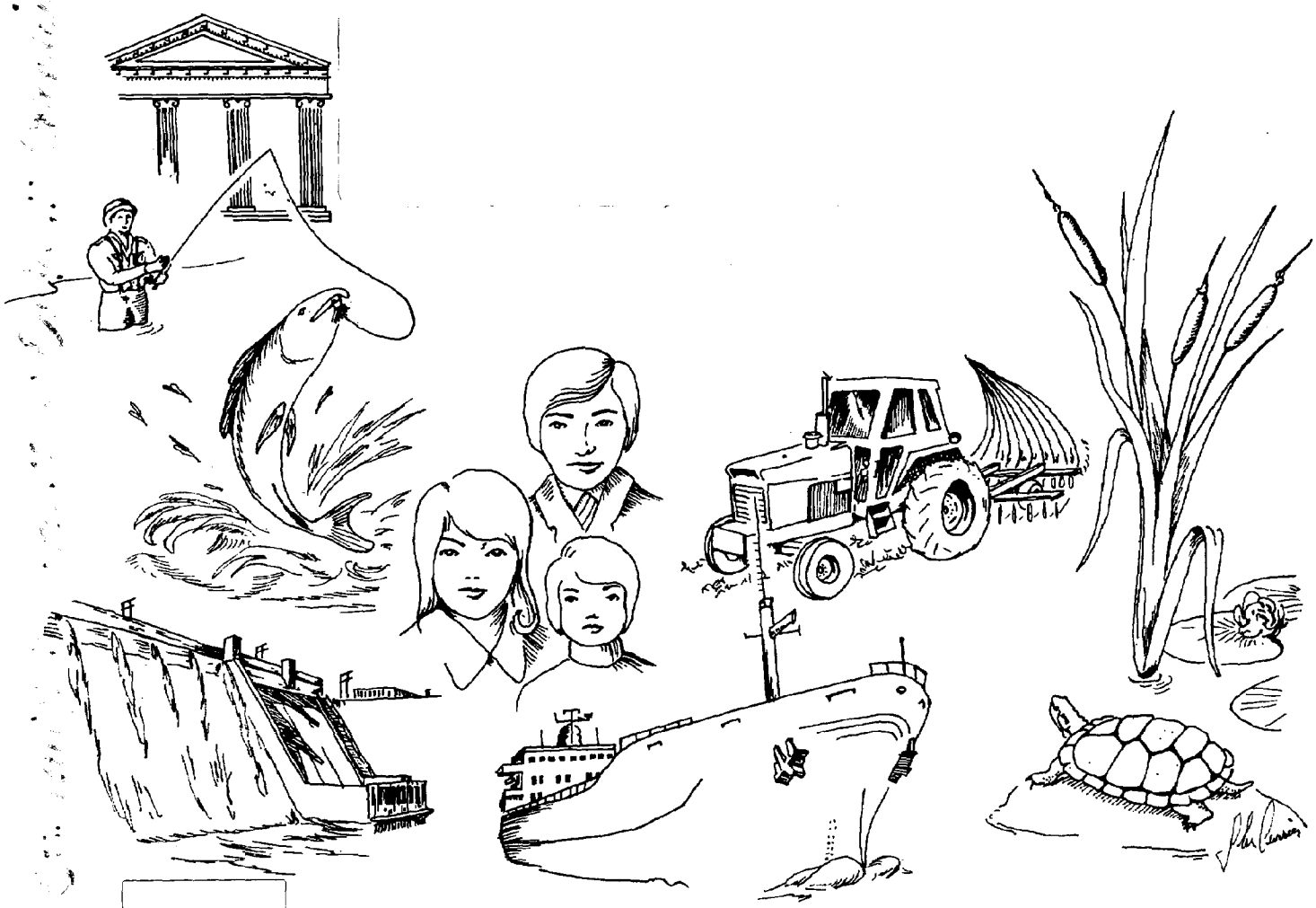
ST. LAWRENCE-EASTERN ONTARIO COMMISSION



Technical Report Series

DRAFT

LAND AND WATER USES

STAFF MEMORANDUM

ST. LAWRENCE-EASTERN ONTARIO COMMISSION

March 1977

Revised June 1977

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BACKGROUND

The St. Lawrence-Eastern Ontario Commission was established in recognition both of the statewide value of the area's distinctive shoreline resources, and the evident forces of change that threatened their continued productivity and attractiveness. In addition to coastal research and a project review process, the Commission's legislation provides for the establishment of areas "recommended primarily for scenic, historical, recreational, commercial, industrial, agricultural, residential or other use, or for a combination of such uses." Such areas shall be identified "considering such factors as the scarcity, vulnerability, or productivity of specific natural resources..." The Commission shall identify "land, air, and water uses to be permitted within areas, and ... priorities for permitted uses may be established."

