The St. Clair River Area of Concern

Binational Habitat Management Plan

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Remedial Action Plan
Habitat Sub-Committee
and
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1.0 INTRODUCTION

In 1983, the St. Clair River was identified as an Area of Concern (AOC) by the International Joint Commission (IJC) Great Lakes Water Quality Board (GLWQB) because of the serious water quality and environmental problems existing there. In 1985 Remedial Action Plans (RAPs) were developed for each AOC within their jurisdictional boundaries, to help in the rehabilitation of these areas. The RAP process is a long-term endeavor to restore environmental problems. Its purpose is to identify environmental problems within the area, identify problem sources, and attempt to find solutions to the problems. It will be ongoing until data confirm that established water quality goals have been met, and identified beneficial uses have been restored. Although the RAP processes may end, efforts to restore, protect and enhance environmental quality will continue indefinitely.

An impaired beneficial use is described as an impairment of an environmental feature such as drinking water or fish and wildlife populations that bring economic, recreational and sociological benefits to society. Loss of fish and wildlife habitat was identified as an impaired beneficial use for the St. Clair River AOC, with habitat having been lost to filling, draining, dredging and bulkheading for industrial, urban, agricultural and navigation uses.

To address concerns relating specifically to habitat, the RAP identified a "Habitat Sub-Committee" comprising members selected from BPAC and RAP teams, agency representatives and local experts. The goal of the RAP Habitat Sub-Committee, is to outline actions to protect, restore and rehabilitate habitat within the boundaries of the AOC, until "loss of fish and wildlife habitat" can be "delisted" as an impaired beneficial use from the AOC. A number of actions were identified during the Stage 2 Recommended Plan(1995), which upon completion, should lead to the delisting of the habitat impairment. These actions include:

Strengthen wetland protection measures
Undertake identified habitat restoration and enhancement projects; expand candidate sites; maximize fish use of delta habitats; encourage maintenance/enhancement of riparian vegetation; improve coordination amongst conservation/protection agencies; expand list of special status species.
Develop a long-term habitat management plan
Assess the requirements needed to maintain wildlife diversity and integrity (Gap analysis).
Develop and implement communications/education programs and appropriate landowner guidelines.


Floodway entering St. Clair River

Included under action number 2 was the creation/restoration of 240 ha (600 ac) of aquatic and/or riparian habitat, and the creation/restoration of 440 ha (1100 ac) of land along the Darcy McKeough floodway.

The development of a long-term binational habitat management plan with an accompanying gap analysis, is a necessary element as one of the RAP's delisting guidelines for habitat impairment. The purpose of the management plan is "To ensure continuity, protection and rehabilitation of fish and wildlife habitat beyond the life of the RAP."

The following management plan consists of a review of related initiatives that exist or are proposed in local, provincial or state documents, as well as a selection of few other related documents and management plans that may be applicable. It discusses the management approach that will be undertaken in the St. Clair River AOC, and time lines for completion of recommended actions. Background information including site description, shoreline use and species found in the study area is provided in Appendix 1. The management approach chosen by the RAP follows that of the Natural Heritage System (NHS) landscape design as discussed in Riley and Mohr (1994) and the Nature

Conservancy (1994). The plan continues with the NHS already initiated in 1997 by Geomatics International, and in the Lambton County Official Plan (1996).

A gap analysis is a method that evaluates species representation (vegetation and/or wildlife) and protection in a given area, and attempts to find gaps in biodiversity representation. A gap analysis for the St. Clair River AOC, involved comparing historical habitat and vegetation categories such as forest, meadows and wetlands to present day conditions. From this analysis, it has been possible to measure some of the losses that have occurred over time and set goals for future gains in the watershed.

Recommendations have been divided into two time frames. Short-term recommendations (1-10 years) are those actions required immediately in order for the RAP to delist habitat as a use-impairment. Long-term recommendations (10 years and beyond) are those actions necessary to ensure protection and rehabilitation of fish and wildlife habitat continues long after the RAP processes have ended.

2.0 OBJECTIVES OF THE ST. CLAIR RIVER AOC

Since the St. Clair River was first introduced as an AOC and the RAP process has been underway, a vast number of agencies - federal, provincial, state, municipal - private industry, volunteers and organizations have developed documents outlining strategies for restoration specifically for regions within the AOC, and others applicable to any ecological area. Appendix 3, provides a summary of the documents reviewed including the goals and main objectives of the program or plan. It is important that the RAP recognizes the work and interests of other organizations and programs underway in the study area, and strives to coordinate all the efforts into one common goal – increasing and improving habitat within the boundaries of the AOC. The following paragraphs discuss a few key documents that have played a significant role in designing the St. Clair River binational management plan.

Managing for biological diversity is a common theme discussed in many management plans today. Biological diversity or "biodiversity" can be measured at several levels: genetic, species, structural, and landscape. It is suggested that striving towards structural variety (shape, size, and chemical composition of biological components) and landscape diversity (size, shape, spatial arrangements of patches of a uniform ecosystem) should lead to high diversity at all levels (species and genetic included). In settled landscapes such as that in the St. Clair River AOC, natural areas have become reduced to a scattering of small, widely spaced patches in the landscape. This "fragmentation" is one of the greatest threats to biological diversity today (Riley and Mohr, 1994).

A NHS is a method that has recently been developed to assist in landscape planning and design. It attempts to define a system of interconnected natural areas which include *Core Conservation Lands and Waters*; *Natural Corridors and Countryside*; and, *Restored Connecting Links in Landscapes and Biodiversity* (Riley and Mohr, 1994). This management strategy involves a broader multi-species approach to landscape design, which stresses the retention of a full diversity of intact ecosystems. Ideally, a NHS should represent an area's full spectrum of natural ecosystems. The overall objective of a NHS is to identify the full range of environmentally significant features, functions and linkages on the landscape, and ensure these areas are protected for the future (The Nature Conservancy, 1994; Riley and Mohr, 1994). The product of a NHS would be a map showing all the conservation lands and waters, the environmental policies for the conservation and protection of that system, and methods to assess the environmental impacts and to monitor changes over time. A NHS should conform to a methodology that can be replicated and modified over time (Riley and Mohr, 1994).

Core areas are defined as the larger "nodes" or "anchor" lands such as areas designated as provincial, state or national parks, wildlife protection areas, etc (Riley and Mohr, 1994; Lambton County, 1996). There are often inconsistencies in the exact procedure for choosing core areas, but overall there is generally one common underlying theme – these areas are normally chosen because of a significant function or feature they perform or retain. In the Lambton County Official Plan (1998), core areas have been identified in the County as "areas with significant environmental features and functions". These include Areas of Natural and Scientific Interest (ANSI's), Environmentally Sensitive Areas (ESA's), wetlands, Conservation Areas, Provincial and Municipal parklands, Carolinian Forest Areas, County-owned and Agreement Forests (for a definition of an ANSI and ESA, see Appendix 5). Significant features and functions may include significant woodlands (groundwater recharge areas, habitats for endangered species), significant wetlands and important bodies of water, to name a few.

"An Evaluation Framework for Natural Areas in the Regional Municipality of Ottawa-Carleton" (Brownell and Larson, 1995) is an excellent document describing the Region's method for designing a NHS that retains a diversity of landscape features and functions. Table 5 in Appendix 2 provides the guidelines used to identify core areas in the Regional Municipality of Ottawa-Carleton. Once the core areas were chosen, a gap analysis was then performed on the areas to determine if these areas truly represent biological diversity in the area.

Natural corridors and countryside include the important links between core conservation lands that allow the free movement of species from one significant habitat to another. In Lambton County, designated corridors often tend to follow major river and stream systems. As mentioned previously, the greatest threat to biodiversity is fragmentation

in the landscape. Often, these small, remaining natural areas resemble “islands” in size and isolation, because migration between patches becomes difficult or impossible particularly for low mobility species (DOE et al 1997, Riley and Mohr, 1994). When species are unable to migrate to new areas, breeding becomes difficult, and the genetic integrity of the population is reduced. Greater than 90% of modern bird extinctions, and 75% of mammal extinctions, have been on islands (Riley and Mohr, 1994). Although maintaining a large mosaic of natural areas in the landscape is extremely important, just as important is ensuring these lands are interconnected so that species can travel freely to and from the large natural areas to maintain their population and genetic integrity.

