A Proposed Wetland Restoration Project - Lake St. Clair

Final Report

"A socio-economic and environmental effects study of a proposed 1000 acre wetland restoration project near Lake St. Clair, in Southwestern Ontario"

Prepared for

EHJV•PCHE

EASTERN HABITAT JOINT VENTURE

LE PLAN CONJOINT DES HABITATS DE L'EST

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Executive Summary

Ontario's wetland habitats are critical to the survival of over 142 species of birds, 53 species of fish, 20 species of mammals, 19 species of amphibians and reptiles, and 350 species of plants. Of these, 17 species are included in the Ontario Endangered Species Act; and many are associated with wetlands located in the Carolinian Zone of southwestern Ontario.

The wetlands of the Lake St. Clair area are internationally recognized as being of continental significance to hundreds of thousands of waterfowl, shorebirds, and songbirds that migrate through the area twice a year on their way to and from winter habitats in the south and breeding habitats in the north. The importance of these wetlands stems from the fact that they provide important feeding and resting habitats at a critical location along the Mississippi and Atlantic (migratory) flyways.

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The Eastern Habitat Joint Venture (EHJV) has identified the Lake St. Clair area as one of Ontario's top priorities for migratory waterfowl habitat conservation. Through this study, the Lake St. Clair Technical Committee of the EHJV has investigated the possible socio-economic and biological implications of undertaking a wetland restoration project of approximately 1,000 acres in the vicinity of the Canadian portion of the Lake St. Clair shoreline. The primary goal of the restoration project is to increase the availability of waterfowl staging habitat within approximately 8 km of the Canadian shoreline of Lake St. Clair.

The general purposes of this study are to determine:

- The environmental, economic, and social effects of the restoration project of these 1,000 acres of wetland habitat
- How the benefits identified as part of this study could be applied to similar wetland proposals

The objectives of this study are to identify:

- The economic and social effects that the restoration of a wetland of this size will have on the local area (and other scales, e.g. regional), including but not limited to agriculture, tourism, and recreation
- The environmental benefits on local, regional, and continental scales of restoring a wetland in this type of landscape and socio-economic setting

Conclusions

The results of the analyses clearly suggest that the proposed wetland restoration project would provide substantial environmental and social benefits. They also suggest that the economic downside of the project is negligible and that there is a reasonable basis for expecting modest economic benefits. Accordingly, the EHJV partners and the Municipality of Chatham-Kent should consider moving forward with the initiative at the earliest opportunity.

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A key step in the methodology of the study was a comparative analysis of other restored wetland sites. Seven sites located in Michigan, Ohio, New York, and Ontario were selected based on their potential comparability to the EHJV project and their ability to provide a range of acquisition and management experiences. Restoration of wetland habitat was a key aim in the development of each of the seven sites.

The comparative analysis highlights the following characteristics:

- Management objectives
- Activities, services, and facilities provided
- Waterfowl, other wildlife, and wetland management
- Visitation, promotion, and economic impacts
- Relationships with surrounding landowners
- Staffing and budgets

An evaluation of the results of the comparative analysis was used to develop estimations of budgets, economic impacts, social impacts, site visitation levels, and recreational opportunities which may occur at the proposed restoration site.

Current wetland mapping from the Ontario Ministry of Natural Resources (OMNR) shows the wetland area in the Study Area to be approximately 4,806 acres. This figure varies considerably due to the fact that varying lake levels affect a large percentage of the coastal wetlands.

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Restoration of a 1,000 acre wetland would increase the area of wetlands in the Study Area by approximately 21 percent. The restoration project will likely consist of three to six wetland cells separated by dykes.

The design and management of the restored wetland will focus primarily on maximizing benefits to migrating waterfowl. It will benefit continental and regional waterfowl populations primarily by providing high quality Spring and Fall staging habitat for resting and feeding, which will improve the health and increase the chance of survival of migrating waterfowl.

Incorporation of ancillary compatible habitats has the potential to significantly augment local biodiversity and greatly increase the socio-economic benefits of the project.

It is not known with certainty whether the wetland would simply redistribute waterfowl currently using the area or if it would generate additional waterfowl stopovers; however, it is anticipated that additional wetland habitat will increase the number of migrating waterfowl using Lake St. Clair area as a stopover.

The primary purpose of the restored wetland will be as a feeding and resting area for migrating waterfowl; however, it is apparent that the incorporation of ancillary compatible habitats has the potential to significantly augment local biodiversity and greatly increase the socio-economic benefits of the project.

Additional habitat types which could be included in the restoration project include:

- Mudflat
- Tallgrass Prairie
- Swamp
- Woodland

Restoration of all of the proposed habitat types could more than double the total biota in the area to 804 species. Of the 534 additional species provided for by the restored habitat types, 135 are animals and 399 are plants. Twenty of the additional animal species and 39 of the plant species are considered rare. Of course, each of the various habitat types is associated with a group of species not found in any other habitat type. The shallow marsh and associated upland dykes, which will cover most of the restored area, will account for half (269 or 50 percent) of the new species. Swamps could add 91 (17 percent) additional species to the area and tall grass prairie could add 72 (14 percent). The remaining 102 species (19 percent) could be contributed through upland woodland habitat.

Additional recreation opportunities including birding and nature viewing and hunting, will be provided by the restoration of wetland habitat.

Additional recreation opportunities including birding and nature viewing and hunting, will be provided by the restoration of wetland habitat. The proposed basic wetland design alone will draw visitors, but incremental increases in biodiversity through the creation of additional habitat (e.g. mud flats to attract shore birds or grasslands) will likely increase visitation.

The restored wetland would add approximately 500 hunter days per season.

The local consensus is that there are too few sites to satisfy local demand for hunting; therefore, the proposed wetland is welcomed as a development that will help meet this demand. The restored wetland would add approximately 500 hunter days per season.

The total economic effect from new recreation expenditures associated with the restored wetland is estimated to be $200,000 to $430,000, annually. Total recreational user value (based on a "Willingness to Pay" approach) for the restored wetland is estimated to be $130,000 to $330,000, annually.

The economic effects of the wetland are directly related to attracting users to the site. Factors affecting human use of the site include the variety of habitat types, range of recreational opportunities, and the quality of the onsite facilities. The following variations on the basic options were evaluated: base case (marsh habitat with minimal facilities), mudflats (base case plus additional shorebird habitat), and interpretive centre (base case, several other habitats plus interpretive faciities).

While a specific site has not yet been selected for the new wetland, it is clear that 1,000 acres (405 ha.) of land will be acquired for the proposed facility. Intensive cropping is the predominant land use within the study area, with little idle land in evidence and virtually no livestock activity. All of the land to be acquired for the new wetland is therefore assumed to be arable farmland producing cash crops that are representative of the area.

The displacement of 1,000 acres of agricultural land implies a total annual loss in gross farm sales of $430,000 for a corn/bean rotation or $1,700,000 for a vegetable rotation. The corresponding losses in net farm income are $149,000 and $571,000, respectively. Depending on the proportion of cropping systems that are displaced, the actual losses will lie between these limits.

The cost of site land is expected to range from $3.7 to $4.5 million. This money is expected to go to farm families and to be used by these families to create annuity funds for retirement. Proceeds from the resulting retirement funds represent new household income amounting to $329,000 annually. Expenditures from this retirement income will, in part, offset the adverse economic impact of the loss of farm income discussed above.

From the perspective of business performance, it appears that a restoration project including an additional mud flat habitat is the best option in terms of the highest expected net operating income and the lowest risk of loss. The assessment of net public benefit suggests that the inclusion of an interpretive centre has the highest net economic benefit, even after risk is taken into account. The interpretive centre option also shows the best performance in terms of impact on economic activity, with only a small chance that a loss in activity might occur with this.

The assessment of net public benefit suggests that the inclusion of an interpretive centre has the highest net economic benefit.

These results imply that an optional business strategy would entail the initial development of the mud flats. If something resembling the interpretive centre is eventually desired because of the public benefits that it creates, then such a centre could be developed more gradually building on the experience and knowledge gained by running a more modest facility. Such an approach might also allow time to assess the impacts of increased use of the facility on the ecology of the wetland and the ecological benefits that are expected.

Social impacts of the project are positive and significant.

Social impacts of the project are positive and significant. The restored wetland will generate significant new recreational opportunities on publicly accessible land throughout most of the year. The findings of this study suggest that the potential for negative effects is negligible and would be limited to possible nuisance impacts such as trespassing, litter, noise, and parking/traffic issues. None of these issues were noted as being significant in the minds of local residents, either during this study or in the Phase I consultations, but were apparent at some of the comparative sites. The issues are easily controlled with proper site/facility design and management.

Crop damage resulting from waterfowl depredation was identified as a concern during the Phase I consultations. The finding of this study suggests that, should the project proceed, this should not be a significant occurrence.

A restored wetland in the Lake St. Clair area would be a very attractive opportunity for local educators. It is estimated that elementary schools in the Chatham-Kent region take 55 to 70 field trips annually which have an environmental focus. Assuming that there are 25 students per trip, this involves 1,400 to 1,750 students. If this assumption is applied to the seventeen elementary schools in just the Kent portion of the St. Clair Catholic District School Board, then there would be 35 to 40 environmentally focussed school trips annually that would involve 900 to 1,000 area students.

