white elm, white oak, balsam poplar, ash, and willow. Most of the wetland swamps are land-locked and are located adjacent to the cattail marshes. The presence of rare tree species were not discovered during recent assessments, however Carolinian type species do exist.

vi) *Cleared Lands*

The remaining features of the property consist of cleared lands that occupy 60 ha or less than 17% of the area. They can be further grouped into agricultural fields, retired fields, and abandoned clearings (Map G). Prior to its purchase by the Nature Conservancy of Canada, seven fields had periodically been in agricultural production. When the property was secured by the GRCA, the "Management Committee" continued the land rental agreement with the local farmer with conservation measures being implemented. These activities included; crop rotation after each year, proper weed control, and conservation tillage. As well, several small surface drainage ditches were seeded down with a forage grass cover and a 30m grassed buffer strip was established adjacent to the marshes. In 1997, an additional 3 fields totally 19 ha will be taken out of production and retired. As a result of these measures, only four fields (18 ha) remain in agricultural crop production. The GRCA retains the Ontario Farm Tax Rebate and applies the annual lease against the taxes.

The remainder of the upland area consists of abandoned clearings (23 ha) located east of Maple Creek and the Paisley Drain. Historically, this land was also farmed up to the 1960s; however, these practices had ceased due primarily to poor drainage, limited machinery access, and lower soil capabilities. As a result, the area has been left to natural successional processes. Shrub encroachment has been ongoing since the mid 1970s, and the area has become an early successional forest interspersed with clearings, shrub communities, and old fencerows. There is also a small wedge of similar conditions north of the railway tracks that leads south to Broad Creek.

SECTION III - MANAGEMENT PLAN

III.1 Background

The "Management Committee" has been undertaking studies and considering options on how to manage the ecological features of the property. This information and suggestions were presented to the public at an Open House held at the Dunnville Recreational Centre on February 22, 1996. The meeting was intended to get additional public input and feedback. A series of three management themes were presented that focused on: (i) wetlands, (ii) uplands, and (iii) public use. No specific recommendations or concerns were expressed by the public and there was a general consensus that the approach and directions taken by the "Management Committee" were acceptable. This set the stage for the establishment of goals, objectives, and management practices for the area.

III.2 Goal and Objectives

I) Goal

The future direction and management of the Dunnville Marsh property will be: "To preserve the lands as a natural area for the conservation and management of waterfowl, other wildlife, and the natural communities."

ii) Objectives

a) Wetland Management

- ▶ Conserve and protect rare and endangered species.
- ▶ Enhance the productivity, biodiversity, and ecological integrity of the wetlands.
- ▶ Increase populations of waterfowl by improving wetland habitat.
- ▶ Secure waterfowl resources by creating and managing quality wetlands.
- ▶ Provide fish with access to existing spawning and nursery habitats.
- ▶ Improve watershed conditions of Maple Creek and Paisley Drain.
- ▶ Secure and protect additional wetland areas of the Lower Grand River.
- ▶ Intensify efforts to control and eliminate invasive, non-native species.
- ▶ Improve habitat for wildlife utilizing the wetlands.

b) Upland Management

- ▶ Manage for native species.
- ▶ Create quality waterfowl nesting cover.
- ▶ Create wetlands in suitable upland areas.
- ▶ Promote land stewardship activities throughout the adjacent landscapes.
- ▶ Curtail agricultural landuse activities.
- ▶ Promote woodlot management and secure forested landscapes.
- ▶ Develop landuse practices to improve degraded areas.
- ▶ Improve wildlife habitat throughout the upland areas.

- c) Public Use
- ▶ Create opportunities for specific passive recreational activities.
 - ▶ Allow selective and traditional consumptive recreational activities.
 - ▶ Promote the educational, research, ecotourism, archeological features.
 - ▶ Establish a mechanism for determining public demands on the area.
 - ▶ Ensure the economic viability of the property
 - ▶ Prohibit undesirable uses in the area.
 - ▶ Allow public access in areas that are compatible with the ecology of the area.

III.3 Management Practices

I) Wetland Management

When considering any wetland management strategy for the Dunnville property, it is important to note that the extent, distribution, and disturbances of the wetlands are controlled to a great degree by the seasonal, cyclical, and unpredictable fluctuations of water levels of the Grand River and Lake Erie. In addition, inputs from upstream landuse activities have degraded and deteriorated productivity and biodiversity values of the wetland ecosystems. Management efforts must, therefore, be primarily directed at the promotion and implementation of landuse efforts and measures that will prevent the further deterioration and degradation of the wetlands.