Once core areas and natural corridors have been identified, it becomes important to focus on the restoration of connecting links and biodiversity gaps. In areas where natural corridors and core areas are not existent, restoration and replacement can enhance the viability of isolated woodlots, re-establish stream cover, and fill in disturbed areas to create continuous forest tracts. Areas targeted as connecting links include watercourses (riparian habitat), shorelines, and anthropogenic formations such as utility corridors and old railway lines, abandoned agricultural fields and municipal open spaces (Riley and Mohr, 1994; Lambton County, 1996).

A “Conservation Strategy for Carolinian Canada” (vanHemessen, Reid and Symmes, 1996) is being developed that focuses on the concept of a NHS where management is focused on preserving biodiversity at the landscape level. In this strategy, key features and landforms (45 features are recognized in all) of the Carolinian landscape are identified and mapped. Each of these features is then checked to determine how well it is represented through existing parks or other protected areas. From this information, a system of conservation core areas will be developed, connecting links will be identified for restoration, and priority themes for restoration efforts can be developed (i.e. focusing on forest interior, riparian habitat individual wildlife species etc.).

In Ontario, ESA’s and ANSI’s were developed in an attempt to identify a system of environmentally significant areas that reflected a diversity of elements and ecosystems. Many of these areas make suitable choices as core lands, but their protection status varies. In most cases, they are privately-owned, and the continued conservation is encouraged but can not be enforced.

Environment Canada, Ontario Ministry of Natural Resources and Ontario Ministry of Environment developed guidelines to assist RAP teams and Public Advisory Committees in habitat management within AOCs. The paper is titled “A Framework for Guiding Habitat Rehabilitation in Great Lakes Areas of Concern” (Environment Canada et al, 1998). The purpose of this “Framework” is to establish guidelines for restoring habitat (forest, wetland and riparian) in the AOC that will eventually lead to delisting. The process builds upon the NHS currently being implemented through municipal land use planning processes across Ontario.

The Framework is a starting document to assist in setting targets for the St. Clair River AOC. The guidelines established are based on biologically-sound research that suggest these are optimum conditions for maintaining forest interior bird species, wetland species and a high level of water quality in a watershed. Several other issues addressed in the Framework include:

> the protection of existing habitat should be the most important planning activity
> the management of habitats for fish and wildlife must take an ecological landscape approach, with boundaries beyond that of the AOC
> representivity must be considered in the identification of components within the NHS.
> representivity refers to a consideration of the range and proportion of habitat types or ecosystems that formed the original (pre-European settlement) landscape (e.g. gap analysis). This step is critical when addressing biodiversity issues.

A summary of the Framework guidelines for wetlands, forest and riparian habitat are presented in Section 1.1 of Appendix 3. The importance of upland forest cover, wetlands, and riparian habitat is discussed in Appendix 4 of this report.

In the St. Clair River AOC, a NHS was completed for the RAP (Geomatics International,1998). In this study area, upland forest, riparian and wetland areas were mapped, measured, and additional areas for restoration and rehabilitation have been identified. Numerous organizations and governments provided data for this study including the Ontario Ministry of Natural Resources; County of Lambton; Ontario Ministry of Agriculture, Food and Rural Affairs; Ontario Ministry of Culture, Communications, and Recreation; U. S. Army Corps of Engineers, Michigan Resource Information System; Michigan Department of Natural Resources, Land and Water Management Division; St. Clair County Planning Commission; and The Nature Conservancy. From this large data set, it was possible to measure the percent of forest cover, riparian cover and wetland that currently exists in the AOC. The parameters chosen for measurement (riparian, forest, interior forest, wetland etc.) were based on the Framework document, so that comparisons could be made between the guidelines set out in the Framework and the actual values in the study area. The NHS has not defined a set of core conservation lands and corridors. This document will set the stage for the long-term binational management plan by providing current, benchmark conditions for which to set goals and strategies for protection and restoration in the future.

The St. Clair River binational habitat management plan will thus continue with the NHS initiated for the RAP, and as discussed in Riley and Mohr (1994) and The Nature Conservancy (1994). The gap analysis provides a comparison between historical and current vegetation characteristics and will enable the AOC to establish targets for species representation. It will further refine the information gained in the NHS, and establish targets that will allow the AOC to move closer to historical conditions. The Framework document will be used to assist in establishing goals and targets for habitat gains in the study area.

Wilkesport site prior to restoration

Wilkesport site after two seasons

3.0 GAP ANALYSIS

3.1 DEFINITION

Gap analysis uses vegetation types and/or other taxa if adequate distributional data are available as indicators of biodiversity. Maps of existing vegetation are prepared from satellite imagery (LANDSAT) and other sources and are entered into a Geographic Information System (GIS). Vegetation maps are also verified through field checks and examination of aerial photographs. Predicted species distributions are based on existing range maps and other distributional data, combined with information on the habitat affinities of each species. Distributional maps for individual species are overlaid in the GIS to produce maps of species richness. This can be done for any group of species of biological or political interest. An additional GIS layer of land ownership and management status allows identification of gaps in the representation of vegetation types and centres of species richness in natural ecosystems through a comparison of the vegetation and species richness maps with ownership and management status maps.

The overall goal of a gap analysis is to ensure that all ecosystems and areas rich in biodiversity are represented adequately in management areas. The methodology of the analysis is to identify any gaps in representation of biodiversity, so that they can be filled in through new reserve acquisitions or designations, or through a change in management practices.

Gap analysis is a powerful and efficient first step towards setting land management priorities. It provides focus, direction and accountability for conservation efforts. Areas identified as important through gap analysis can then be examined more closely for their biological qualities and needs (Scott et al, 1993).

3.2 A GAP ANALYSIS FOR THE ST. CLAIR RIVER AOC

In the U.S., a National Gap Analysis Program (GAP) exists that is sponsored and coordinated by the Biological Resources Division of the U.S. Geological Survey, with additional national support by the Department of Defense and the Environmental Protection Agency. It is the first state- and national-level effort to map existing natural vegetation to the level of dominant or co-dominant plant species; map predicted distribution of native vertebrate species; map public land ownership and private conservation lands; show the current network of conservation lands; compare distributions of any vertebrate species, group of species, or vegetation communities of interest with the network of conservation lands; and, provide an objective basis of information for local, state, and national options in managing biological resources. Mapping and analysis is conducted by GAP projects within each state. In Michigan, classification of the northern half of the Lower Peninsula was expected to be completed by July, 1998. National Wetland Inventory data, used in the image processing protocol, is currently being digitized in the southern half of the Lower Peninsula. The conversion of public ownership data from a large mainframe database to a GIS is underway and The Nature Conservancy lands have been mapped for the stewardship data layer. Digital coverages for lands and national parks are being acquired, vertebrate data are being evaluated, and Breeding Bird Survey data at 1/4 township scale and the recently revised “Michigan Mammals” are being used.