REQUIREMENTS OF THE CZM PROGRAM

Threshold Paper #2 provides a summary of the requirements for land and water uses relative to an acceptable Coastal Zone Management Program. Direct reference is made to parts of the Coastal Zone Management Act and parts of applicable federal regulations.

Requirements of the Act

Sec. 305 (b) (2): a definition of what shall constitute permissible land and water uses within the coastal zone which leave a direct and significant impact on coastal waters.

Sec. 305 (b) (5): broad guidelines on priority of uses in particular areas, including specifically those of lowest priority

Sec. 306 (e) (2): a method of assuring that local land and water use

regulations within the coastal zone do not unreasonably restrict or exclude land and water uses of regional benefit

Requirements of the Regulations

15 CFR 923.12: evidence that the state has developed and applied a procedure for defining permissible land and water uses within the coastal zone which have a direct and significant impact upon coastal waters, including at a minimum:

1) a method for relating various specific land and water uses to impacts upon coastal waters, including an operational definition of direct and significant impact;
2) an inventory of natural and man made coastal resources;
3) an analysis - or establishment of a method of analysis - of the capability and suitability for each type of resource and application to existing, projected or potential uses;
4) an analysis - or establishment of a method of analysis - of the environmental impact of reasonable resource utilization

15 CFR 923.14: broad policies or guidelines governing the relative priorities which will be accorded in particular areas to at least those permissible land and water uses identified pursuant to 15 CFR 923.12; priorities will be based upon an analysis of state and local needs as well as the effect of the uses on the area; uses of lowest priority will be specifically stated

for each type of area

15 CFR 923.17: evidence that the state has developed and applied a method for determining uses of regional benefit, and that it has established a method for assuring that local land and water use controls in the coastal zone do not unreasonably or arbitrarily restrict or exclude those uses of regional benefit

Discussion:

Not directly referenced in TP #2 are Coastal Zone Management Act Sec. 305 (b) (3): designation of GAPC's; Sec. 306 (c) (8): consideration of National interest; and Sec. 306 (c) (9): designation of APRs (areas for preservation or restoration). Although addressed more specifically in TP #3, the designation of GAPCs is dependent upon information and analyses derived from land and water use activities, especially the inventory of resources, and analysis of capability and suitability. Designation of APRs involves the recommending of more explicit, special management techniques for GAPCs. Consideration of the national interest in determining permissible and priority uses is related to those of regional benefit, although obviously on a larger scale.

To aid in responding to the requirements for Land and Water Uses, this memorandum consists of five parts addressing the points referenced in the Act and Regulations:

1. Relationship between land and water uses and impacts on coastal waters: the memo describes the process employed by staff to describe relationships between uses and impacts on resources, including criteria to identify likely environmental impacts resulting from 12 primary uses and activities.

2. Survey of natural and man-made resources: the memo provides a summary of findings of the SLEOC inventory of resources; additional information is available in technical reports, file notes, maps, and the Commission's Preliminary Findings report.
3. Capability and suitability of each resource type: the memo provides information and presents a table indicating the capability and suitability of various resources to sustain certain land and water uses and activities.
4. Permissible uses: the memo describes the means to define permissible uses, and provides broad guidelines on priority of uses in particular areas.
5. Regional benefit: the memo identifies a method for determining uses of regional benefit and assuring that local controls do not unreasonably restrict them.

I. RELATIONSHIP BETWEEN LAND AND WATER USES AND IMPACT ON COASTAL WATERS

Virtually every possible land or water use activity will have some impact on environmental resources, which in turn may affect economic or social resources. Such impacts vary in kind and degree, but generally, a given use can be expected to cause similar impacts with each application of the use, allowing for differences in resources' abilities to withstand different uses. To aid in the determination of such impacts, the Commission has identified numerous resource types to which a variety of uses may be applied. The relationship between various uses, and the impacts of those uses on various resources, can be described in tables which cross-reference each use to its impacts, and in turn, the impacts to specific resource types.

Commission staff reviewed a variety of analytical techniques useful in identifying such relationships. In consideration of the special resource values present within the service area, staff has developed a methodology enabling descriptions of what impacts are likely to be caused by a particular land or water use, what resources are affected by the uses, and how those resources are affected. The schematic in Table I-1 presents a general picture of the matrix employed by staff. Briefly, impacts on resources are identified in this manner: primary land and water uses are identified in the upper left hand column; secondary uses and development activities are identified in the second listing by noting the points of intersection in area I; by noting the intersection of points in area II, processes through which