Summary

The combined environmental, economic, and social effects of the proposed project are positive and significant. The restored wetland will:

- Increase waterfowl staging habitat
- Increase local biodiversity
- Increase local hunting opportunities
- Increase local recreational opportunities
- Have a negligible economic effect
- Have positive public benefits
- Enhance local tourism potential
- Provide education and research opportunities
- Contribute to local cultural heritage
- Restore critical habitat within the Great Lakes ecosystem

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1. Introduction

Natural wetland

1.1 Background

Ontario's wetland habitats are critical to the survival of more than 142 species of birds, 53 species of fish, 20 species of mammals, 19 species of amphibians and reptiles, and 350 species of plants. Of these, 17 species are included in the Ontario Endangered Species Act; many are associated with wetlands located in the Carolinian zone of southwestern Ontario.

Wetlands are of critical importance as breeding habitat and migration stopovers for waterfowl and a wide variety of other migrating birds, most notably shorebirds. In the spring, migrant birds stop on the way to arctic, subarctic, western, and northern breeding areas. In the fall, migrant birds returning to wintering grounds in the eastern and southern parts of the United States, Mexico, and South America make extensive use of traditional Ontario staging areas (i.e. 68 million waterfowl-use days per year). The lower Great Lakes shoreline and the coasts of Hudson Bay and James Bay are particularly important staging areas, providing feeding and resting habitats at critical locations along the Atlantic and Mississippi migratory flyways (Eastern Habitat Joint Venture, 1994).

Roughly 90 percent of the wetlands that existed in the Lake St. Clair area prior to European settlement have been lost to various forms of development.

Wetlands and agriculture are fundamental elements of the natural and cultural heritage of Kent, Lambton, and Essex counties. However, roughly 90 percent of the wetlands that existed in the Lake St. Clair area prior to European settlement have been lost to various forms of development.[1] Snell (1986) estimated the pre-settlement wetland area of the three counties to be 1,109,500 acres. By 1982, 90 percent of this wetland area had been lost, mostly to agricultural development. In the Municipality of Chatham-Kent, wetlands currently represent less than 4 percent of total land cover, compared to about 64 percent in pre-settlement days. Only a small portion of the original area of marsh and wet meadow remains along Lake St. Clair.

Due to the substantial loss of natural wetland, the Eastern Habitat Joint Venture has identified the Lake St. Clair (LSC) area as one of Ontario's top priorities for migratory waterfowl habitat conservation (Eastern Habitat Joint Venture, 1994).

[1] Specific losses in the Lake St. Clair area are discussed in more detail in Section 6.1.

1.2 Eastern Habitat Joint Venture Program

The Eastern Habitat Joint Venture (EHJV) is one of 14 habitat joint ventures established under the umbrella of the North American Waterfowl Management Plan (NAWMP). The NAWMP is a significant partnership initiative undertaken by the conservation community. Initiated in 1986, the NAWMP is an agreement among the governments of Canada, the United States, and Mexico aimed at ensuring the survival of and increase in waterfowl populations and the protection and conservation of wetland and associated habitats across the continent. The NAWMP combines the resources of federal, state, and provincial governments with those of non-government organizations for joint projects.

The EHJV covers significant portions of Ontario, Quebec, and the Maritime provinces. The goal of the EHJV is to protect, restore, and enhance wetlands in eastern Canada.

In Ontario, the EHJV is a partnership of seven agencies that work together to influence, secure, enhance, and manage wetlands in the province. These agencies are:

- Ontario Ministry of Natural Resources
- Canadian Wildlife Service, Environment Canada
- Ducks Unlimited Canada
- Wildlife Habitat Canada
- Ontario Ministry of Agriculture, Food & Rural Affairs
- Nature Conservancy of Canada
- Agriculture and Agri-Food Canada

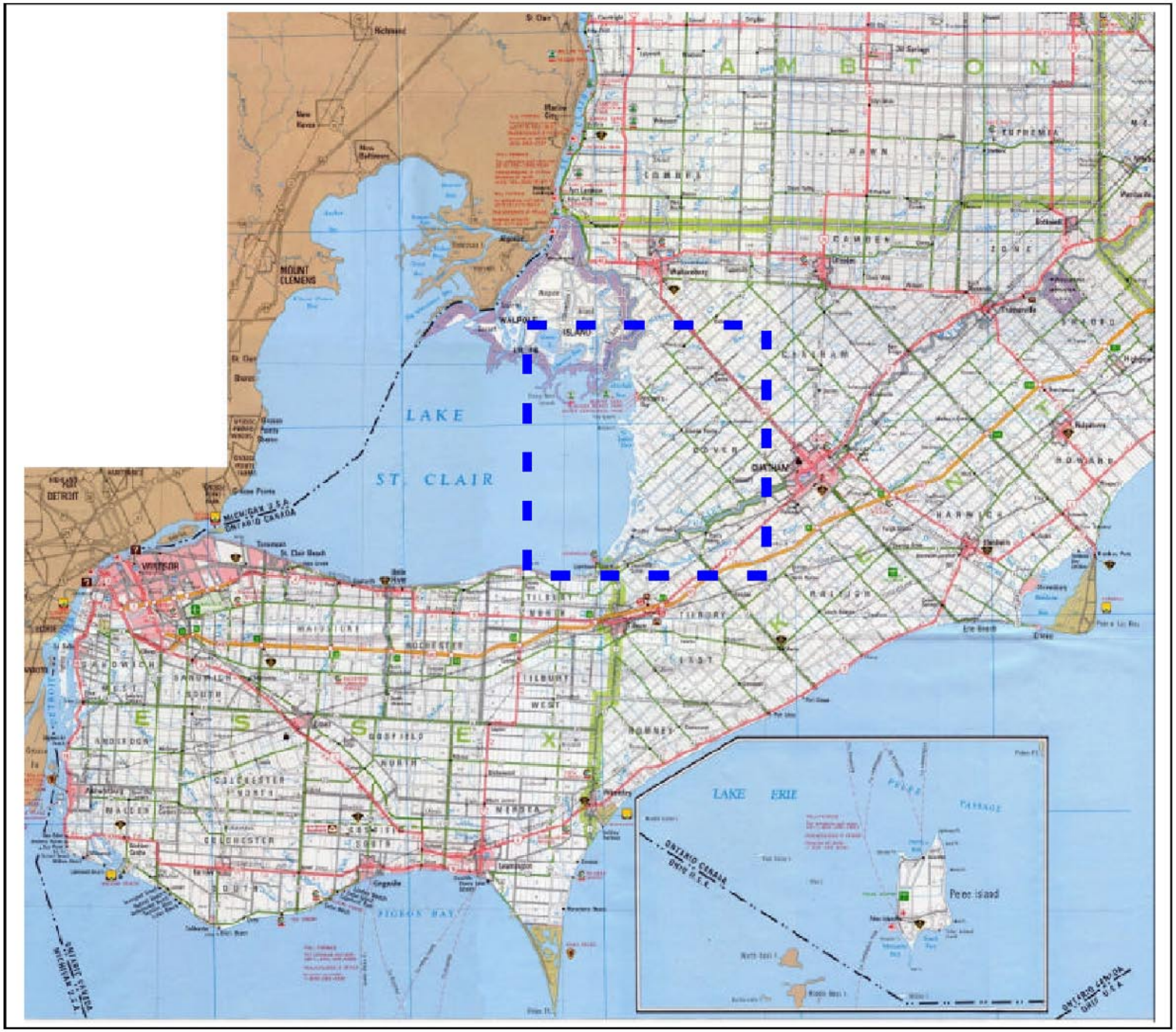
The EHJV recognizes that a number of tools can be employed to assist in achieving the desired outcomes identified in its Implementation Plan (Eastern Habitat Joint Venture, 1994). The Lake St. Clair area wetland restoration project is one of those tools.

1.3 Overview of the Proposed Undertaking

The EHJV, through its Lake St. Clair Technical Committee (LSCTC), is investigating the possibility of undertaking a wetland restoration project of approximately 1,000 acres in the vicinity of the Lake St. Clair shoreline, as shown in Figure 1-1. The primary goal of the restoration project is to increase the availability of waterfowl staging habitat within approximately 8 km of the Canadian shoreline of Lake St. Clair. (The project concept is described in more detail in Section 4.)

The Lake St. Clair area has been identified by the EHJV as one of Ontario's top priorities for migratory waterfowl habitat conservation.

As currently envisioned, the restored wetland would consist of the reconversion of agricultural lands into a number of wetland habitat cells. While the design and management of the restoration project would focus primarily on maximizing benefits to migrating waterfowl, serious consideration is also being given to incorporating ancillary habitat



Legend

General Study Area

Project 118800.TT.01	**Date** Jan. 2001
Scale NTS	**Drwn/Chkd** JPC / SND

Figure 1-1

Study Area - Regional Settings

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types into the project to complement the needs of other migratory and non-migratory species, including vulnerable, threatened and endangered flora and fauna.

A consulting report completed in the summer and fall of 1998 revealed moderate support within the local community for the proposed restoration project (Monteith Zelinaka Priamo Limited, 1998). This support was qualified by general interest from local residents in an assessment of the likely economic, social, and environment effects that might be expected should the project proceed.[2] The following report has been prepared to address local concerns, to evaluate the potential socio-economic and environmental effects of the restoration project, and to serve as a model to assist other EHJV technical committees in undertaking site-specific evaluation of projects proposed under the Implementation Plan.