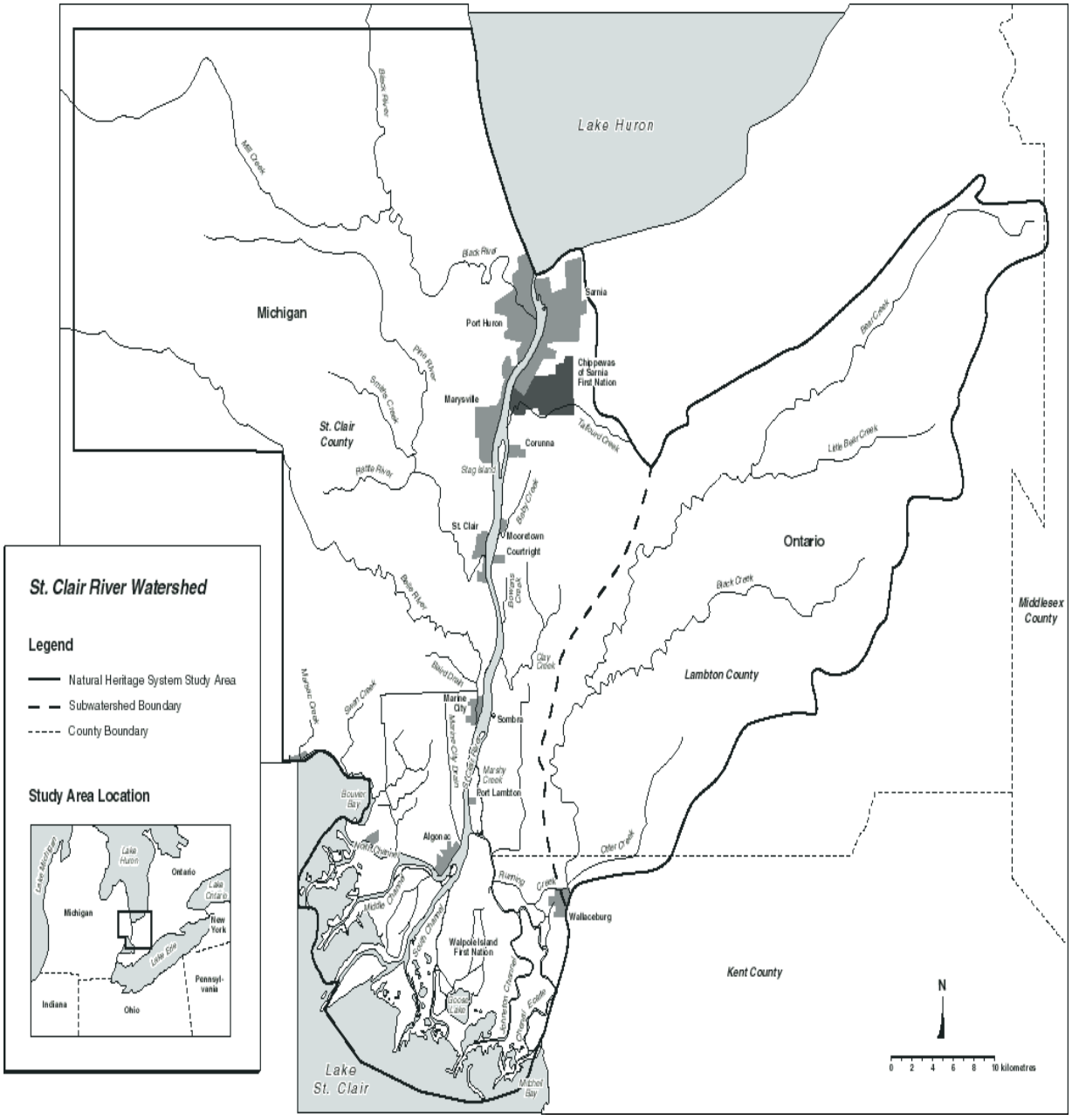
Given the scope of time available, it is not feasible for a detailed gap analysis described above (3.1), to be performed on the St. Clair River AOC for this plan. However, the completion of even a raw analysis on the area, can provide the basis for some valuable conclusions and set the stage for future management goals and strategies.

3.3 PROCEDURE

A gap analysis for the St. Clair River AOC was conducted by comparing historical vegetation (pre-settlement) to present day vegetation for both Michigan and Ontario. This was possible for Ontario by consulting Geomatics International who had recently compiled a GIS database for the watershed in “A Natural Heritage System for The St. Clair River Watershed” (1998). Michigan historical values tabulated and forwarded by St. Clair County Planning Department, and Geomatics International tabulated current values for both Michigan and Ontario, with both groups relying upon databases that had been previously compiled by various organizations and governments. The Michigan

historical data set is taken from surveys done between 1816 and 1866 (Michigan Resource Information System). The Ontario data date back to surveys completed between 1792 and 1856 (Findlay, 1978). Figure 1 provides a map of the study area as defined by Geomatics International (1998) study.

Figure 1. Study Area



3.4 HISTORICAL CONDITIONS

3.4.1 Ontario

Historical vegetation types determined for the Ontario portion of the watershed can be broken down as shown in Table 1. Figure 2 provides a map of historical conditions in the watershed as prepared by Geomatics International (ibid).

Table 1: Historical Communities and Their Percentages in Ontario

VEGETATION CLASS	HECTARES (ACRES)	PERCENT
Tamarack/Black Ash Swamp	7,203 (17,800.3)	28.6
Open Marsh	563.3 (1,391.8)	2.2
Open Meadow	319.8 (790.3)	1.3
Oak	15,148.8 (3,7432.7)	60.1
Beech/Maple	1,940.6 (4,795.3)	7.7
Total	25,176.2 (62,210.3)	100.0
Summary		
Total Wetland	7,766.9 (19,192.1)	30.8
Total Forested	17,089.4 (42,227.9)	67.9
Total Prairie	319.8 (790.3)	1.3

Historical vegetation classes for Ontario were not available in as diverse a format as that was recorded for Michigan. In reviewing historical maps for Ontario however, surveys did identify other tree species in many areas including elm, basswood, walnut, sycamore, hickory and beech. Thus, it is likely that Ontario would contain many of the same vegetation classes as Michigan if the data were available.

3.4.2 Michigan

Historical vegetation classes for St. Clair County, Michigan, can be broken down as shown in Table 2 (St. Clair Planning Department, 1998). For the purpose of setting targets, each category has been further identified as either prairie, forest, or wetland. Figure 3 provides a map of the historical landscape as provided by Geomatics International (ibid).

There are some marked differences between the two data sets. In Ontario, the dominant vegetation class was the oak community, which comprised 60.1% of the historical landscape. In Michigan however, White oak, Black oak and Hickory forests comprised a mere 0.7% of the landscape. In Ontario, the Beech/Maple community comprised only 7.7%, while in Michigan this vegetation class including Basswood comprised 66.7%.