These activities will include the establishment of well-buffered naturalized zones adjacent to the existing wetlands; plus further securement and protection of adjacent wetlands to the property. Sedimentation and siltation problems from upstream activities will need to be addressed through a comprehensive, effective, and coordinated soil, water, and wetland conservation strategy of the entire lower Grand River system.

Wetland habitat for fish and wildlife can then be selectively targeted for improvement, creation, and protection. These activities will include the protection of habitat for the bald eagle. Careful monitoring and assessment by qualified experts will determine necessary management efforts to ensure its continued success. Waterfowl habitat in particular will be improved and increased waterfowl populations will be protected from overharvesting efforts through the possible strategic incorporation of a wildlife sanctuary area.

Purple loosestrife infestations will be monitored and systematically targeted for effective control. Various techniques, including the biological control measures now in use, will be assessed and implemented accordingly. Control measures will ensure a return of the biodiversity values of the marshland plant communities.

ii) Upland Management

The agricultural cropping practices have been winding down since the property was acquired. It is proposed to curtail the remaining agricultural activities and manage the upland areas for wildlife. This will involve the creation of wildlife habitat throughout the field areas, plus the creation and improvement of habitat throughout the remaining sections of the property.

Nesting habitat will be improved for waterfowl and new wetlands will be created in the lower depression areas. Quality grassland habitat will be provided around these new wetlands and adjacent to the existing marshlands along the river. The combination of nesting and newly created wetlands will increase waterfowl and wetland wildlife populations in the area. A wildlife habitat plan will be prepared to determine the optimum setting for these activities.

Habitat for the other wildlife using the area will also be created, improved, and protected wherever possible. This will occur in the abandoned clearings, the old fencerows, and the upland woodlots. Further assessment and planning will be required to establish a natural heritage management strategy. This will most certainly involve and provide a combination of core, interior-edge, open area, hedgerow, linkage and corridor functions.

The upland woodlots will also be managed for a variety of compatible activities including passive recreation and woodlot management practices. A woodlot management plan will determine this, following further assessment and review. Additional woodlots in the immediate vicinity will also be considered for securement and management as well. It is proposed that the types of activities occurring on the Dunnville property be promoted as pilot-demonstrations that could be applied throughout the local landscape. Stewardship type arrangements will then be encouraged to other areas and features with assistance from the local community.

iii) Public Use

The general public will be encouraged to use the Dunnville property for a variety of compatible activities and interests. Traditional consumptive uses like hunting, fishing and trapping will continue to be accommodated on a controlled basis. As well, opportunities will be made available for the more passive recreational activities such as canoeing, cross-country skiing, hiking, nature viewing and photography, education and research, ecotours, and archeological studies. It is felt that these activities will not impact the features or the wildlife to any great extent. In addition, certain specific activities will be severely restricted or prohibited on site. Motorized craft and vehicles, horseback riding, dog trials, and camping have been included on this list. Facilities and access for the acceptable public uses will be planned and provided for accordingly, while deterrents and enforcement will be required to discourage the undesirable intruders.

III.4 Implementation

This plan is proposed to be implemented over a 5 year period, at which time a review will take place. It is suggested that the "Management Committee" remain and function as originally established. This committee will continue to authorize, review, approve and oversee the strategies, plans, and conservation actions proposed. The plan will be implemented through a number of mechanisms, agencies, and funding arrangements. The timing and scheduling of these developments will likewise be highly dependent upon these factors.

The key to the successful completion of the plan will no doubt depend on very innovative partnerships, community involvement, corporate sponsorships, and volunteer arrangements. This must be undertaken through mutual agreements such as the Eastern Habitat Joint Venture that is already in place. More such avenues must be sought and every effort will be made to take full advantage of funding initiatives

It is proposed that once the various management components have been approved for the wetlands, woodlots, uplands, wildlife, etc., the property will qualify for reduced land tax status. This will help offset the loss in revenue presently realized through the agricultural lease. Similarly, user fees, controlled hunting charges, etc. must be established to offset the annual operating costs. The development and management of the property must operate on a break even basis, or many of the actions proposed will not be able to proceed.

The management committee will also be responsible to ensure that sound environmental monitoring and evaluation are incorporated into all undertakings. Only in this way can the approach mechanisms and actions taken be successfully applied to other areas or issues in the local community.

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