1.4 Purpose and Objectives

The general purposes of this study are to determine:

- The environmental, economic, and social effects of the restoration project of these 1,000 acres of wetland habitat
- How the benefits identified as part of this study could be applied to similar wetland proposals

The objectives of this study are to identify:

- The economic and social effects that the restoration of a wetland of this size will have on the surrounding area (local and regional), including but not limited to agriculture, tourism, and recreation
- The environmental benefits on local, regional, and continental scales of restoring a wetland in this type of landscape and socio-economic setting

This study has been undertaken as one component of the process to assess the feasibility of implementing the project. If implemented, the final design will undoubtedly differentiate in some ways from the concepts and alternatives presented in this report. Regardless, these alternatives are necessary as a basis to undertake the socio-economic and environmental evaluation.

[2] A number of other issues and concerns were reviewed during this consultation process and are addressed in Section 8.

1.5 Environmental Assessment Act Requirements

In addition to reviewing the socio-economic and environmental effects of the proposed wetland restoration project, this report also addresses the project's Environmental Assessment Act requirements. These requirements follow the Ministry of Natural Resources Class EA process for small-scale projects. This undertaking is considered a Category "B" project under the Class EA and has been evaluated according to the field environmental planning procedure (FEPP) described in Appendix J. After a preliminary evaluation of the study's results and initial proposed alternatives according to the FEPP, the project may proceed to a more detailed planning level.

1.6 Organization of the Report

Section 2 provides a general overview and description of the study design and research methods (detailed descriptions of specific analytical techniques are located in relevant sections of the report). Section 3 presents a general socio-economic and environmental profile of the study area. Section 4 describes the proposed EHJV project concept. Section 5 presents findings of the comparative analysis of selected restored wetland sites in the Great Lakes Basin. Section 6 addresses potential biological/environmental impacts and values of the proposed restoration project. Section 7 provides estimates of the economic impacts of the proposed restoration project. Section 8 presents an evaluation of alternative design concepts for meeting the project's ecological restoration objectives. Section 9 discusses broader lessons learned. Section 10 presents a summary and conclusions and Section 11 lists references consulted during the preparation of this report. Section 12 acknowledges the contributions of all those who assisted the project team in this study. Supporting material is provided in the report's appendixes.

2. Study Design and Methods

This section provides a general overview of the research design and methods used to address the study objectives; additional details are provided in the relevant sections of the report.

2.1 Lake St. Clair Technical Committee

The EHJV project partners formed an 11-member technical committee to oversee and assist in developing the Lake St. Clair (LSC) restoration project. The committee provides technical supervision and coordination and is overseeing the long-term project management.

2.2 Development of Detailed Work Plan

The first phase in the study design was to refine the study approach and work plan. This process involved four components:

- Identification of a long list of potential wetland values to be considered
- Scoping of specific and appropriate wetland values for more detailed analysis
- Description of valuation methods to be applied to scoped values
- Finalization of the detailed work plan

These components were developed in consultation with, and approved by, the LSC Technical Committee.

Wetland Values

Wetland functions can include water storage, groundwater recharge, water purification, sediment retention, flood protection, and nutrient recycling, along with providing wildlife habitat and maintaining biodiversity.

Wetlands provide myriad ecological, economic, and other functions and benefits to society and natural systems. Wetland functions can include water storage, groundwater recharge, water purification, sediment retention, flood protection, and nutrient recycling, along with providing fish and wildlife habitat and maintaining biodiversity (Young, 1994). Wetlands can also provide significant and unique recreational, sporting, and nature-appreciation opportunities.

Not all values are equally applicable or present in an individual wetland or ecological context. For the LSC study, it was necessary to identify a long list of wetland values that could be realized by the restoration project, and then assess their applicability to the proposed undertaking. These "scoped" values would then form the basis for the site-specific evaluation and assessment.

Table 2.1 provides the long list of wetland values; for classification purposes, these have been grouped into non-consumptive, consumptive,

TABLE 2.1
POTENTIAL WETLAND VALUES

Item	Description	Comments
Non-Consumptive – Ecosystem Values		
Species population protection/ enhancement	Habitat production and/or enhancement. Rare and endangered species, wildfowl populations, other species	Describe impacts in qualitative and/or quantitative terms. The assignment of monetary values is heavily dependent on the quality of existing data/studies. There may be an opportunity to estimate existence and bequest values for the new wetland if suitable information is obtained from literature sources.
Ecosystem protection	Valued systems, linkages, and corridors	See above.
Aquifer recharge	Enhancement of groundwater quality and quantity	Identify opportunities and significance but do not attempt to assign monetary values unless wetland is located in a region where these benefits have potential to contribute measurably.
Discharge to baseflow	Enhancement of surface water quality and quantity	Identify opportunities and significance but do not attempt to assign monetary values unless wetland is located in a region where these benefits have potential to contribute measurably.
Non-Consumptive – Institutional Use Values		
Scientific research	Habitat restoration studies	Identify opportunities and significance but do not attempt to assign monetary values unless wetland is located in a region where these benefits have potential to contribute measurably.
Outdoor education	School trips, summer nature camps	Identify opportunities and significance but do not attempt to assign monetary values unless wetland is located in a region where these benefits have potential to contribute measurably.
Heritage preservation	Recreate historic land forms	Identify opportunities and significance but do not attempt to assign monetary values unless wetland is located in a region where these benefits have potential to contribute measurably.
Non-Consumptive – Recreational/Cultural Use Values		
Nature appreciation	Bird watching, amateur botany, herpetology, etc.	Assess potential opportunities and site capacity for nature appreciation recreation, estimate potential user days and assign values based on literature estimates of user day values, adjust user day values based on site attributes if possible. The analysis should include an assessment of infrastructure investments required to foster this type of use. Consider potential human disturbance impacts.
Other recreation	Hiking, canoeing, skating, picnics, camping, etc.	User-day value approach (see nature appreciation). Opportunities for other types of recreation will depend on site-specific facility objectives and designs. Consider potential human disturbance impacts.
Non-Consumptive – Recreational/Cultural Use Values		
Cultural significance	Historic community attachment/association with wetlands, etc.	Identify opportunities and significance but do not attempt to assign monetary values unless wetland is located in a region where these benefits have potential to contribute measurably. Consider potential human disturbance impacts.
Visual diversity	Landscape perception/analysis	Identify opportunities and significance but do not attempt to assign monetary values unless wetland is located in a region where these benefits have potential to contribute measurably. Consider potential human disturbance impacts.

TABLE 2.1
POTENTIAL WETLAND VALUES

Item	Description	Comments
Consumptive – Recreational/Cultural Use Values		
Waterfowl hunting	Duck and geese hunting	User-day value approach (see nature appreciation). Issues to consider include limitations on the number of hunters, site leasing to hunting parties, competition from/with commercial hunt clubs or other establishments in the vicinity. Consider potential human disturbance impacts.
Other hunting	Rabbits, deer, partridge, grouse, etc.	User-day value approach (see nature appreciation). Opportunities for other types of hunting will depend on site-specific facility objectives and designs. Consider potential human disturbance impacts.
Fishing	Recreational Fishing	User-day value approach (see nature appreciation). Issues to consider include the type of onsite species available for fishing and the enhancement of offsite fishing through the provision of spawning or feeding or prey fish habitat to fish populations in adjoining streams, rivers or Lake littoral zones. Opportunities and potential quality/viability for benefit will depend on site-specific facility objectives and designs. Consider potential human disturbance impacts.
Other non-commercial harvests	Wild foods, plant materials for crafts	User-day value approach (see nature appreciation). Opportunities for other types of recreational harvest will depend on site-specific facility objectives and designs. Consider potential human disturbance impacts.
Commercial Values		
Agricultural sector – benefits	Beneficial impact on production costs or yields associated with water supply during drought episodes	Evaluation based on an analysis of crop insurance records for occurrence and severity of losses due to drought and logical opportunity for the site to contribute.
Agricultural sector – losses	Adverse impact on production costs or yields associated with wildfowl grazing, pest invasions, or disruptions to land drainage	Assessment based on crop budgeting analysis using estimates of yield losses and increases in inputs of labour and materials for crop production. Adverse drainage impacts can be evaluated by assuming a reduction in yields associated with poor drainage.
Tourism sector	Income and employment opportunities created by new recreational expenditures on goods and services	Expenditures estimated based on visitation rates and representative expenditure values. Specific commercial opportunities identified from the assessment of comparable wetland sites and local knowledge/experience.
Commercial harvests	Harvests of bait fish, furs, plant materials, wild foods	Likelihood and opportunity of harvest activities to be assessed on a site-specific basis. Valuation could be based on enterprise budget analysis.
Displacement of enterprises	Loss of onsite farms and other enterprises	Loss to the owner is considered fully offset by virtue of the real estate sale. Estimates of lost income, employment and expenditures to the economy to be used in the multiplier analysis (see below).
Multiplier effects	Income and employment impacts relating to lost enterprises, construction and new commerce	Direct, indirect, and induced employment and income effects can be estimated using input/output analysis or similar approaches or by using known economic-base multipliers.
Flood damage reduction	Reduction in downstream flood damage to crops and buildings based on hydrologic function during floods	A formal analysis of flood damage reduction benefits requires the use of hydraulic modelling, land use inventory and flood stage-damage curves. Given the cost generally associated with these studies, a formal analysis is not recommended unless the area is exposed to flood risk and/or value of potential damage avoided is considerable.
Water and waste-water treatment	Reductions in water and/or wastewater treatment costs associated with water quality impacts	Analysis limited to real savings at existing treatment plants using surface water resources that will experience improvements in water quality can include storage of agricultural runoff. Identify opportunities and significance but do not attempt to assign monetary values unless wetland is located in a region where these benefits have potential to contribute measurably.
Erosion control	Reduction in costs associated with drain maintenance and other erosion mitigation measures	Identify opportunities and significance but do not attempt to assign monetary values in this project unless wetland is located in a region where these benefits have potential to contribute measurably.
Other resource harvesting	Peat mining, rice, wild rice	Identify opportunities and significance but decision/feasibility to assign monetary values will depend on the specific resources harvesting activity.

and commercial values. It is recognized that a number of the values could be interpreted and classed into multiple categories; however, a simple classification is used as a basis of identifying general values. The table also provides comments on general approaches to incorporating this information into an analysis of benefits. While not all of these values are relevant to the LSC project, the long list can be used to provide guidance and a basis of departure for subsequent EHJV evaluations.