Figure 2. Historical Land Use in Ontario

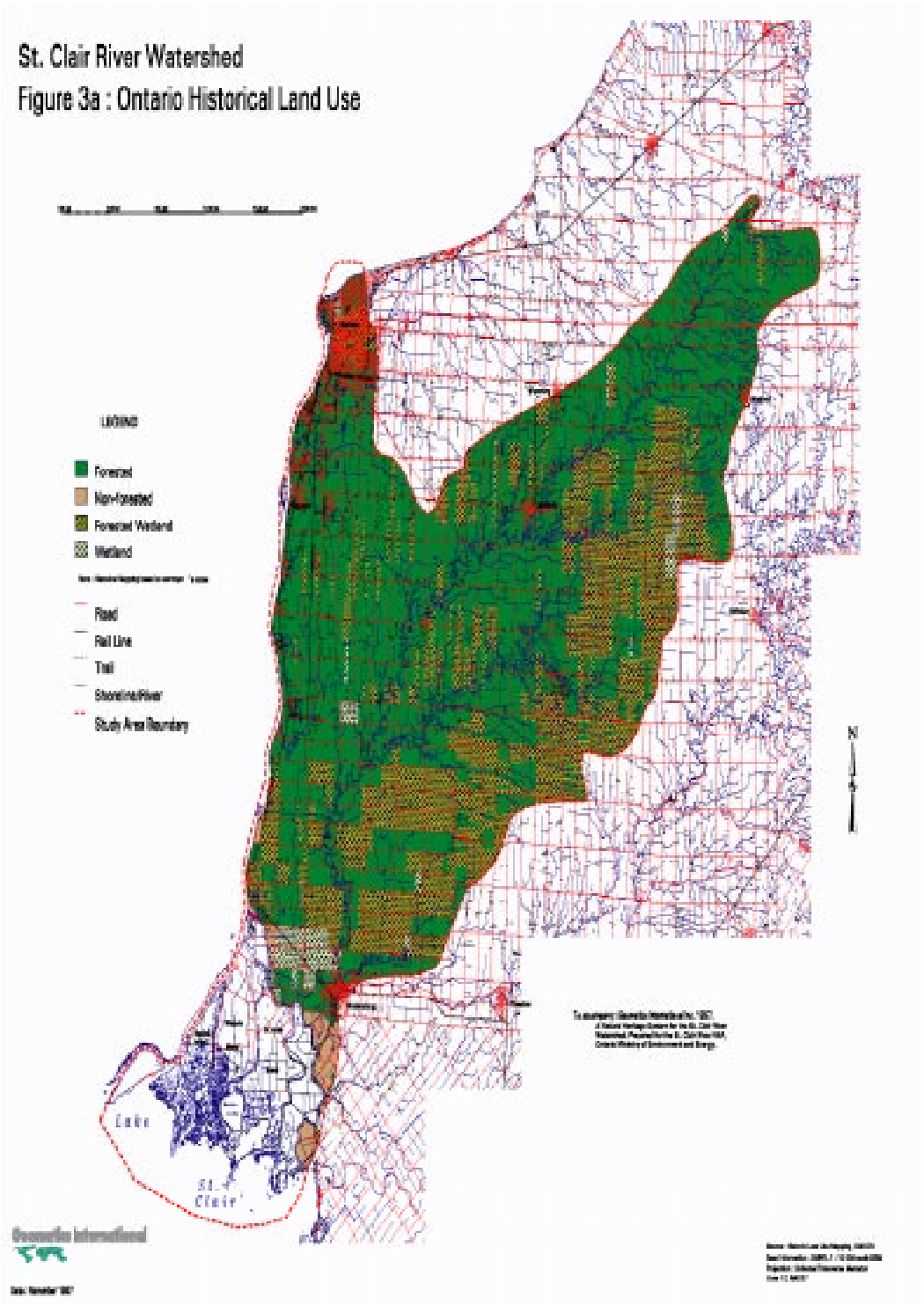
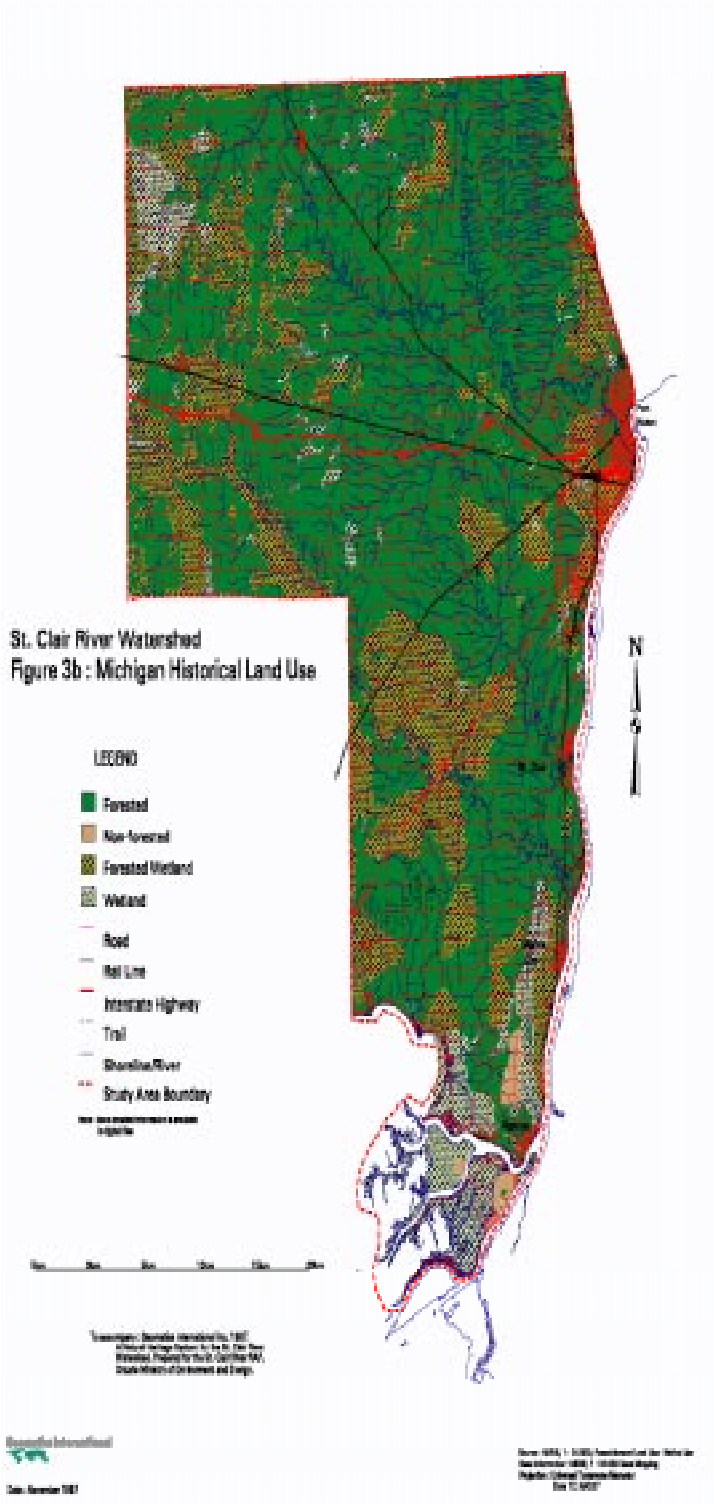


Figure 3. Historical Land Use in Michigan



In Ontario, wetlands accounted for 30.8% of the land base, while in Michigan they accounted for 23.2%. Michigan values may not be accurate as the data set originally identified Tamarack, Lowland Hardwood, Silver Maple/Red Maple to be forest when they may actually be swampland (Eddy, pers. comm. 1998). In visually reviewing Figure 2, it appears that treed wetland accounted for a greater part of the landscape than is reflected in the data. In a workshop held with the RAP habitat sub-committee, it was agreed that lowland hardwoods, Black ash, Elm, Silver Maple, Red Maple, Tamarack should be classified as wetland.

Historical data sets are based on surveyors who walked the land and observed major forest communities from roadways back in the 1800's. This may account for some of the unusual percentages reported above as discrepancies between the observations of different surveyors would have been impossible to control.

Table 2: Historical Vegetation Classes for St. Clair County Michigan

VEGETATION CLASS	HECTARES (ACRES)	PERCENT
Lake Plain Oak Opening	1,125.0 (2,779.9)	0.6
Hardwood/Conifer – Hardwood dominant	369.0 (911.9)	0.2
Beech, Sugar Maple, Basswood	125,729.9 (31,0678.8)	66.7
White Oak, Black Oak, Hickory	1,412.9 (3,491.2)	0.8
Aspens, Paper Birch	366.0 (904.3)	0.2
Lowland Hardwood	29,936.6 (73,973.4)	15.9
Black Ash	1,364.0 (3,370.3)	0.7
Elms	30.1 (74.5)	0.02
Silver Maple, Red Maple	27.0 (66.6)	0.01
Balsam Poplar	18.8 (46.4)	0.01
Conifer/Hardwood – Conifer dominant	254.4 (628.5)	0.1
Hemlock	2,759.5 (6,818.7)	1.5
Lowland Conifer	258.3 (638.1)	0.1
Cedar	1,419.5 (3,507.6)	0.8
Black Spruce	194.5 (480.7)	0.1
Tamarack	9,799.3 (24,214.0)	5.2
Major River	445.8 (1,101.5)	0.2
Lake or Pond	5.2 (12.9)	0.00
Bog	101.8 (251.4)	0.05
Alder, Willow, Bog Birch Thicket	1,413.8 (3,493.5)	0.8
Emergent Marsh	1,070.4 (2,645.0)	0.6
Great Lakes Prairie	4,236.6 (10,469.0)	2.3
Lake Plain Prairie	6,189.23 (15,294.0)	3.3

Inland Wet Prairie	54.3 (134.3)	0.03
Total	186,394.1 (465,985.3)	100.0
Summary		
Total Wetland	32,286.3 (79,778.2)	23.2
Total Forested	429,804.9 (1,062,033.3)	70.4
Total Prairie	25,896.0 (63,963.1)	6.2

3.5 CURRENT CONDITIONS

Data for present day vegetation conditions are not available in all the above categories, therefore, only forest, wetland and riparian cover (vegetation adjacent to streams) is determined. Riparian cover does not imply any specific type of vegetative community, only that a wooded vegetation area exists adjacent to a waterway. This parameter was measured as the percent of waterways within the watershed that have a woody vegetative cover. Two other parameters measured included forest interior that is 100 m from any edge and at 200 m from an edge, and the size of the largest forest patch. The parameters chosen are based on the Framework document (DOE et al, 1998). Therefore, the results below will be discussed in accordance to the targets suggested in the Framework document (Appendix 2). Present day values for these parameters with the study area are provided in Table 3. Figures 4 and 5 are maps of both Ontario and Michigan respectively, showing the present day conditions in the AOC, based upon provided data (Geomatics International, ibid).