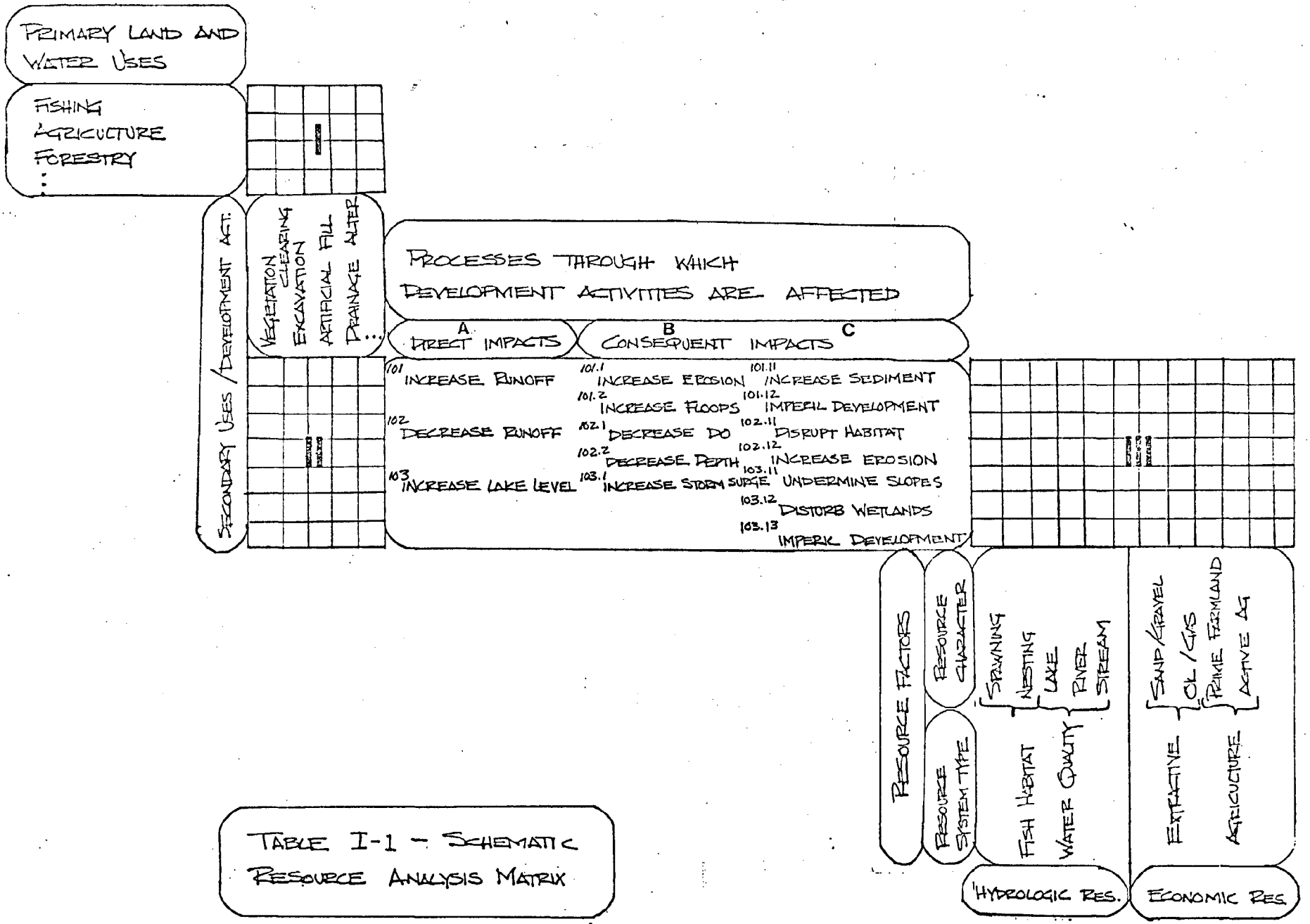

TABLE I-1 - SCHEMATIC RESOURCE ANALYSIS MATRIX

development activities affect resources (impacts) maybe identified by reading across to the three columns listing impacts; the resources likely to be affected by the impacts can be identified by noting the points of intersection in area III and reading down to the list of resources. A fully developed matrix accompanies this staff memorandum. The following describes in detail the procedure briefly explained above.

Primary Land and Water Uses

Given the exceptional resource character of shoreline areas, a significant number of development activities are possible. A broad range - from less intensive recreation, agriculture, and so on, to more intensive industrial activities - can be expected to make use of water and land resources. Traditional land use classification systems provide a basis for describing major categories of possible uses. Commission staff has identified 12 such major categories which embrace virtually the complete spectrum of uses or activities possible in coastal areas. Table I-2 lists these and how they are defined for purposes of the CZM program.

Primary uses and activities are listed in the matrix in the upper left axis. They provide an immediate identifier for planning or impact analysis purposes.

Consequent Land/Water Uses and Development Activities

Land and water use and activity categories, in and of themselves, frequently are not indicative of impacts on the environment. Rather, it is the uses and activities associated with primary uses which may have direct and significant impacts on coastal waters. Since traditional land use classification systems lack the specificity necessary to assess potential impacts,

staff has identified associated, or secondary, uses and activities the may have direct and significant impacts on coastal waters.