Table 2.2 provides the results of the site-specific screening exercise performed on the long list of values. Some values (e.g. groundwater recharge) were screened out simply because they would not be applicable to this wetland given its geographic setting. The design principles and concepts for the restoration project are discussed more fully in Section 4.

Table 2.2 also describes the general approaches to evaluation that were considered or used in the detailed analysis. The specific methods of analysis employed are discussed in the relevant sections of this report.

2.3 Literature Search and Review

A strategic literature search was undertaken at the outset of the project. Keywords used to guide the search are listed in Table 2.3.

The following core databases were queried with the selected combinations of keywords:

- Academic Search Elite
- Water Resources Abstracts
- Environmental Sciences and Pollution Management
- Cambridge Scientific Abstracts
- Duckdata
- Elsevier Journals
- EIS: Digest of Environmental Impact Statements
- Ecology Abstracts
- Applied Science and Technology Abstracts
- Dissertation Abstracts

A general search of Internet resources and publications was also completed using multiple search engines.

TABLE 2.2
VALUATION METHODS FOR LAKE ST. CLAIR WETLAND RESTORATION

Item	Description	Comments / Issues
Non-Consumptive – Ecosystem Values		
Species population protection/enhancement and ecosystem protection	• Identify and describe impact (species and habitats, population impacts)	• Given the scale of the project and available knowledge, it may be difficult to describe clear benefits/impacts over large geographic areas on a waterfowl population basis.
Biodiversity	• Identify and describe species likely to inhabit newly created habitat types. Comparison of before and after conditions (i.e. potential species increase by taxa)	• Design concept scenarios that will include habitat type and size considerations which will influence relative biodiversity impacts (advantages and disadvantages).
Aquifer recharge	• Screened out from detailed analysis/evaluation	• Restored wetland not anticipated to contribute significantly/measurably to affect this value, given its location within the watershed and the presence of the water table close to ground surface.
Discharge to baseflow	• Screened out from detailed analysis/evaluation	• Restored wetland not anticipated to contribute significantly/measurably to affect this value, given its location within the watershed and the presence of the water table close to ground surface.
Non-Consumptive – Institutional Use Values		
Scientific research, outdoor education, and heritage preservation	• Identify and describe opportunities qualitatively	• Not all benefits lend themselves to meaningful quantification and valuation. It is nonetheless critical to identify and describe the benefit so that it can be incorporated into overall project assessment in qualitative form.
Non-Consumptive – Recreational/Cultural Use Values		
Nature appreciation, other non-consumptive uses	• (Average per capita-day use value) * (# of user days)	• Find a meaningful estimate of per capita-day use value for each type of use. • Adjust values to reflect site attributes (ad hoc benefits transfer approach). • Estimate total user days by type: This is a function of total demand, competing and complementary sites, capacity and attributes of new site. If demand is sufficient we can assume full capacity utilisation, but we still have to estimate capacity based on site size, recreation infrastructure (parking, toilets, trails, etc.), and other attributes or by expert opinion.
Cultural significance	• Identify and describe opportunities qualitatively	• Not all benefits lend themselves to meaningful quantification and valuation. It is nonetheless critical to identify and describe the benefit so that it can be incorporated into overall project assessment in qualitative form.
Visual diversity	• Identify and describe opportunities qualitatively	• Not all benefits lend themselves to meaningful quantification and valuation. It is nonetheless critical to identify and describe the benefit so that it can be incorporated into overall project assessment in qualitative form.
Consumptive – Recreational Use Values		
Waterfowl hunting, other hunting, fishing, and other non-commercial harvests	• (Average per capita-day use value) * (# of user days)	• See comments for non-consumptive recreation • Primary focus on waterfowl hunting – develop a reasonable benefits transfer approach for this use. Other uses are likely to be relatively insignificant at this site – use a simple user-day value approach

TABLE 2.2
VALUATION METHODS FOR LAKE ST. CLAIR WETLAND RESTORATION

Item	Description	Comments / Issues
Commercial Values		
Agricultural sector – benefits from irrigation supply	• Screened out from detailed analysis/evaluation	• Volume of available water for irrigation is likely to be small relative to demand during periods of drought
Agricultural sector – losses from waterfowl feeding on crops	• Screened out from analysis based on feedback from local farm operators, marsh managers, and Canadian wildlife serve staff	• If the analysis had been needed, the approach would depend on available data but at a minimum should reflect actual crop systems for the impact area and include: (average % reduction in yield) * (crop yield/ha) * (net crop value) * (ha's exposed to predation) or simplify to (average loss/ha) * (ha's exposed to predation). • Costing should be based on net economic loss with adjustment for reduction in variable costs (e.g. combining, drying costs).
Tourism sector	• Direct impact by type of recreation = ➢ (days recreation) * (expenditure per day within the study area)	• Recreation days should probably be differentiated by origin to distinguish locals from visitors if the data exist. • Local recreational expenditures may represent a redistribution of local spending and not a real increase in local income in the service sector.
Commercial harvests	• Screened out from analysis. Not likely to be a significant use at the site.	• If the analysis had been needed a typical approach would include: New income for each harvest activity ➢ = (harvest amounts) * (sale price) – (harvest costs) ➢ or simplify to (average harvest income) * (# of harvesters)
Construction activity (NEW)	• Identify and describe construction opportunities • Direct income from construction ➢ = (total capital cost) * (% expended within study area)	• Construction costs to be considered in analysis of capital and operating budget. Direct income from construction can also be factored into multiplier analysis.
Displacement of enterprises	• Identify and describe lost enterprises (assume all agricultural) • Assume no net loss of income to the enterprise owner since land sales are on a willing buyer/willing seller basis • Calculate lost income for purposes of the multiplier analysis as: ➢ (ha's taken out of production) * (net income per ha) and/or ➢ (# lost livestock enterprises) * (average income per enterprise)	• Need to assume a profile of cropping systems for the acquisition area(s)
Multiplier effects	• Indirect and induced impacts calculated using a regional I/O model based on direct income effects	• Use simply multiplier approach if a suitable I/O model is not readily available
Flood damage reduction	• Screened out from detailed analysis/evaluation	• Proposed wetland will not be connected to surface water drainage system in a significant capacity to affect this value.
Erosion control	• Screened out from detailed analysis/evaluation	• Proposed wetland will not be connected to surface water drainage system in a significant capacity to affect this value.
Other resource harvesting	• Screened out from detailed analysis/evaluation	• Not anticipate to provide a significant opportunity given the current goals and objectives for the restored habitat.
Water and wastewater treatment	• Screened out from detailed analysis/evaluation	• Proposed wetland will not be connected to surface water drainage system in a significant capacity to affect this value.

TABLE 2.3
LITERATURE SEARCH KEYWORD LIST

General Terms	Valuation, evaluation, benefit assessment, economic evaluation
	OF
	Wetlands, resources, natural resources, water resources, recreation
Types of Value Measurements	Willingness to pay, consumer surplus, compensating variation, equivalent variation
	User-day value, use or user value
	Non-use value, existence value, option value, bequest value
	Aesthetics/aesthetics value
Methodologies	Travel cost (model), hedonic travel cost, random utility model
	Contingent value (or valuation), contingent ranking, discrete choice analysis (or model), conjoint analysis, referendum data, bidding data, benefit transfer
	Hedonic value, property value model
Activities	Hunting (waterfowl, duck, small game)
	Fishing (coarse fish, warm water, pan fish, carp, pike, bass)
	Birding, bird watching
	Nature viewing, nature appreciation, nature trails
	Hiking, picnicking
	Conversion/draining of agriculture land for wildlife habitat
	Tourism
Programs	Natural resource damage assessment (NRDA)
Environmental/ Biological	Lake St. Clair wetlands, lacustrine marsh ecology
	Wetland restoration, wetland restoration – impacts, marsh restoration
	Artificial marshes, artificial wetlands
	Waterfowl habitat restoration, waterfowl habitat
	Marsh wildlife, wetland restoration
	Wetland sediment removal, wetland contaminant removal, wetland wastewater treatment

2.4 Comparative Sites Analysis

A key step in the methodology was a comparative analysis of other restored wetland sites. Given that there are few suitable empirical studies in the literature, in order to assess the potential effects of the project it was essential to collect and interpret data from professionals experienced in restoring and managing similar habitats from comparative sites within the Great Lakes basin.