Table 3: Current Values for Wetlands, Riparian Cover, Upland Forest and Interior Forest in the St. Clair River Study

	ONTARIO			**MICHIGAN**			**WATERSHED**		
	ha	ac	%	ha	ac	%	ha	ac	%
Wetlands	6,311	15,588	3.4	3,911	9,660	2.0	10,221	25,246	2.7
Forest Cover	20,400	50,388	11.2	29,320	72,420	14.9	49,720	122,808	13.2
Forest Interior > 100 m	3,680	9,090	2.0	6,301	15,563	3.2	9,980	24,651	2.6
Forest Interior > 200 m	800	1,976	0.4	1,657	4,093	0.8	2,437	6,019	0.7
Size of Largest Forest Patch	1,300	3,211	n/a	3,339	8,247	n/a	3,339	8,247	n/a
Riparian Cover	467,400 (m)	n/a	13.4	742,012 (m)	n/a	6.0	1,209,412 (m)	n/a	7.6
55 Forest Patches>100 ha	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Figure 4. Current Land Use in Ontario

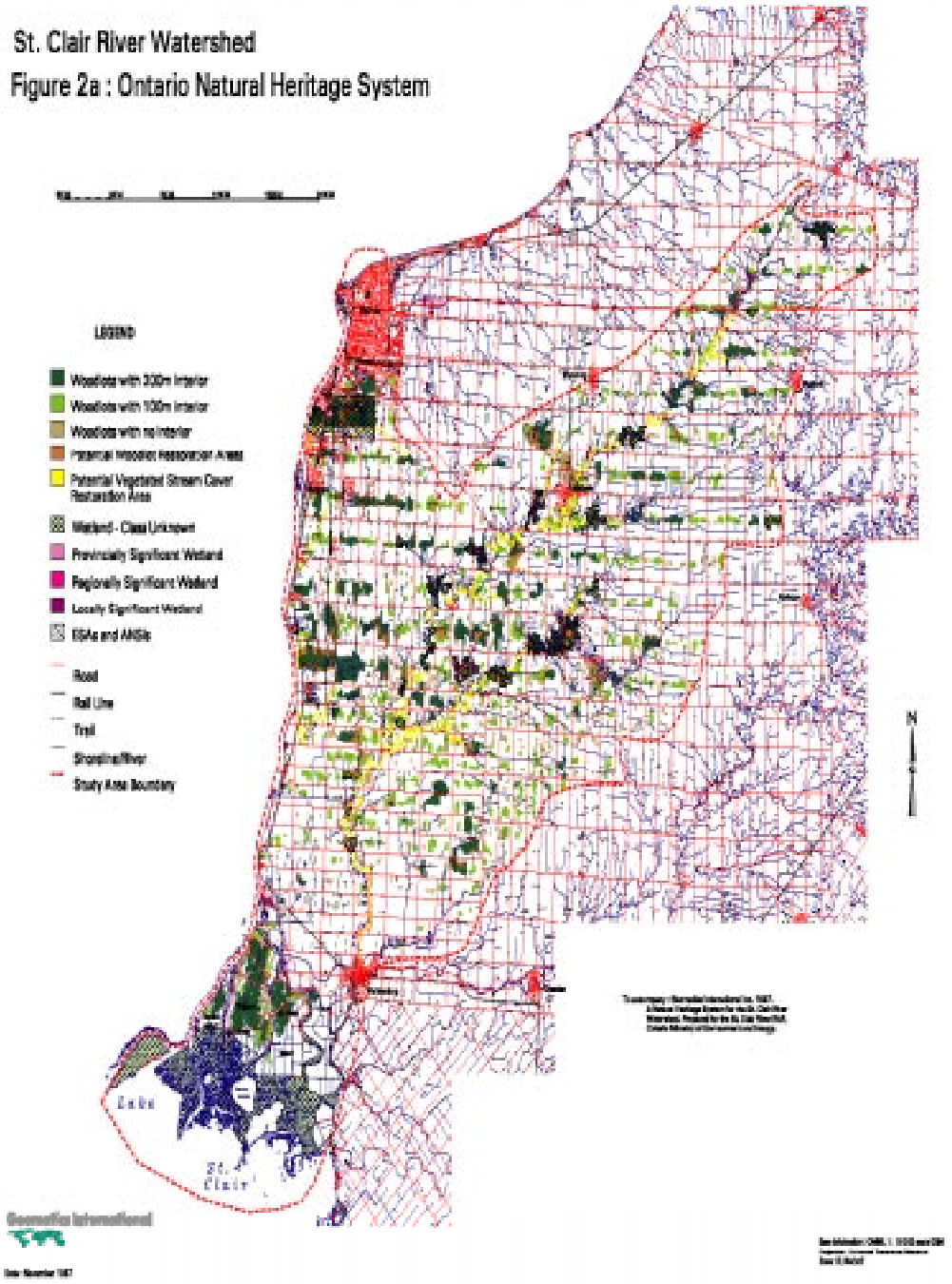
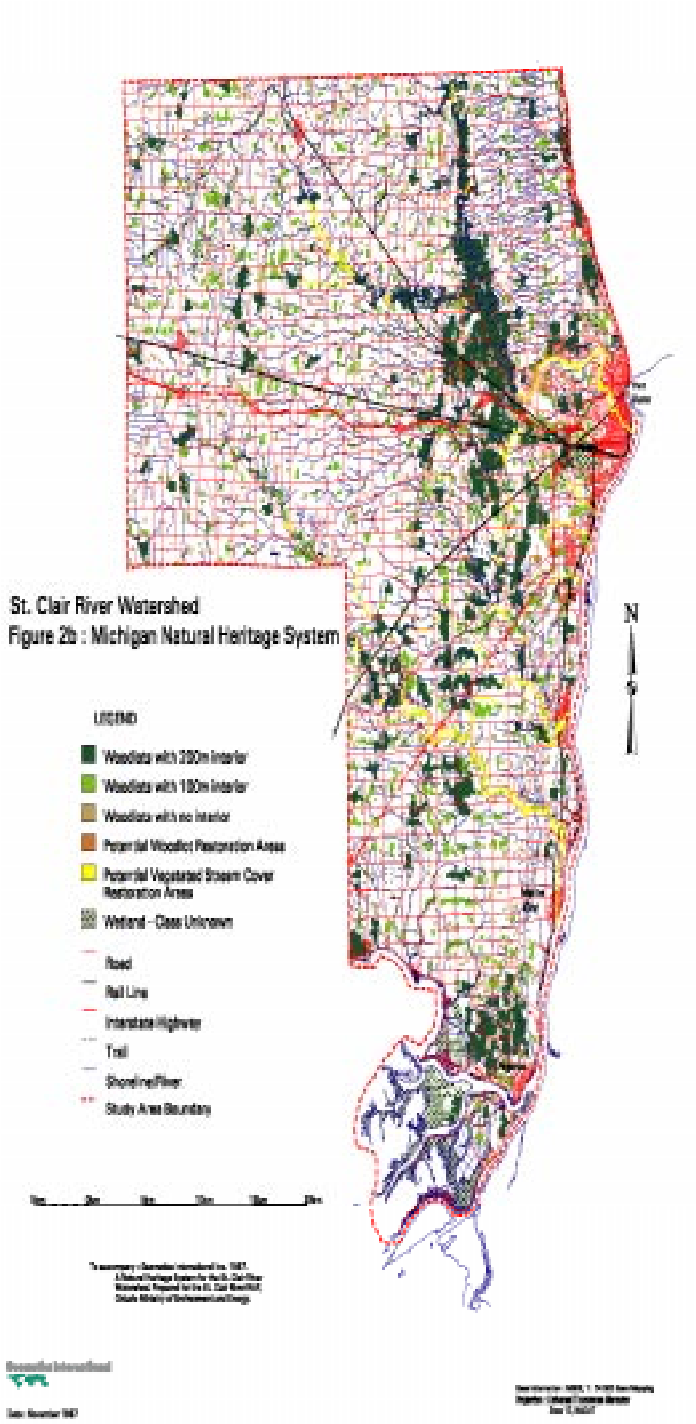


Figure 5. Current Land Use in Michigan



3.5.1 Wetlands

The present day values for wetlands may not be entirely accurate as the LANDSAT imagery is unable to define the difference between "forest cover" and "treed wetlands" (swamp), therefore some swamps may have been included as forest cover, when they should have been included as wetlands. Some evidence in favour of this comes from the ESA studies in Ontario. Many of the designated ESA's have silver maple swampland, not distinguishable in the GIS. Environment Canada et al (1998) suggest that satellite imagery alone, may only be 50% accurate for identifying wetlands.