With every major land and water use type, several of these secondary uses, facilities or occurances may be present. These involve shoreline and water structures, land structures, potential and actual pollution, and land/water physical disruption. Table I-3 lists 30 such secondary uses and development characteristics associated with major land or water uses. Consequent uses and development activities are necessary to have a certain major use, and as such are the actual causes of alterations to natural resources.

The matrix provides a means for relating primary land and water uses to those activities associated with them. The cell designated as area I on the matrix indicates the consequent uses associated with a given primary use, whether it is on-site or off-site, and whether it is always present with the primary use (invariable) or conditional upon certain other factors.

Processes Through Which Development Activities Affect Resources

Any development activity has associated with it a variety of physical, chemical and biological processes which are in some manner affected by the activity and which in turn have an effect on natural factors. Such processes cause, and in fact can be themselves, impacts, which result in alteration of phenomena within coastal ecosystems. As such, a single identifiable impact may cause still more impacts, secondary and tertiary to the first. Through identification of these consequent impacts a more realistic projection and identification of effects resulting from development activity is possible.

TABLE I-2. PRIMARY LAND-WATER USES AND ACTIVITIES

1. FISHING, SWIMMING, CAMPING, NON-INTENSIVE RECREATION:	Includes range of relatively non-intensive uses and activities such as hiking, sight-seeing, hunting, fishing, as well as relatively organized camping sites such as state and privately owned trailer parks, campgrounds, etc.
2. AGRICULTURAL ACTIVITIES:	Includes crop, orcharc, muck, and dairy farming
3. FORESTRY, LOGGING:	Includes forest management and timber production
4. BOATING:	Includes recreational boating and related activities such as fishing, water-skiing, etc.
5. SHIPPING:	Includes the linear movement of water vessels for commerce
6. SHORELINE STRIP DEVELOPMENT:	Includes range of residential, commercial, service facilities and activities, cottages, etc., relatively scattered and of low density located adjacent to the shoreline
7. COASTAL COMMUNITIES:	Includes major and minor urban centers located within the Coastal Zone
8. GAS/OIL EXTRACTION:	Includes drilling and wells for natural gas and petroleum
9. SAND AND GRAVEL EXTRACTION:	Includes sand and gravel pit excavation and extraction
10. ENERGY PRODUTION: HYDRO:	Includes hydroelectric dam facilities
11. ENERGY PRODUCTION: THERMAL:	Includes nuclear power plant production of electricity and fossil-fueled petroleum and coal-fired steam plants.
12. INDUSTRIAL ACTIVITIES:	Includes warehousing and transhipment terminal operations related to air, land and water product transportation, petroleum and natural gas bulk storage, industrial fabrication, processing, and production activities

TABLE I-3: CONSEQUENT USES AND DEVELOPMENT ACTIVITIES

1. Vegetation Clearing
2. Excavation
3. Artificail Filling
4. Drainage Alteration
5. Construction Activity
6. Chemical Application/Spillage
7. Fertilizer Application
8. Operation of Boats/Ships
9. Oil Spillage
10. Plowing, Cultivation
11. Dredging
12. Revetments
13. Groins
14. Breakwaters
15. Launch Ramps
16. Piers, docks
17. Navigation Aids
18. Dams
19. Buildings
20. Streets, Roads, Parking
21. Transmission Lines, Towers
22. Septic Tanks
23. Sewage Collect, Treatment, Discharge
24. Solid Waste Disposal
25. Grazing Stock
26. Radioactive Materials
27. Termal Discharge
28. Water Supply: Wells
29. Water Supply: Systems
30. Extraction

The matrix includes three columns under Processes which describe initial, or direct, impacts (A) and consequent impacts (B & C). To determine the initial impact of a land use or development activity, refer to area II where activities are cross-referenced to impacts. Points of intersection indicate the impacts which are associated with secondary uses and development activity. Consequent impacts are determined by checking columns B and C.

Resource Factors: Natural and Man-Made Coastal Resources

Impacts from coastal developments and activities will affect a variety of resources - both natural and man-made - in different ways. An extensive survey of coastal phenomena indicates a high degree of complexity and interspersim among resource types. To facilitate analysis of resource utilization relative to impacts, SLEOC has developed a comprehensive listing of factors which, when used within the context of the matrix, allows an exact determination of how various resources are affected, i.e., to determine what the

impacts and processes are.