Seven sites located in Michigan, Ohio, New York, and Ontario were selected for this analysis. The study team, the LSC Technical Committee, and third-party informants were involved in the site identification and selection. Sites were selected based on their potential comparability to the EHJV project and their ability to provide a range of acquisition and management experiences. A summary of the features of these sites is presented in Table 2.4.

TABLE 2.4
COMPARATIVE RESTORED WETLAND SITES

	Total Size	Wetland Area
Hullett Marsh Provincial Wildlife Area, Ontario	5,200 ac. (2,105 ha)	1,680 ac. (680 ha) mostly dyked marsh
Hilliardton Provincial Wildlife Area, Ontario	1,790 ac. (725 ha)	506 ac. (205 ha) dyked marsh, swamp, bog, and fen
Tiny Marsh Provincial Wildlife Area, Ontario	2,300 ac. (930 ha)	1,400 ac. (566 ha) dyked marsh
St. John's Marsh Wildlife Area, Michigan	2,500 ac. (1,012 ha)	1,700 ac. (690 ha) coastal marsh 200 ac. (80 ha) dyked marsh
Ottawa Wetland Complex, Ohio	8,250 ac. (3,340 ha) Total: 5,600 ac. (2,270 ha) Ottawa Refuge: 650 ac.(263 ha) Metzger Marsh 2,000 ac. (810 ha) Magee WA	4,860 ac. (1,970 ha) dyked marsh + 200 ac. (80 ha) natural marsh Ottawa Refuge 620 ac. (250 ha) dyked marsh Metzger Marsh 1,800 ac. (730 ha) dyked marsh Magee WA
Pickeral Creek Wildlife Area, Ohio	3,000 ac. (1,215 ha)	2,000 ac. (810 ha) dyked marsh
Montezuma Wetland Complex, New York	36,000 ac. (14,570 ha) Total: 7,068 ac. (2,860 ha) Montezuma Refuge 7,660 ac. (3,100 ha) N. Montezuma WMA Balance mostly private land	3,600 ac. (1,456 ha) dyked marsh in Montezuma Refuge 5,360 ac. (2,170 ha) dyked marsh in N. Montezuma WMA

Managers at each comparative site were contacted by telephone, and the nature and purpose of the data-collection exercise was explained. A comparative site questionnaire was then faxed or mailed (the list of contacts and the questionnaire are contained in Appendix A). Interviews

were conducted by phone; in some cases, completed questionnaires were returned by fax or mail and follow-up phone conversations sought elaboration of some information provided.

For the most part, the analysis is based on the site questionnaires and phone interviews. In several instances, data are drawn from documents provided by managers. The analysis highlights:

- Management objectives for the wetland sites
- Activities, services, and facilities provided
- Waterfowl, other wildlife, and wetland management
- Visitation, promotion, and economic impacts
- Relationships with surrounding landowners
- Staffing and budgets

The detailed analysis of these sites is contained in Section 5.

2.5 Consultation and Communication

Local Advisory Committee

A ten-member Local Advisory Committee (LAC) was formed to assist the LSC Technical Committee. The LAC members represent local residents and businesses, conservation groups, hunt clubs, agriculture, tourism and local services, and municipalities.

For this study, the LAC acted as a discussion forum that assisted the Technical Committee in refining the design of the project. The LAC served as a community link to the EHJV partners, and provided input to the Technical Committee concerning the impact of the proposed project on the local community. The roles and responsibilities of the LAC are described in Table 2.5. The LAC also provided valuable information and feedback to the consultants.

Notice of Study Initiation

To inform the broader community, a Notice of Study Initiation was published in two newspapers serving the study area, on July 24, 1999 in the *Chatham Daily News,* and on July 27, 1999 in *Chatham This Week*. The notice provided key contacts for the study and a toll-free telephone number to facilitate public queries. A copy of the notice is provided in Appendix B.

Newsletters

The EHJV, through the LSC Technical Committee, has published newsletters about the project. Each newsletter was mailed to the contacts on the project distribution list that had been developed during the initial public consultation phase of the project.

TABLE 2.5
MANDATE AND ROLE OF THE LOCAL ADVISORY COMMITTEE

- Provide ongoing advice to the Technical Committee on community support for the project
- Provide comments on consultants' work to the Technical Committee
- Review and provide comments on reports and activities carried out under the Lake St. Clair project to the Technical Committee
- Provide input on the design concept (e.g. what the wetland will look like, permitted uses, how it will be managed)
- Provide input on project site selection criteria
- Provide advice on determination of candidate site location(s) for the project
- Provide input on policies developed for buying and use of farmland to be restored to wetland
- Provide advice on the effects of the wetland on adjacent land uses (e.g. crop compensation issues, etc.)
- Provide input with the promotion of the Lake St. Clair project (e.g. communications, education initiatives, newsletters/ bulletins, and information presentations)
- Reflect and disseminate local opinions and local organization support for the project
- Be knowledgeable of the social, economic, and environmental issues/ impacts facing the Municipality of Chatham-Kent
- Act as a liaison to the organizations the LAC represents by relaying information that helps the organizations develop their support for the project
- Reflect their organizations' viewpoints and support at Local Advisory Committee meetings
- Assume a responsibility to ensure the organizations are updated on Local Advisory Committee activities and decisions of the Technical Committee
- Assist the Technical Committee with the facilitation of community meetings regarding the project

Local Key Informant Interviews

Interviews were held with a number of key informants on August 25–26 and September 14–15, 1999; key informants included operators of local hunt clubs, outfitters, and farm operators. Information was collected from these individuals on the understanding that it would remain confidential and would be used only in aggregate, to assist primarily in the economic analysis. A copy of the interview guide used is provided in Appendix C.

2.6 Technical Workshop on Biological and Biodiversity Effects

A technical workshop was held on November 15, 1999 to explore the scientific foundations for the biological and biodiversity assessment components of the study. The purpose of this workshop was to identify and address anticipated effects of wetland restoration on waterfowl, specifically, and biodiversity, generally. It was recognized that there is a range of data sources, availability, and accuracy. Therefore, the workshop was convened to bring a number of technical experts together to share information and research results and to get a consensus on the best science to be used in approaching the biological evaluation of the proposed project.

Twenty-two people participated in the workshop, including representatives from Environment Canada; Ontario Ministry of Natural Resources; Ontario Ministry of Agriculture, Food & Rural Affairs; Ducks Unlimited; the LSC Local Advisory Committee; and the consulting team. A list of workshop participants is provided in Appendix D.

3. Description of the Study Area

This section provides a general overview and profile of the location and key physical, biological, and socio-economic features of the study area; additional supporting information is found in Appendix E.

3.1 Location

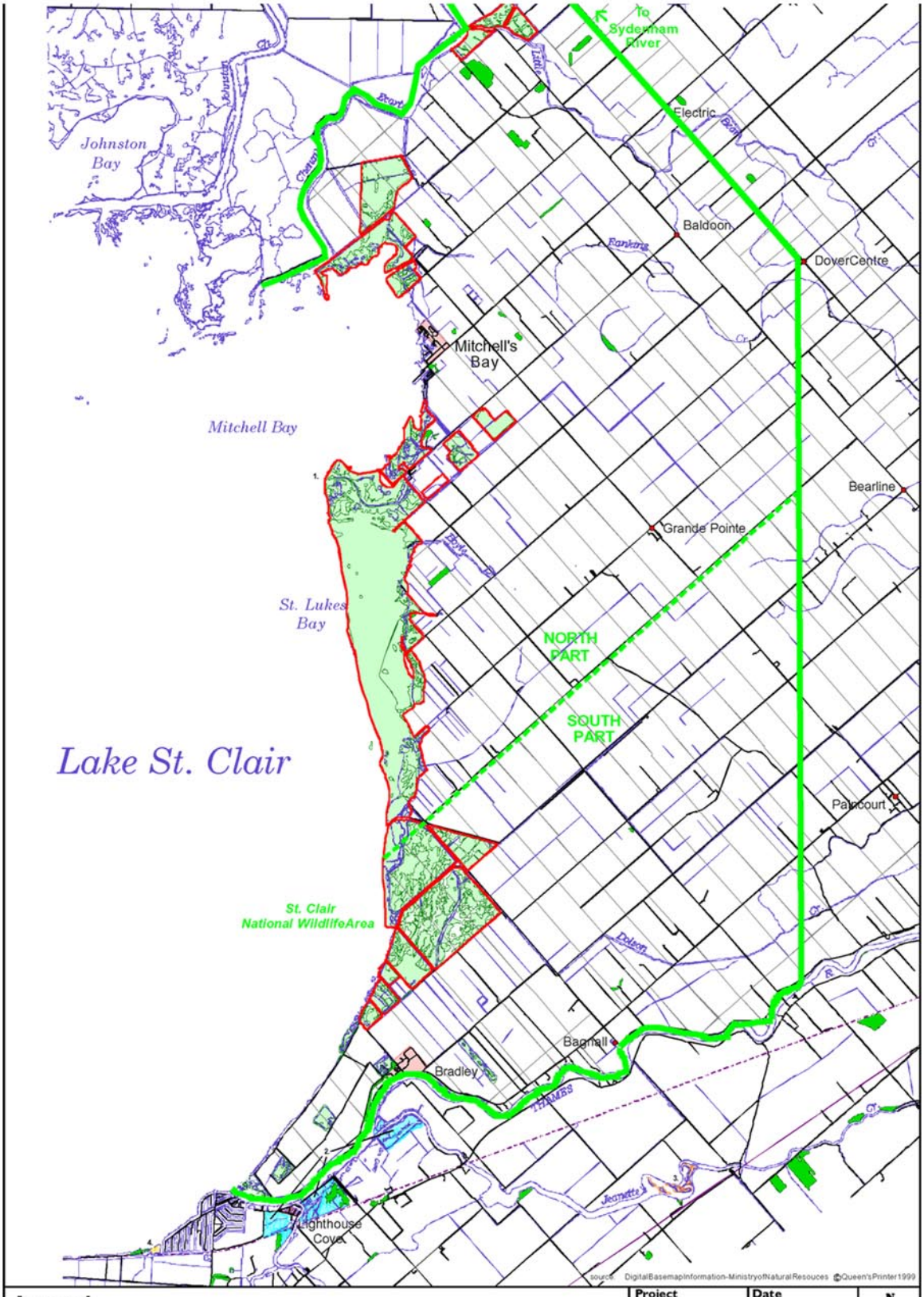
The general study area is shown in Figure 3-1. It is located along the eastern shoreline of Lake St. Clair and includes the majority of the former Dover Township in what is now the Municipality of Chatham-Kent. It generally encompasses the shore areas and the land area approximately 8 km inland from Lake St. Clair and is bordered by the Thames River to the south and the Sydenham River to the north. Communities within the study area include the Town of Mitchell's Bay and the Villages of Bagnall, Baldoon, Bearline, Bradley, Dover Centre, Electric, and Grande Point.