The Framework suggests wetlands should be approximately 10% of the watershed. Wetland values in the watershed are significantly below 10% and have been drastically reduced since pre-settlement time.

3.5.2 Riparian Cover

Riparian cover was chosen as a parameter because of its importance in maintaining water quality and wildlife habitat within a watershed (Appendix 3). Riparian cover was determined by measuring the entire length of streams and rivers within the watershed, then determining what percentage of that length had riparian cover. Without extensive ground truthing, the values provided here are likely not accurate estimates of true riparian cover. The satellite imagery was unable to detect any vegetated buffers that are less than 30 m (98.4 ft) in width along watercourses, and only tabulated riparian cover as that when forest intersected with water. This eliminates other riparian cover that might exist such as shrubs, grasses, or old pasture lands. Additionally, total stream length used in this study included all agricultural drains, thus likely leading to an overestimate of stream length, and an underestimate of vegetated stream length.

Natural vegetation along streams accounts for approximately 7.6% (1,209,412 m/3,968,081 ft) of the total length of watercourses (15,906,320 m/52,188,636 ft) within the study area (Table 3) (Geomatics International, ibid). The Framework document suggests 75% of streams should have at least a 30 m (98.4) buffer in place. Geomatics International (ibid) identified an additional 565,637 m (1,855,855 ft) of streams for restoration/rehabilitation (see Figures 4,5, yellow highlight). All streams flowing directly into the St. Clair River were selected, as well as major natural channels, which provide linkage between large forest blocks. This increased the percentage of vegetated stream length to 11.2%, a value still well below the suggested optimum.

3.5.3 Forest

A total of 13.2% (11.2% in Ontario and 14.9% in Michigan) of the study area remains as forest today – a vast difference from pre-settlement conditions. The Framework suggests 30% forest is optimum in a watershed for protecting forest bird species. Other parameters measured based on the Framework include size of the largest forest patch and interior forest 100 m (322 ft) and 200m 644 ft) from the edge. In this study area, only 2.6% consists of forest interior conditions that are 100 m (322 ft) from an edge, while only 0.75% of forest interior exists 200 m (644 ft) from an edge. The Framework suggests that in order to support a strong population of interior bird species, greater than 5% of interior forest should be 100 m (322 ft) from any edge, and greater than 3% of interior forest should be 200 m (644 ft) from an edge. Based on these guidelines, the study area does not contain adequate interior forest conditions. The AOC is however, meeting guidelines for the size of the largest forest patch as the Framework suggests there should be at least one 100 ha (247 ac) forest patch at minimum in a watershed; the AOC contains 55 patches of forest greater than 100 ha (247 ac) in size.

Geomatics International (ibid.) also analyzed potential restoration sites by looking at existing forested tracts that were at or close to 500 m (1641 ft) in width. A minimum of 500 m (1641 ft) is necessary to produce a 200 m (644 ft) interior. By restoring gaps within these sites and rounding out the edges, 2513.3 ha (6,208 ac) were identified for potential restoration (brown areas, figures 4 and 5). Unfortunately, even with this technique, this only amounted to

forest interior defined by a 200 m (644 ft) edge increasing to 1.7%, and overall forest increasing form 13.2% to 13.8%.

Forest shape and the proximity to other forest patches was not measured in the NHS. In reviewing maps visually however, it appears that the majority of the forest patches follow the contours of agriculture land and therefore tend to be linear or very irregular in shape (figures 4 and 5). When taking into account the scale of the map, it does appear that a majority of forest patches do exist within a 2 km (1.2 mi) proximity as recommended by the Framework.

3.5.4 Meadow/Prairie Habitat

The Framework document does not address habitat types such as tall grass prairie or other early to mid-successional habitat. Historically in Ontario, the majority of the tall grass prairie habitat fell outside of the St. Clair River AOC, mainly in Essex County around Lake St. Clair. In the actual boundaries of the AOC, only 1.3% was meadow on the Ontario side. In reviewing historical maps, much of this also occurred toward the lower end near the delta and on Walpole Island (RLSN, 1995). Because of the endangered status of prairie species, much attention has been given to this community type, and several hectares of prairie have already been restored in the watershed. These areas include MacDonald Park, Stag Island, Wilkesport Wetland and Prairie, and Moore Wildlife Habitat Management Area, to name a few. In Michigan, prairie accounted for a higher percentage of the historical landscape at just over 6%. It is not known exactly where the majority of this habitat occurred historically, but it may also have been restricted to the delta.

Planting at Stag Island

3.6 PROTECTED AREAS WITHIN THE WATERSHED

3.6.1 Ontario

In Ontario, the only truly protected lands are Provincial Parks and Conservation Areas, which are public lands kept for wildlife preservation and recreational opportunities. Two other environmentally significant designations are the ESA's and ANSI's. These areas are public or private lands that have been designated as significant areas based on many significant biological criteria (for a complete description and definition of an ESA and ANSI, refer to Appendix 2). ESA's and ANSI's in most cases are not protected from detrimental land use, but landowners who's property has been designated as environmentally significant, are encourage to conserve the area.

In the study area boundary described in Geomatics International (ibid.), 23 ESA's were identified with 10 of the 23 also designated as ANSI's, and one other ANSI is identified. The total acreage of natural area on Stag Island is not known, nor is the acreage for Walpole Island and the Sarnia Indian Reserve. Total area of the other 20 ESA's and one ANSI is 2,067 ha (5,105,5 ac). Also included in the study area are the Bridgeview Conservation Area, Chantos Tract Agreement Forest, Lorne C. Henderson Conservation Area, and the Marthaville Habitat Wildlife Management Area (SCRCA). It is not known what vegetation types can be found within these areas, or the total size of these areas.

Out of the 24 ANSI's and ESA's, 15 are described as containing Oak or specifically an Oak/ Hickory forest. Thirteen are described as a Beech/Maple climax forest, 10 as containing some form of open meadow, 10 with open marsh/wetland habitats and 9 with treed swamp. In none of these reports were the vegetation category described as Tamarack/Black Ash Swamp found. All the swamplands were described as Silver Maple Swamp, with one containing swamp white oak. The ESA and ANSI reports do not specify how much of acreage of each site is designated to each of the vegetation types.

Based on these results, the opportunity exists to have a representation of habitat diversity amongst protected areas in the watershed, but the ESA and ANSI reports are dated, and extensive ground truthing needs to be repeated to

determine the quality of these sites today. Maple/Beach climax forest is often an outcome of oak dominated forests which have not had the presence of fire and flooding to maintain them. Over time, some of the designated oak dominated sites may not be as high a quality. It is known that Walpole Island contains the best remnant examples of tall grass prairie, however, Walpole Island is not open to public use and cannot truly be considered as a "protected area". Attempts are being made however, to work with First Nations people and encourage the continued conservation of their land. Attempts to restore prairie habitat on MacDonald Park, two locations near Wilkesport, and Stag Island have also occurred recently. The prairie and savannah habitat type is a critically imperiled resource (The Nature Conservancy, 1994). A number of the ESA's and ANSI's contain some form of open meadow, and may be optimal sites for re-establishing prairie habitat.

3.6.2 Michigan

St. Clair County in Michigan does not have a comparable system to that of the ESA and ANSI sites in Ontario, however there is a number of protected areas within the watershed. The following information was provided in "A Natural Heritage Management Plan for St. Clair Flats Wildlife and Algonac State Park" (Bauer et al, 1994).

The St. Clair Flats represents the Delta area at the top of Lake St. Clair and includes Dickinson Island, Harsens Island, and St. John's Marsh. Dickinson Island has a total area of 1,200 ha (3,000 ac), with 840 ha (2,100 ac) remaining in a natural condition. Harsens Island is 3,188 ha (7,971 ac) and contains 4 ha (10 ac) of habitat in a natural state. St. John's Marsh has an area of 920 ha (2,300 ac) with 29 ha (73 ac) in a natural state. It contains the only intact and largest example of a freshwater delta on the continent and likely the world.