Resources are divided into major groups:

1) Hydrologic Resources
2) Soil Resources
3) Hazard Areas
4) Habitat Areas
5) Recreation Resources
6) Economic Resources
7) Community Development Resources
8) Pre-empted Resources (those already under public agency control)

Within these major groups (See Park II of this memo) are several sub-categories which describe more precisely the resources. Often individual resource types overlap resulting in several different kinds of impacts on the same site. To determine what resources are affected and how they are affected by uses and activities, refer to area III in the matrix. By cross-referencing the Processes Through Which Development Activities Affect Resources (Impacts), with the Resource Factors, listing, the reader is able to determine what the impacts are and whether they are initial (direct) or consequent (the letters refer to columns A, B. and C).

Application of the Process to the St. Lawrence-Eastern Ontario Resources

The matrix accompanying this memo is keyed to the extensive SLEOC mapped inventory describing natural and man-made coastal resources. The system permits the user - planner, developer, citizen, etc. - to determine the relationship between uses and impacts on resources.

Commission staff is applying the matrix procedure to resources to determine permissible uses and priority of uses within resource suitability and capability limits. Part IV of this memo provides framework criteria for permissible uses.

The magnitude or severity of an impact involves measurement of its significance. Direct impacts are those resulting from direct resource utilization - i.e., the use (indicated by the listing of secondary uses and characteristics) occurs directly in or on, or adjacent to, the resource. Significant impacts are those which produce a demonstrable change in the condition and character of the resource type, or which produce conditions exceeding acceptable standards of a recognized authority. In many instances, the former rely on qualitative evaluation criteria. The latter - based upon a a concept of "prior authority" - rely on standards established through legislation, or administratively as enabled through legislation.

Direct Impacts

For purposes of the Coastal Zone Management program, any resource affected by emplacement of a use thereon (as indicated by the relationship between secondary uses and resources), or by an activity or condition resulting from direct resource utilization (as indicated by the relationship between secondary uses and resources) will constitute a direct impact. Under Processes Through Which Development Activities Affect Resources, column A indicates initial, direct impacts.

Significant Impacts

Factors indicating the measure of an impact are listed in Table A-I-1 in the Appendix. Evidence of an impact as described in the table constitutes a potential for the impact to be significant.

II. SURVEY OF NATURAL AND MAN-MADE COASTAL RESOURCES

The following is a summary of coastal resources identified by the St. Lawrence-Eastern Ontario Commission. Complete descriptions of resources are found in the series of St. Lawrence-Eastern Ontario Commission Technical Reports, 1:24,000 and 1:125,000 maps, and office files.

The listing of resource factors includes the major groups referenced in part I plus the sub-categories:

HYDROLOGIC RESOURCES

Physical Typology:

1. Open Lake
2. Open River
3. Coastal Streams
4. Littoral Zones
5. Coastal Bays

Water Quality Limited*

1. Streams and Ponds

Fish Habitat

1. Spawning
2. Nesting
3. Feeding/Forage

Groundwater

1. Aquifers
2. Aquifer Recharge Areas

SOIL RESOURCE LIMITATONS

Slight to Moderate

1. Permeability
2. Slope

*DEC determination of serious water quality problems.

3. Erosion

4. Depth to Rock

5. Depth to Watertable

Severe to Very Severe

1. Permeability

2. Slope

3. Erosion

4. Depth to Rock

5. Depth to Watertable

HAZARD AREAS

Shoreline Erosion

1. Shoreline $\leq$ 30' high

2. Shoreline $\geq$ 30' high

Water

1. Storm Surge/Wave/Inundation

2. 100 Year Flood Plain

HABITAT AREAS

Cover Type

1. Scrub/Successional

2. Forests

3. Coastal Wetlands

Special Features

1. Beaches

2. Dunes

3. Bluffs

4. Drumlins

Wildlife/Vegetative Character

1. Wildlife Concentration Areas (WCA)
2. Exceptional/Unique Ecological Areas (EEA/VEA)
3. Existing or Potential Habitat for Rare, Endangered, Threatened Species (RETS)

RECREATION RESOURCES

Private/Commercial

1. Various

Public

1. State Parks
2. Natural Areas

ECONOMIC RESOURCES

Extractive

1. Sand/Gravel
2. Oil/Gas

Agricultural

1. Prime Farmland
2. Active Agriculture

COMMUNITY DEVELOPMENT RESOURCES

Shipping

1. Port Properties
2. Seaway Channel

Industry

1. Industrial Parks
2. Other Industrial

Power

1. Power Plants
2. Transmission Corridors

Other Transport

1. Railroads
2. Airports

Community Infrastructure

1. Utility Service Areas
2. Outside Service Areas

PRE-EMPTIVE USAGE

State Public Lands

1. PASNY and Private Utilities
2. Bridge/Port Authorities
3. NYS OPR
4. NYS DEC
5. SUNY
6. NYS Dept. Mental Health

Federal Lands (Exclusion)

1. US CG
2. US Treasury (Customs)
3. US DOT (SLSDC)
4. US DI

The following section entitled "Coastal Resources of the St. Lawrence-Eastern Ontario Commission has been extracted from an unpublished report - "A Summary of Findings on Coastal Resources."