The Lake St. Clair shoreline is approximately 272 km. The shore of the St. Clair River and its main distributary channels combined with the Detroit River and Belle Isle add 224 km. Of this total 496 km of shoreline, 188 km (38 percent) can be classified as coastal wetland (Herdendorf and Raphael, 1986). The wetland complex along the eastern shore of the lake, illustrated in Figure 3-1, consists of 21 individual marshes. Most of these remaining wetlands are dyked and have been maintained to provide waterfowl hunting opportunities.

Lake St. Clair is a very shallow lake, with a zone no more than 1 m deep extending 0.5 to 1 km into the lake. Because of the extent of this shallow area, wetland zones are constantly changing in size and composition depending on lake levels and climate factors. Lake St. Clair has a mean depth of only 3 m, and a maximum natural depth of 6.4 m. Its deepest waters are found along the dredged channel between the St. Clair and Detroit Rivers, which is 8.2 m below low water datum (Herdendorf and Raphael, 1986).

3.2 Physical Features

The study area is located in the St. Clair Clay Plain physiographic region, which encompasses the majority of the counties of Lambton, Kent, and Essex (Chapman and Putnam, 1984). Figure 3-2 illustrates three variables in major soil type: clay plain, sand plain, and an area of peat and muck near the northern limits of the study area, all of which are underlain by black shale.



Legend

- Road
- ANSIBoundary
- WoodedArea
- Streams, Creeks&Drains
- WaterBody
- Railway
- Township Lot

WetlandComplexes:

1. St.ClairMarshComplex
2. ThamesRiver MouthComplex
3. Jeanette'sCreekMarsh
4. PaternasterClub

Project	Date
118800.TT.01	Jan. 2001
Scale	**Drwn/Chkd**
NTS	JPC/SND

N W E S

Figure3-1

Study Area

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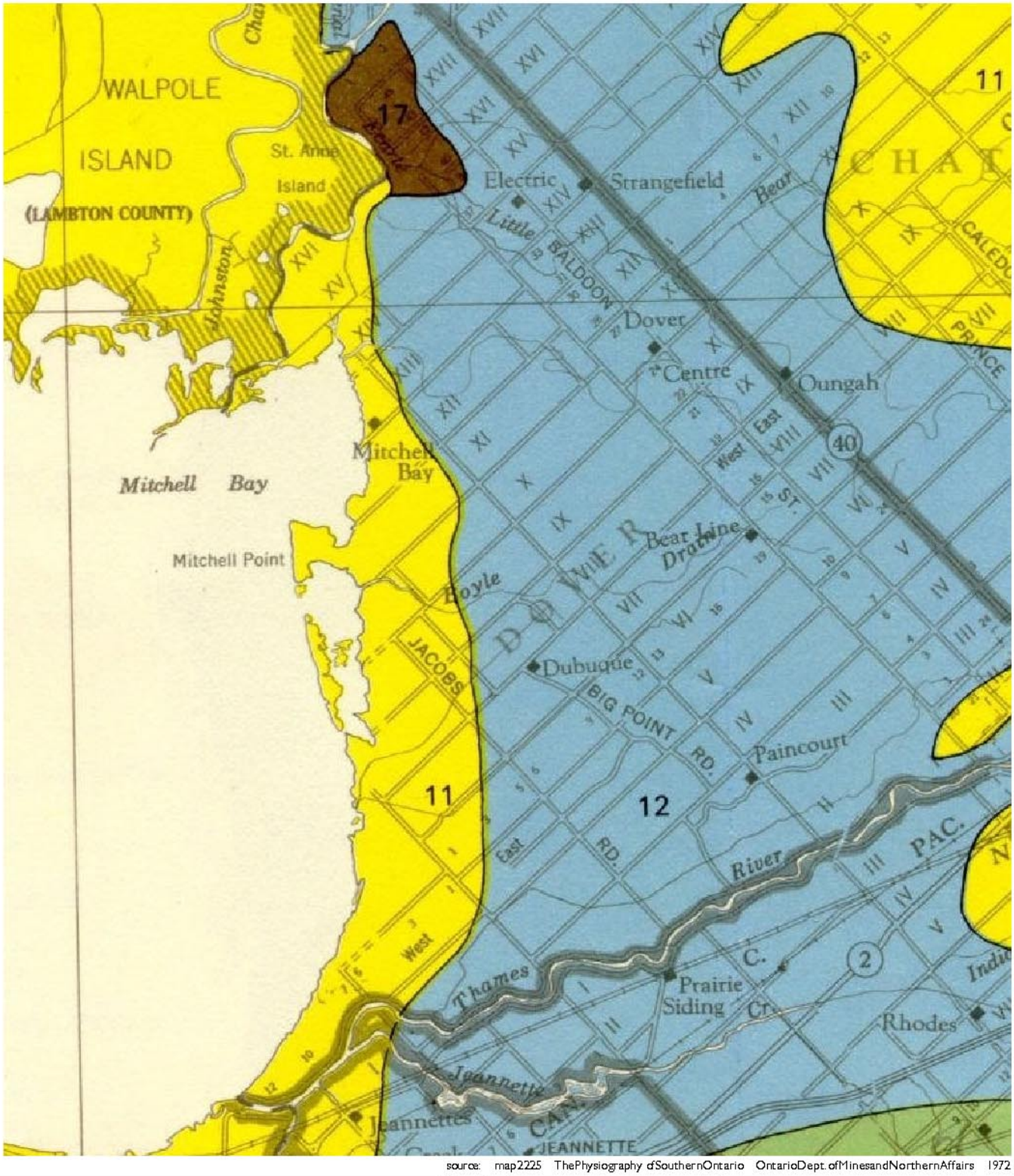

source: map2225 ThePhysiography ofSouthernOntario OntarioDept.ofMinesandNorthernAffairs 1972

Legend

- Clay Plain
- Sand Plain
- Peat and Muck

Project 118800.TT.01	**Date** Jan. 2001
Scale NTS	**Drwn/Chkd** JPC / SND

N W E S

Figure 3-2

Physiographic Regions

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The St. Clair Clay Plain has little relief, with the area draining east to west toward Lake St. Clair. Historically, the area supported a forested swamp consisting of elm, black and white ash, and silver or red maple; along the shoreline of Lake St. Clair, the predominant vegetation was meadow and marsh (see Figure 6-1). There was little development in the area until the municipalities established artificial drainage, initially by gravity drains. Beginning in the 1880s, portions of wetland in the Dover Community were dyked and drained by pumps (Lauriston, 1952). Over time, an extensive system of dykes, drains, and pumping stations developed, protecting about 40,000 acres of land at or below the level of Lake St. Clair (Roy, 1986). As a result of this development, many of the historic wetland features in the area have been dyked and drained to support agriculture, resulting in the loss of 90 percent of the areas non-coastal wetlands.

High water levels and storms on Lake St. Clair during the early 1970s weakened dykes along the lake, and portions of the drained farmland were flooded in 1973. The provincial government initially provided funds for emergency dyke repairs, and in 1974 Canada and Ontario signed an agreement under the Agricultural and Rural Development Act (ARDA) to rebuild dykes along the Lake St. Clair shoreline, the lower Thames River, and several other watercourses in Kent County. The major part of this project involved the Lake St. Clair shoreline, where 35 km of dyke reconstruction and realignment were completed in 1978 (Roy, 1986).

The St. Clair Clay Plain is subdivided into four regions: the Essex Clay Plain, the Lambton Clay Plain, the Chatham Flats, and the St. Clair Delta. The study area includes a large portion of the Chatham Flats and a smaller portion of the St. Clair Delta in its northern reaches. The Chatham Flats is a small region of highly fertile soils, created during the last glacial period; the resulting Clyde Loam soils are stone-free and high in mineral and organic content. These factors, combined with 155 to 165 frost-free days annually, have influenced agricultural development in the area, with the high-value farms being given to the production of cash crops, some vegetables, and few livestock. There is no significant erosion on the clay plains, although the area is prone to summer droughts. The St. Clair Delta consists mainly of open-water marshes and a thin beach area, although several thousand acres have been drained and currently support agricultural operations. This delta is an excellent example of a bird's foot delta, with the only settlement being within the boundaries of the Walpole Island First Nation.