The St. Clair Flats area contains over 160 herbaceous plant species composed primarily of grasses and forbs. The more common prairie grasses are the big and little blue stem, Indian grass, switch grass and prairie cord grass. Familiar summer wild flowers include blazing star and Ridell's and Ohio goldenrod. Rare species found in the area are Gattinger's gerardia, Shinner's gerardia, Sullivant's milkweed, Short-fruited rush, seedbox, prairie fringed orchid, Clinton's bulrush and few-flowered nut-rush. Oak openings of principally black and white oaks are found on higher beach ridges. Swamp white oak, Chestnut oak and Pin oak are found on wetter, lower grounds or swales.

Wildlife found within the St. Clair Flats vicinity include over 60 species of mammals, 25 species of reptiles, 20 species of amphibians, and over 250 species of birds. Insect species diversity has also been shown to be very high within Algonac State Park. Rare animals include a Great Blue Heron rookery, King rail, Common tern, Forster's tern, Spotted turtle, Eastern fox snake, and Bald eagle. The marshy area serves as a critical migratory stop-over for birds. At least 3 million waterfowl migrate annually through the Great Lakes region. Dabbling ducks prefer Harsens Island where shallow marshes and grain are available while diving ducks prefer open water and wetlands of Lake St. Clair. The bays and wetlands also play a vital role in the spawning and nurturing areas for many species of fish found in the lake system (Bauer et al, 1994).

St. John's Marsh

Pre-settlement vegetation described for Algonac State Park and St. Clair Flats indicate an area consisting primarily of oak openings, prairies, and Great Lakes coastal marshes. In Algonac State Park, lowland hardwoods were found adjacent to the St. Clair River. Much of the park's interior consisted of lakeplain prairie, and the northern and western sections of the park were dominated by lakeplain oak openings. Lakeplain prairies dominated St. John's Marsh, while Dickinson and Harsens Island consisted primarily of Great Lakes marsh with lakeplain prairies on the eastern sides. Small patches of oak-hickory forests on the far east side of Harsens Island were also indicated.

Lakeplain and oak openings are extremely rare according to the MNFI database and the most recent site surveys. Much has been lost to agriculture, development and successional processes. Twenty-seven occurrences of lakeplain prairies have been noted in the state and only eight of lakeplain oak. Where water tables have been lowered to

accommodate agriculture, prairies quickly succumb to woody vegetation and eventually convert to other habitat types.

Today, little of the vegetation characteristics of pre-settlement times remain except on Dickinson Island. Dickinson Island contains Great Lakes marsh, lakeplain prairie and lakeplain oak openings. At Algonac State Park, much of the vegetation on the eastern portion is thickets of shrubs and young trees interspersed with open areas containing prairie plants. There are a few small stands with mature oak treas. The western portion of the park consists mainly of forests with areas of oak openings with an understory of primarily red maple. On Harsens Island, small remnants of lakeplain prairie are interspersed with dyked marshes designed to provide waterfowl habitats. St. John's Marsh retains a high quality sheltered Great Lakes coastal marsh, dyked marsh areas for waterfowl habitat, and also a high quality lakeplain prairie at its southeastern edge.

Dredging, filling and channelization has consumed a large portion of the wetlands in the St. Clair Flats Area. In 1976 the Michigan Natural Resources Commission approved and dedicated the 1,200 ha- (3,000 ac-) wetland as the St. John's Marsh Wildlife Area. The St. John's Marsh is the only large contiguous block of marsh habitat remaining along the U.S. shoreline of Lake St. Clair, exclusive of the island areas that make up the remainder of the St. Clair Flats complex. A management plan has been developed exclusively for the St. John's Marsh area.

Water level/moist soil management through the use of dykes and pumps is employed to manage waterfowl habitat conditions. In an area located at the northeast corner of the marsh a series of dykes, ditches, water control structures and channels are being constructed in order to establish food plots and high quality nesting, brood and migration habitats and as part of a wetland mitigation.

Prescribed burning, implemented by the MDNR Fire Officers in the Forestry management and Wildlife Divisions, is used routinely in both Great Lakes marsh and lakeplain prairie communities for waterfowl habitat management and savannah and lakeplain prairie restoration.

3.7 CONCLUSION

There are limits to the conclusions that can be drawn from this analysis because of the difference in parameters being measured in the two data sets (historical and present day). Without knowing the exact vegetation classes today, as those presented historically, it can not be truly determined what is missing in biodiversity. As well, not only is information needed as to the representation of those vegetation classes today, but also, how much information is required regarding the amount of vegetation currently protected. For example: according to historical information, Michigan should have a natural landscape base of approximately 2.25% Great Lakes Prairie in order to meet biodiversity needs. Hypothetically, if Michigan currently has 2.25% of its remaining natural landscape as Great Lakes Prairie, however, only 1.25% falls within a protected area. It must assume then that unless Michigan takes steps to ensure the remaining 1% of Great Lakes Prairie is protected, biodiversity may not be truly represented as the fate of that 1% remains unclear. Currently in Michigan and Ontario, other than the areas discussed in Section 3.6, very little habitat is actually protected.

The gap analysis does however, provide some useful base information. Firstly, historical data can be used as a guide for the AOC to follow when setting goals to protect, restore, and rehabilitate natural areas by attempting to ensure the landscape retains representation similar to historical conditions. Secondly, the two data sets indicate the large losses in natural habitat that have occurred over the years and the importance of setting conservation goals focused at preserving biodiversity today.

Striving to maintain a similar representation of species across the landscape as that which occurred historically would be a logical first step towards preserving Biodiversity at the landscape level. Since attempting to restore to original percentages is not realistic, the AOC must first come up with a more attainable goal for each of the habitat categories in the watershed. In April 1997, the St. Clair habitat team discussed appropriate targets for the AOC based on the Environment Canada Framework and on results from the NHS showing current conditions for each of the categories.

At the time, the gap analysis information was not available, and targets for vegetation categories could not be determined. The habitat team has chosen to maintain the Framework targets for forest interior and wetlands, but has reduced the overall forest percentage target to 20% and riparian cover to 50%. Table 5 in section 4 provides the parameters measured, the actual values, the target values and steps for the AOC to take to reach these targets. For the purpose of setting targets, the habitat team has re-classed all the historic vegetation categories into forest, wetland, prairie or riparian.

4.0 THE ST. CLAIR WATERSHED BINATIONAL HABITAT MANAGEMENT PLAN

With an area as vast as the St. Clair River watershed, it is important to ensure that the goals set are specific, attainable, and will ultimately lead to the delisting of the watershed as an AOC. The RAP team set several habitat creation goals when developing the Stage 2 report (1995) that included a goal to protect or rehabilitate 240 ha (600 ac) of aquatic and/or riparian habitat. At the time, data from the NHS and gap analysis was not available. The RAP must still strive towards the original goal of 240 ha (600 ac) of natural area rehabilitated, but should refine the goal to reflect the data derived from the gap analysis and NHS. This will ensure a more naturally diverse and thus ecologically sound environment is established in the AOC. Table 5 outlines the RAP targets for the parameters measure in the NHS and gap analysis as provides some suggestions for meeting those targets.

Although the NHS provides some excellent starting data for the watershed, it is not complete. The true quality of many habitats within the AOC (particularly riparian) will be relatively unknown until on the ground evaluations occur. A complete database is a necessary component for decision-making, and must be easily accessible, manipulated and displayed (Edsell 1988). As well, the success of a NHS involves the formal identification of core lands and corridors, and identifying opportunities for restoring linkages.

Currently, we do not accurately know how well biodiversity is represented in our landscape, as the protection status of many of our remaining natural areas is unclear. The County of Lambton in Ontario, has outlined a system of core lands and corridors and has identified some potential connecting links. The RAP should work with the County and adopt the same system (for the Ontario portion of the watershed) in order to keep consistent goals. The RAP should still continue however, to look for new restoration opportunities in Lambton County as well, and provide knowledge back to the county whenever possible continuously encouraging protection of the land. Carolinian Canada is also working towards establishing a system of core conservation areas and the restoration of connecting links. This is another group that the RAP can look to for guidance and support, as well as for maintaining consistent and common goals.

The following recommendations have been divided into two major time frames. Short-term encompasses the next 1-10 years; long-term is 10 years and beyond the life of the RAP. Short term recommendations are deemed most critical for immediate attention, particularly for delisting habitat as an impaired beneficial use. Long-term recommendations are also important, but will contribute to the maintenance of the area after delisting has occurred.