DRAFT

THE ST. LAWRENCE RIVER AND EASTERN LAKE ONTARIO SHORELANDS:

A SUMMARY OF FINDINGS ON COASTAL RESOURCES

June 1977

Charles W. Kelly
Chairman

William E. Tyson
Executive Director

ST. LAWRENCE-EASTERN ONTARIO COMMISSION
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ACKNOWLEDGEMENT

The St. Lawrence-Eastern Ontario Commission wishes to express its appreciation for the important contributions made by members of the agency's citizen advisory committees; local, regional, state and federal officials; and all those who provided information about the area's shoreland resources. This report offers a detailed summary of the area's economic, social and natural resources. It represents an important first step in the full understanding and appreciation of the coastal resources that we often take for granted. It is through the contributions and encouragement of those concerned with the wise development and protection of the area's resources that this report was made possible.

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III. COASTAL RESOURCES

After the significance of New York's coastal areas and in particular the Commission's service area was recognized, extensive efforts have been made to develop an understanding of coastal resources. This understanding is the basis upon which a coastal zone management program will be built.

Discussed below in summary form are the area's five principal coastal resources identified by the Commission. Following extensive analysis of each resource, a series of findings are set forth. These findings are currently being used as the basis for development of a coastal zone management program.

A. Population and the Economy

1. Summary Profile of the Area

a) Land Ownership and Settlement Patterns

To date, detailed analyses of shoreline settlements have only been completed for Oswego County. Currently, extensive efforts are being undertaken to complete the analysis for the remainder of the service area.

As indicated in Table 2 there are 52,362 properties in the service area. Of these 32,547 are permanent residences and 9,161 are seasonal residences. Residences account for about 80 percent of all properties.

The three largest urban areas - Oswego City, Ogdensburg City and Massena - account for 14,468 or 27.6 percent of all properties. Other settled areas such as Clayton, Sackets

Table 2. Tax Roll Property Count Summary

	Residential					Non-Residential		
	Permanent No.	%[b]	Seasonal No.	%[b]	Total No.	No.	%[b]	Total Properties
Cayuga[a]	767	42.8	399	22.2	1,166	628	35.0	1,794
Fair Haven	205	29.1	292	41.4	497	208	29.5	705
Sterling	562	51.6	107	9.8	669	420	38.6	1,089
Jefferson[a]	7,687	43.1	5,626	31.5	13,313	4,526	25.4	17,839
Alexandria	1,121	43.7	691	26.9	1,812	756	29.4	2,568
Brownville	1,262	54.4	589	25.4	1,851	470	20.2	2,321
Cape Vincent	768	47.8	514	32.0	1,282	325	20.2	1,607
Clayton	1,201	47.2	616	24.2	1,817	729	28.6	2,546
Ellisburg	1,121	59.1	236	12.4	1,357	541	28.5	1,898
Henderson	397	24.8	809	50.5	1,206	394	24.6	1,600
Hounsfield	494	35.2	412	29.4	906	497	35.4	1,403
Lyme	646	30.1	1,094	50.9	1,740	409	19.0	2,149
Orleans	676	38.7	666	38.1	1,342	405	23.2	1,747
Oswego[a]	13,041	78.3	1,553	9.3	14,594	2,069	12.4	16,663
Mexico	1,255	73.9	171	10.0	1,426	272	16.0	1,698
New Haven	522	49.2	171	16.1	693	369	34.7	1,062
Oswego City	5,178	80.8	28	.4	5,206	1,205	18.8	6,411
Oswego	1,046	74.8	50	3.6	1,096	303	21.7	1,399
Richland	1,516	63.3	282	11.8	1,798	596	24.9	2,394
Sandy Creek	828	28.7	645	30.1	1,473	667	31.2	2,140
Scriba	1,142	73.3	206	13.2	1,348	211	13.5	1,559
St. Lawrence[a]	11,052	68.7	1,583	9.8	12,635	3,431	21.4	16,069
Hammond	460	39.4	416	35.6	876	291	24.9	1,167
Lisbon	1,151	72.7	134	8.5	1,285	298	18.8	1,583
Louisville	720	59.9	153	12.7	873	330	27.4	1,203
Massena	3,341	79.9	13	.3	3,354	827	19.8	4,181
Morristown	688	41.5	566	34.2	1,254	402	24.3	1,656
Ogdensburg City	3,157	81.6	8	.2	3,165	702	18.2	3,867
Oswegatchie	903	62.1	257	17.7	1,160	293	20.2	1,453
Waddington	632	66.0	36	3.8	668	290	30.3	958
SLEOC	32,547	62.2	9,161	17.5	41,708	10,654	20.3	52,362

[a]SLEOC portion of County
[b]% of total properties

Source: County tax rolls (1973, 1974)

Harbor and Alexandria Bay account for significant additional numbers.