3.3 Biological Features

The St. Clair Delta is the largest fresh water delta in the world.

The St. Clair Delta is the largest fresh water delta in the world. At one time the entire lake was almost completely vegetated with submergent vegetation; extensive wild celery beds, important for diving ducks, characterized much of the lake bottom (Koonce, Minns and Morrison, 1999). Most of these beds, along with other species of wetland flora and

fauna, have been degraded or eliminated by human land use including residential shoreline development.

The Lake St. Clair wetlands are principally recognized for their importance to waterfowl (EHJV, 1994; Roy, 1986). The Canadian Wildlife Service considers the site to be of national significance as a waterfowl staging area. A survey completed in 1984 by the Canadian Wildlife Service showed the east marshes of Lake St. Clair to be second only to the Long Point Marshes among the 17 staging areas throughout the Southern Great Lakes for the quantity of waterfowl days. The marshes also rank second among the 17 staging areas for the intensity of waterfowl use in autumn, and fourth in spring.

The St. Clair National Wildlife Area, a 600-acre portion of the Lake St. Clair Marsh Complex, is designated a Wetland of International Importance under the Ramsar Convention and is also part of a Provincially Significant Life Science ANSI. It is considered one of the most important staging areas for waterfowl in Ontario because of its location at the intersection of the Atlantic and Mississippi flyways, which are major migratory routes for many species of birds.

Heron tracks in snow

A large number of bird species depend on the marshes for feeding and resting areas during their migration. Because of their southerly location, the Lake St. Clair wetlands are generally among the last in Canada to freeze in the fall and the first to open in the spring. The open marshes and submergent vegetation attract a variety of diving ducks, while the dyked marshes adjacent to agricultural fields attract dabbling ducks, geese, and swans.

Muskrat are found throughout the marshes. Historically, the muskrat has held a strong local cultural and social significance. For example, in the early 1980s trappers in Chatham-Kent, Essex, and Lambton counties harvested approximately 110,000 muskrat, mainly from the Dover Community and Walpole Island. Although no longer widely exploited for commercial purposes, the muskrat does play an important role in the wetlands by preventing cattails from completely dominating marsh areas and preserving the vegetation diversity. The muskrat is considered a nuisance by some, as the animals will often dig into and damage marsh dykes. Trapping and removal of muskrats along dykes is an essential component for the maintenance of dyked marshes.

For the most part, Lake St. Clair and the tributaries that drain into it are warm-water fisheries. The undyked marshes along the lakeshore are designated as regionally significant for their fish spawning and nursery habitat, upon which many of the species occurring in the lake are dependent. The lake supports a healthy sport fishery: yellow perch, walleye, large and smallmouth bass, and northern pike are popular species with anglers. The tributaries mainly support populations of coarse fish such as carp and sucker.

3.4 Socio-Economic Features

General Land Use

The municipality of Chatham-Kent, established on January 1, 1998, combines the former City of Chatham with the former Kent County municipalities, including the former Dover Township.

Figure 3-3 presents the generalized land-use designation in the region as presented in the former township's Official Plan.[3] Agricultural land in the Dover Community is some of the most productive in Ontario, and is the economic base for the community.

Hamlet areas in the region include Dover Centre, Grande Point, and Mitchell's Bay. These areas provide low-density residential housing and local services to the surrounding agricultural areas.

The following socio-economic area profile provides useful information to assist in the assessment of potential impacts; detailed support tables are located in Appendix E.

The majority of the data is derived from the 1996 census.

Population

The population of the Dover Community was approximately 4,000 in 1996, distributed among age groups as follows:

- 0-4 years, 6.8%
- 5-14 years, 14.6%
- 15-19 years, 7.9%
- 20-24 years, 6.2%
- 25-54 years, 43.3%
- 55-64 years, 10.0%
- 65-74 years, 7.3%
- 75+ years, 3.8%

Overall, there are slightly more males than females within the population: 2,075 and 1,965, respectively. Almost half the population is between ages 25 and 54, with a mean age of 35.

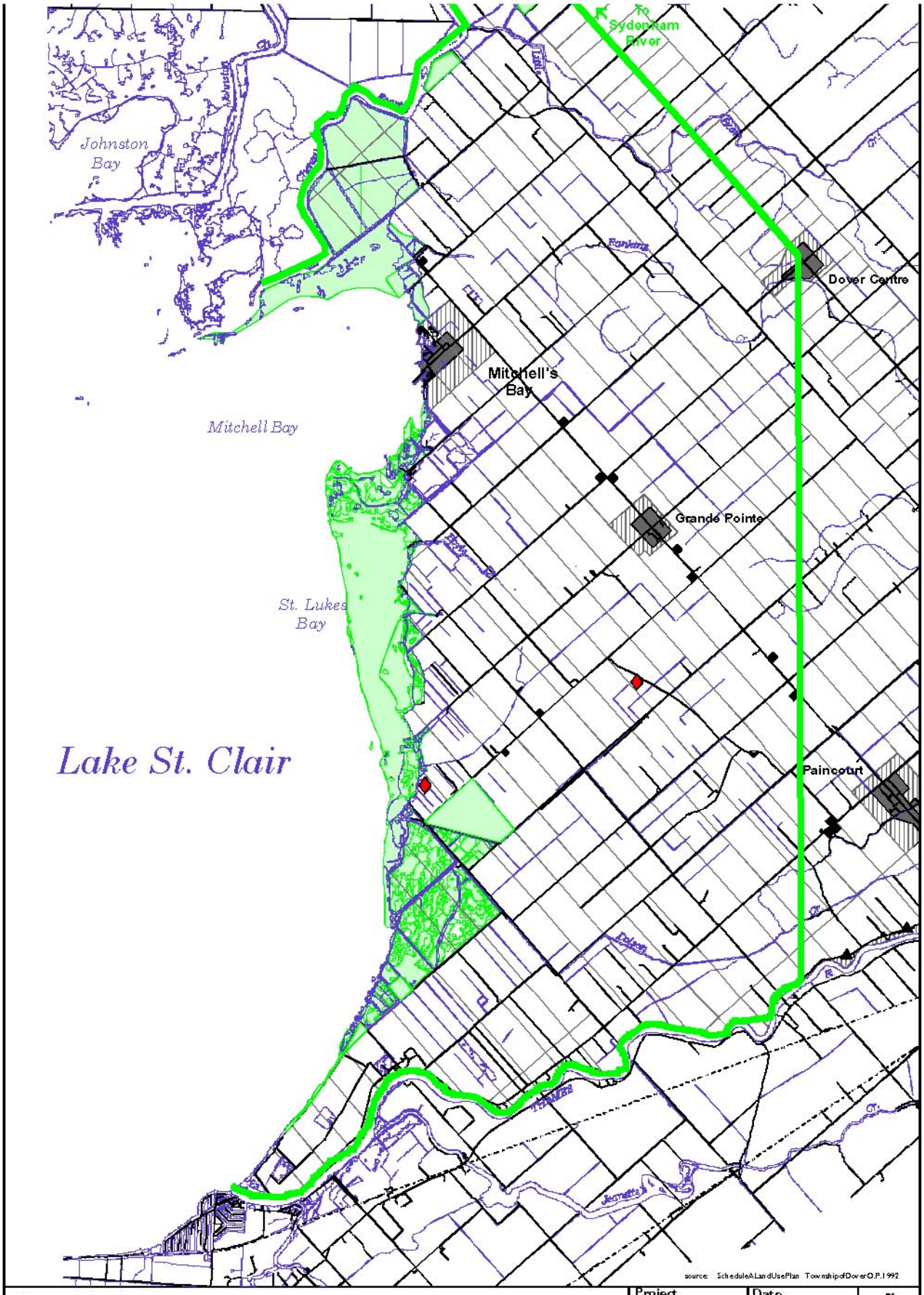
Language

The primary first language of residents in the Dover Community is English, at 72.0 percent, compared to 72.8 percent provincially. French represents the next most common first language, at 15.3 percent, compared to 4.1 percent provincially. All other first languages represent 7.8 percent of the population, compared to 0.7 percent provincially. The Dover Community has a population of French and other-language residents that is slightly higher than the provincial average.

Education

The level of schooling achieved by residents 15 years of age and over is as follows: 38.2 percent have not completed high school; 17.3 percent

[3] Township of Dover Official Plan (Official Consolidation), 1992 (as modified).



Legend

- Roads
- Railway

Land Use Areas:

- Hamlet Area
- Restricted Agriculture
- Industrial Commercial
- Marshlands
- Estate Residential
- Waste Disposal Sites/ Transfer Stations (Active or Former)
- Agriculture

Project: 118800.TT.01	Date: Jan. 2001
Scale: NTS	Drwn/Chkd: JPC/SND

N W E S

Figure 3-3

General Land Use

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have achieved a high school certificate; 9.0 percent have some post-secondary education; 27.2 percent have trades or non-university certificates or diplomas; 8.2 percent have completed university.