4.1 SHORT-TERM RECOMMENDATIONS

Work towards targets outlined in Table 4.

Adopt the Core Areas as described in the Lambton County Official Plan in Ontario. Establish a system of Core Natural Areas (CNAs) within the AOC that provide an adequate representation of species and landscape diversity.

It is recommended that the RAP and BPAC establish a system of CNA within the AOC. These core areas would represent the highest quality habitats that exist today and would be chosen based on factors such as size, significant wildlife habitat, significant community types, etc. An evaluation “Framework for Natural Areas in the Regional Municipality of Ottawa-Carleton” (Brownell and Larson 1995), as discussed in Section 2 provides some relevant guidelines to follow when establishing a set of core areas. Riley and Mohr (1994) also discuss the importance of having Core Conservation areas. In Ontario, many of these core areas would actually be ESA and ANSI sites. In the AOC as a whole, size would likely be one of the most significant factors in designating an area as a CNA.

Evaluate and develop a database for each of the CNAs.

Each of the chosen CNAs should be evaluated on the ground, to determine the vegetative community types that exist, as well as fish and wildlife use of the areas. A database should be developed and integrated into the existing St. Clair River AOC data model and it should be made available to parties interested in the management and/or rehabilitation of these areas. Some examples of the parameters that should be evaluated in the database include:

-a clear measurement of each of the community types contained in the area (forest, wetland, meadow/prairie, riparian).

-wildlife species use of the site including those that use the area for breeding, resting and/or feeding.

- look for management opportunities on the site. These might include opportunities to expand the area or increase forest interior by rounding out the edges or re-establish endangered species or endangered habitat.

-look for opportunities to improve or re-establish wetlands on the site. Evaluate the quality of the wetland if one exists. Is there a proper buffer in place and/or a good ratio of vegetation to open water? Are there opportunities to improve stream flow and water quality by establishing a marsh in the area?

-determine the degree of protection of each site and become acquainted with landowners where core areas fall under private ownership.

- look for opportunities to establish connecting links or corridors to other core areas, stream systems, or any other natural habitat.

Ensure the protection of the CNAs.

Once the CNAs have been established, the RAP should ensure the long-term protection of these areas. These areas will have been chosen so as to ensure the AOC is meeting biodiversity needs. Without adequate protection however, it can not be assumed that these needs will continuously be met. Legislation should be sought that protects these areas from any detrimental landuse for the long-term. Where lands are in private ownership, opportunities to purchase the land should be sought, or at the least, landowners should be made aware of the importance of their land and encouraged to protect it, through such mechanisms as conservation easements, written agreements, zoning or planning restrictions.

Adopt a “No Loss” principle for the entire watershed.

Currently, a “no-net-loss” is commonly found in many management plans, county planning documents, and in much government legislation. This suggests that development that destroys wildlife habitat in one area is tolerable as long as new habitat is reestablished else where to make up the loss. The AOC is already well below suggested targets for forest, wetland and riparian habitat, and a no-net-loss concept will not contribute to increasing habitat within the watershed. In order to achieve delisting status, the AOC must work towards significant gains in wildlife habitat and can not afford any further losses.

4.2 LONG-TERM RECOMMENDATIONS

Continue to encourage stewardship practices in the AOC.

As the majority of the AOC is based on private lands, the continuation of a comprehensive stewardship program (with financial incentives) will be an essential component of the implementation of the NHS.

Develop a brochure to provide landowners in the study area with information on the management plan.

Provide workshops and other educational materials to area residents

Determine the status of riparian vegetation within the watersheds and subwatersheds.

The data provided in the NHS on percentage of riparian cover are not truly accurate without extensive ground truthing. To set specific goals and choose specific areas for planting efforts, it is necessary for the stream systems within the area to be properly measured and evaluated. Each of the subwatersheds should be focused on individually, and some of the parameters that should be assessed include:

-measure the actual percentage of riparian cover per subwatershed, ensuring that drains are not included in the measurements
-measure buffer sizes so the percentage of 30 m buffer strips can be accurately determined
-determine the types of buffers that exist (i.e. buffers other than woody species that did not show up on the GIS)
-map areas where buffer strips could potentially be restored, then make contact with landowners to explore these opportunities

Complete a gap analysis on data derived specifically from the evaluation of the CNAs.

Compare the data collected from the CNAs (including species compositions, landowner and protection status and total area) to the historical database provided in Tables 1 and 2, to determine if the chosen CNAs are representative of biodiversity in the watershed. If representation of habitat types does not currently exist, opportunities to reestablish species and/or communities within the core areas should be sought, or, new CNAs should be added.

Improve Vegetation Mapping.

Detailed mapping of the vegetation types present in the study area is still best accomplished using aerial photographs and extensive ground truthing (Geomatics International, 1997). Detailed mapping is necessary for all work required in the AOC, including an accurate gap analysis, creating linkages and undertaking restoration. More detailed mapping may in fact show the AOC is closer to desired targets than currently implied by the NHS. Additionally, the exercise may also reveal that some of the natural areas identified in the NHS are actually degraded and require rehabilitation.

Work closely with the St. Clair River RAP Non-Point Pollution Source Control Steering Committee, as many of non-point pollution source issues (such as conservation tillage, decreasing soil erosion) coincides with the goals of the Habitat Sub-Committee.

Continue undertaking activities with management plans and strategies currently in place for the St. Clair Flats in Michigan and the Lake St. Clair/Sydenham River Habitat Management Plan. Ensure that the RAP is updated on the progress that is occurring in these areas so techniques used and successes can be incorporated into other areas of the AOC.

Work to accomplish habitat projects on Candidate Sites.

The Ontario Ministry of Natural Resources (draft, 1995) has designated 28 sites on the Ontario side of the AOC as potential rehabilitation sites. Much of the initial investigations for these sites has been done including suitable projects, site designs, and estimated costs. The St. Clair Parkway Commission could be an active partner in initiating projects as 17 day-use parks being owned by the Commission along the River. Landowners should be contacted in regards to these sites as well as other sites where proposed habitat protection and enhancement may take place.

Strengthen wetland protection regulations in Ontario, to provide specific regulatory authority for protection of all types of wetlands, and provide penalties for violators. Strengthen wetland protection in Michigan through application of voluntary and regulatory programs that address silvicultural and agricultural activities currently exempted from wetland permitting requirements (MOEE and MDNR 1995).

Reduce ship wakes and surges (MOEE and MDNR 1995).

Minimize shoreline and benthic habitat damage attributable to winter shipping (MOEE and MDNR 1995).

Control shoreline erosion to improve benthic habitat (MOEE and MDNR 1995).

Work with the Walpole Island Heritage Centre and First Nation peoples to identify candidate sites on the St. Clair Delta (MOEE and MDNR 1995).

Integrate shoreline erosion, shoreline development (or redevelopment) projects with environmentally friendly habitat approaches (like buffer strips and spawning channels) that take hydraulic impacts into account. Improved interagency communications and the need to be proactive and opportunistic is key to this approach (MOEE and MDNR 1995).

Encourage conservation easements as a mechanism for habitat protection (MOEE and MDNR 1995).

Recognize the St. Clair River AOC as a priority area within each agency to increase enforcement focus. This could be a combination of increased funding, focused training for aquatic habitat protection, or a shift in enforcement focus (geographically) (MOEE and MDNR 1995).

Impose strict regulations on use of small watercraft i.e. wave runners etc. within shallow water marshes of the St. Clair River Delta for habitat protection (MOEE and MDNR 1995).

Maximize fish use of the wetland areas in the Delta; provide fish access to wetlands (MOEE and MDNR 1995).

Encourage maintenance or restoration of riparian vegetated zones. However, where this vegetation has already been removed, and cannot be restored, use rip-rap instead seawalls or a combination of rip-rap and seawalls to mitigate the effects of ship wakes, enhance fish habitat and increase shore stabilization. Where seawalls are already installed, place rip-rap at the base of the walls. Replace old seawalls with rip-rap (MOEE and MDNR 1995).

Develop a “candidate sites” list for wetland and aquatic habitat restoration projects in the Michigan portion of the AOC similar to that developed for Ontario (ibid).

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