Table 3 details for Oswego County the ownership and use of the shoreline. Similar data is being developed for the other three counties. As is evident, the primary uses are residential and agricultural, forest and undeveloped. Ownership is primarily in private hands.

Table 3. Ownership and Land Use--Oswego County

	North Pond	Towns of Sandy Creek, Richland[1]	Mexico, New Haven	Scriba, Oswego, City of Oswego	Oswego County
Ownership (% of Shoreline)					
Federal	0	0	0	.2	.1
State	0	4.0	2.6	17.5	6.8
Municipal	0	0	0	3.5	1.1
Private	100	96.0	97.4	78.8	92.0
Total	100	100.0	100.0	100.0	100.0
Land Use (% of Shoreline)					
Permanent Residential	0	0	2.4	1.5	.9
Seasonal Residential	47.6	50.2	50.8	17.2	39.0
Recreational	3.1	16.7	4.0	2.1	5.8
Wildlife Habitat	0	0	0	0	0
Agricultural, Forest and Undeveloped	43.4	27.7	36.9	40.7	38.8
Commercial/ Industrial	5.9	5.4	5.9	38.5	16.1
Total	100.0	100.0	100.0	100.0	100.0

[1]Excluding North Pond.

Source: Assessment Rolls, Oswego County, New York, 197 .

Data reflects that less than half of the seasonal property owners reside in the four counties which contain the service area. It can be further assumed that a large number of these owners do not reside and therefore vote in the jurisdiction where their seasonal property is located in.

Additional counts of riparian property owners are provided in Table 4. Similar data is being tabulated for towns not listed. Again the predominant use of property is for seasonal residences.

Table 4. Riparian Property Count

Town	Residential			Non-Residential
	Permanent	Seasonal	Vacant	
Jefferson				
Henderson	17	613	134	74
Hounsfield	23	114	2	35
Sackets Harbor	14	44	2	16
Cape Vincent	23	320	38	198
Ellisburg	1	120	46	33
Subtotal	78	1,211	222	356
St. Lawrence				
Hammond	12	265	0	113
TOTAL	90	1,476	222	469

b) Demographic Characteristics

The 1970 population of the 23 towns and 2 cities making up the Commission's coastal area was 116,811. In recent years, population changes in the region have paralleled New York State

rural/urban trends. Generally, those towns bordering larger urban centers--Ogdensburg, Canton, Potsdam, Watertown, Fulton and Oswego--have been gaining population while the more rural towns have declined. The urban centers themselves, however, have grown at a slower pace or have lost population. The average annual rate of population growth in the coastal towns is slower than that of the four-county area as a whole, which is less than the state's annual growth rate.

The coastal area contains a higher percentage of younger and older people than does the state as a whole. The remaining population, age 25 to 64, constitutes a lower percentage in the service area than the state average. This is significant because this is the working age group from which the majority of the work force is drawn.

During the 1960's net out-migration from the area equaled nearly 10 percent of the total population. Of the four counties, only Oswego gained more residents through immigration than it lost through out-migration. Out-migration of area residents who are in the productive age groups is of special significance. It is an evident response to inadequate opportunity for local employment, and as it occurs, the area's ability to sustain further economic growth is reduced.

The service area has a smaller percentage of people than the state who have completed four or more years of college, although a higher percentage of residents have

completed 1-4 years of high school. Many of those who attend college outside the area evidently do not return after their educations are completed.

c) Labor Force

In 1970 the area's labor force (persons 16 to 65 years of age) numbered 66,700, and was concentrated in the Town of Massena and the Cities of Ogdensburg and Oswego. Of that total number, some 39,000 were employed resulting in an area labor force participation rate of 52.2 percent which was less than the state's rate of 57 percent.

In coastal towns, the majority of workers are employed as craftsmen, followed by professionals and sales and clerical workers. Employment in agriculture was less than 6 percent of the work force, in great disproportion to the extent of farm land (over 30 percent of the area). Dairying which is land-extensive and capital-intensive, dominates agriculture throughout much of the coastal area.

Average family income in the area, in 1970, was less than 80 percent of the state average and reflects the distribution of occupations and labor force participation rates (see Table 5). The average family income in the service area, $9,750, is about 78 percent of the state average of $12,498.

Low family incomes are due in part to lower labor participation rates especially among women, seasonal employment, and generally lower levels of demand for the higher paid occupational groups because of the nature of the local economy.