Income and Work

Labour-force statistics provide an indication of the number of people employed in a particular sector of the economy. Labour-force numbers include people who are unemployed but actively looking for work in their respective sector. The following discussion provides labour-force statistics for the Dover Community as described in the 1996 census.

The average total income in the Dover Community is $28,370, which is 3.7 percent higher than the provincial average of $27,309. The average unemployment rate within the Dover Community is 6.0 percent, which is lower than the provincial average of 9.1 percent.

The participation rate is defined as the ratio of the total labour force and the size of the population that is eligible to work (i.e. ages 15–65). The participation rate for the Dover Community is 80.4 percent for males and 65.4 percent for females; the total average of 73.1 percent is higher than the provincial total average of 66.3 percent.

Primary industry (agriculture and resource-based) employs 20 percent of Dover Community residents, compared to only 3.0 percent of the provincial population. Secondary industry (manufacturing and construction) employs 22.8 percent of the community labour force, compared to 22.5 percent provincially. The remaining 54.5 percent are employed in tertiary industry (service).

The Farm Sector

Agriculture is the dominant land use and a significant means of livelihood and cultural heritage within the study area. Table 3.1 provides a summary overview of the farming sectors; detailed statistics are found in Appendix E.

Overall, agriculture in the study area is dominated by cash crop operations producing mainly grains and oilseeds. Few vegetable and very few livestock operations exist in the study area; the fertile soils, flat landscape, and extended growing season are most conducive to cash crop production. A decrease in the number of farms and an increase in gross total receipts and the number of acres being irrigated may be indicative of larger operations buying smaller farms and the associated farmland. A decrease in the variety of crops being grown but a stable number of acres being farmed also supports this theory. Current economic conditions support an increase in vegetable production, most notably tomatoes.

TABLE 3.1
AGRICULTURE: SUMMARY OVERVIEW FOR 1996*

Characteristics	Dover Community
Total Number of Farms Reporting	331
Livestock and Poultry Farms Reporting	4
Grain and Oilseed Farms Reporting	265
	Acres
Total Area in Agriculture	73,676
Total Area Owned	42,729
Total Area Rented or Leased	30,947
Area Land in Crops (excluding xmas trees)	67,522
Area Irrigated	1,359
Corn for Grain	27,718
Soybeans	27,112
Total Area for Wheat	5,902
Total Area Vegetables	6,064
Tomatoes	3,475
Green Peas	1,339
Carrots	641
Cucumbers and Gherkins	53
Peppers	97
Other	9

* Source: 1996 Census of Agriculture

Land Tenure

The use of rental land is a major contribution to the agricultural production practices in the region. Between 1991 and 1996 there was a 13 percent increase in the amount of rented agricultural land in the Dover Community, which is likely a result of increased vegetable production.

Area of Land in Crops

From 1991 to 1996 there was no significant change in the land area in crops. There was a noticeable increase in the number of acres being irrigated, from 726 acres in 1991 to 1,359 acres in 1996; this represents an increase of 87.2 percent.

Gross Farm Receipts

From 1991 to 1996 there was a 2.4-percent decrease in the total number of farms in the Dover Community (from 339 to 331). During the same period there was an increase in sole-proprietorship farms and in the number of farms reporting gross total receipts in excess of $250,000.

Hunting

The Lake St. Clair marshes were hunted by early European settlers and Native North Americans who depended on the abundance of water birds. In the 1800s, commercial market hunting was an important economic activity within the St. Clair basin. Recreational waterfowl hunting is currently prevalent throughout the area and is an important part of the local cultural heritage. Hunting is conducted on private land and public Crown-owned areas.

Waterfowl hunting is a significant element of the local community's heritage and culture.

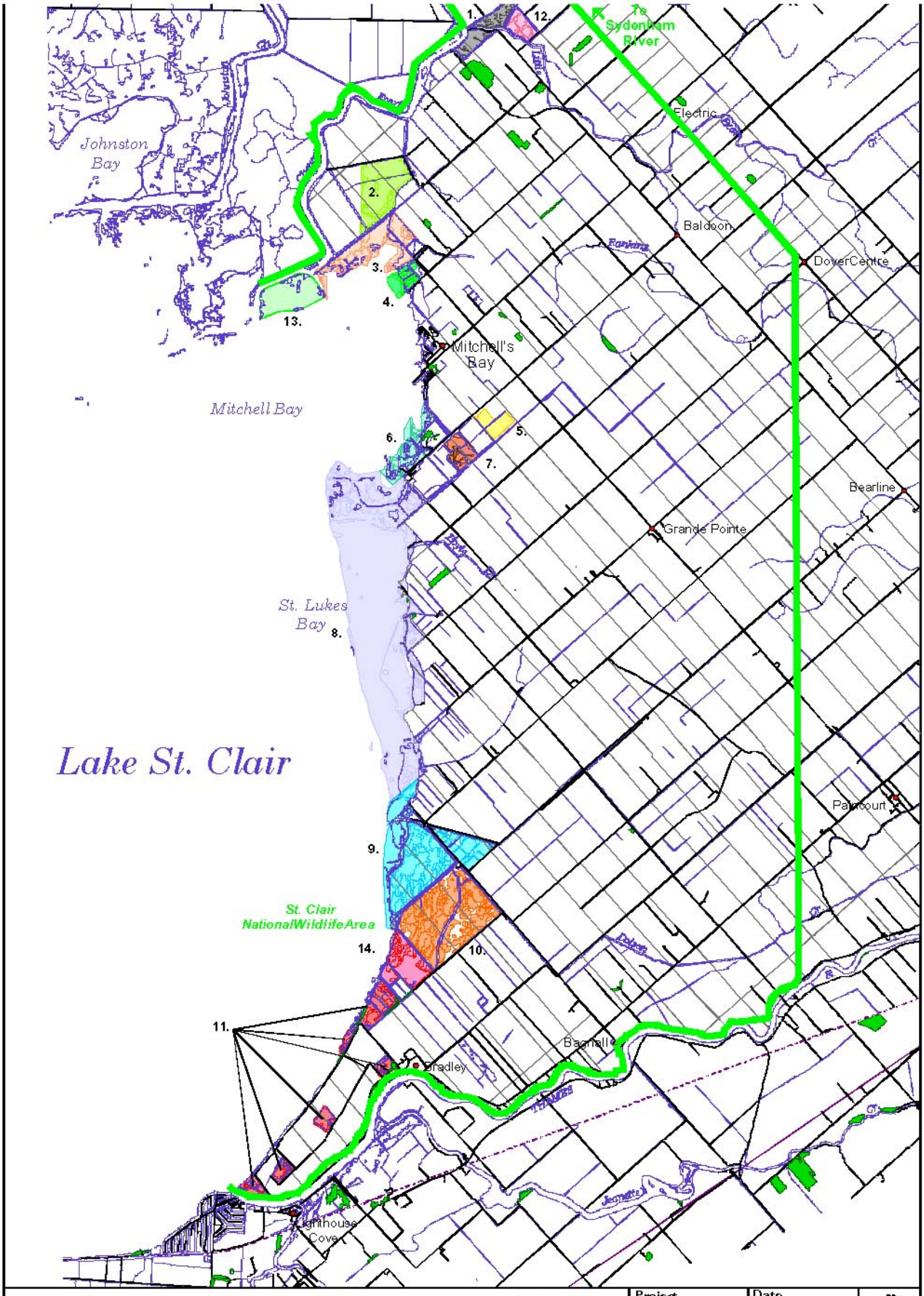
The majority of the remnant marshes within the study area owe their existence to their importance as hunt clubs. These privately owned hunt clubs are typically lightly hunted by the landowners, their families and guests. Many of these clubs employ marsh managers as property caretakers and hunting guides. Adjacent privately owned agricultural fields are also hunted, by the landowners themselves or, commonly, leased for profit.

Limited public waterfowl hunting opportunities exist along the Crown-owned lakeshore within 300 m of the vegetated shore or private property lines.

Numerous commercial hunting businesses operate in the area, offering a variety of hunting packages to a mainly American clientele. These commercial hunting operations range from modest daily hunting blind rentals to elaborate packages including accommodation, exclusive access to leased or privately owned properties, hunt guides, dogs, meals, and game cleaning. The locations of hunted marshes and clubs are shown in Figure 3-4.

Other Outdoor Recreation

Lake St. Clair is a popular and significant recreation destination throughout the year and provides recreation opportunities for nature appreciation, fishing, boating, and other water sports. These activities support a number of local marinas, outfitters and suppliers, and restaurants in the area. As noted above, public access to the lake is extremely limited in the study area. Increased access to public recreation opportunities provided by the restoration project would be beneficial to the local community.



Legend

- Road
- ANSI Boundary
- Wooded Area
- Streams, Creeks & Drains
- WaterBody
- Railway
- TownshipLot

1. BearCreekUnit St.ClairNWA
2. MudCreekClub Marsh
3. PintailMarsh
4. Rex/CadotteMarsh
5. WinterlineMarsh
6. BayLodge
7. RexClubMarsh
8. Big PointClub
9. St. Luke'sClub
10. St. ClaireNationalWildlifeArea
11. BradleyFarmMarsh
12. PigeonMarsh
13. RedheadMarsh
14. BalmoralMarsh

Project	Date
118800.TT.01	Jan. 2001
Scale	**Drwn/Chkd**
NTS	JPC/SND

N W E S

Figure3-4
EasternLake St.Clair HuntClubsand Marsh Properties

1962.01.figure6

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