Table 3. Employment by Type of Occupation: 1970

Occupation	Cayuga[a] #	Cayuga[a] %	Jefferson[a] #	Jefferson[a] %	Oswego[a] #	Oswego[a] %	St. Lawrence[a] #	St. Lawrence[a] %	SLEOC #	SLEOC %
Professional, Technical, Managers and Administrators	111	14.5	1,609	19.4	3,441	23.2	3,061	20.7	8,222	21.3
Sales, Clerical and Kindred Workers	138	18.0	1,418	17.1	3,055	20.6	2,920	19.8	7,531	19.5
Craftsmen, Foremen and Operations (except Transport)	321	41.9	2,432	29.3	4,409	29.8	4,132	28.0	11,294	29.2
Transport Equipment Operatives	38	5.0	412	5.0	560	3.8	624	4.2	1,634	4.2
Laborers (except farm)	38	5.0	398	4.8	602	4.1	514	3.5	1,552	4.0
Farmers, Farm Managers, Farm Laborers and Farm Foremen	53	6.9	876	10.6	406	2.7	839	5.7	2,177	5.6
Service Workers Including Private Household Workers	67	8.7	1,665	14.0	2,331	15.7	2,663	18.1	6,226	16.1
Total	766		8,313		14,804		14,753		38,636	

[a]SLEOC portion of county

Source: 1970 Census

Commuting patterns in coastal towns reflect the distribution of employment centers both within the service area and outside it. Over 90 percent of labor force participants work within their county of residence. An average of only 7 percent of the service area labor force travel outside the four-county area for employment. However, there is significant variation in Oswego and Cayuga Counties where there is a broader area for employment due to the proximity of Syracuse and other employment centers. In Cayuga County, 66 percent of the labor force commutes to other counties (33 percent to Oswego County), while in Oswego County, 14 percent commute to other counties, mostly to Onondaga.

2. The Area's Economic Base

In discussing the economy, it is difficult to separate characteristics of the service area from those of the counties, in part because most economic data is aggregated at the county level. More significantly, however, is the role that economic and employment centers outside the service area play in the local economy.

In 1973, employment in the four-county area totaled 77,000.[1] Manufacturing was the largest sector employing some 37 percent of the labor force (see Table 6), while retail trade was the second largest employing about 22 percent. Service Employment, including that to support the

[1]As used here, employment refers to only those covered by unemployment insurance.

Table 6. Employment: 1973[a]

	Cayuga		Jefferson		Oswego		St. Lawrence		4 Counties		Rest of State		New York State	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Total	16,107	100	20,802	100	18,055	100	22,105	100	77,069	100	1,851,941	100	5,758,507	100
Manufacturing	6,675	41.4	6,580	31.6	7,553	41.8	8,012	36.2	28,820	37.4	728,650	39.3	1,620,135	29.1
Construction	602	3.7	1,009	4.9	1,925	10.7	1,208	5.5	4,744	6.2	99,714	5.4	279,465	4.9
Wholesale Trade	397	2.5	705	3.4	361	2.0	728	3.3	2,191	2.8	95,700	5.2	445,247	7.7
Retail Trade	3,339	20.7	5,176	24.9	3,799	21.0	4,732	21.4	17,046	22.1	367,880	19.9	1,013,660	17.6
Services	3,200	19.9	4,337	20.8	2,584	14.3	4,512	20.4	14,633	19.0	353,913	19.1	1,336,931	23.2
Transportation, Commerce, Public Utilities	1,135	7.0	1,537	7.4	1,114	6.2	997	4.5	4,783	6.2	101,458	5.5	444,157	7.7
Finance, Insurance, Real Estate	662	4.1	1,324	6.4	540	3.0	705	3.2	3,231	4.2	92,082	5.0	584,152	10.1
All Others	97	b	134	b	179	b	1,211	5.5	1,621	2.1	12,547	b	34,710	b

[a]Employment covered by unemployment insurance.
[b]Less than 1%.

Source: New York State Business Fact Book 1975 Supplement, NYS Department of Commerce, 1975.

tourism/recreation industry, accounted for 19 percent of total employment. The proximity of the Cayuga and Oswego County labor force to Syracuse industrial centers account for over 41 percent of the two-county labor force being employed in manufacturing. Another important item reflects that construction employment in Oswego County in 1973 was almost 11 percent, having doubled during the preceding 10 years. This rate is much higher than in the other three counties. Much of the construction underway at that time is now completed, and so unemployment in the construction trade is currently high in Oswego. Compared to the total upstate area, the four-county area has a smaller percentage of employment in manufacturing; wholesale trade; and finance, insurance, and real estate.

Employment data reflects that during the past 2 years, the rate of unemployment in each of the four counties has exceeded that of the state during the December-to-March period. During the peak period of employment, June to September, differences in rates of unemployment between the state and the four counties normally decreases.

In 1975, however, unemployment did not follow this pattern and reached a 2.5 percent difference between the four counties and the state. In Oswego County the difference was 5.6 percent, due primarily to construction declines. Figure 2 indicates unemployment for the state and four-county area from 1973 through October 1976.

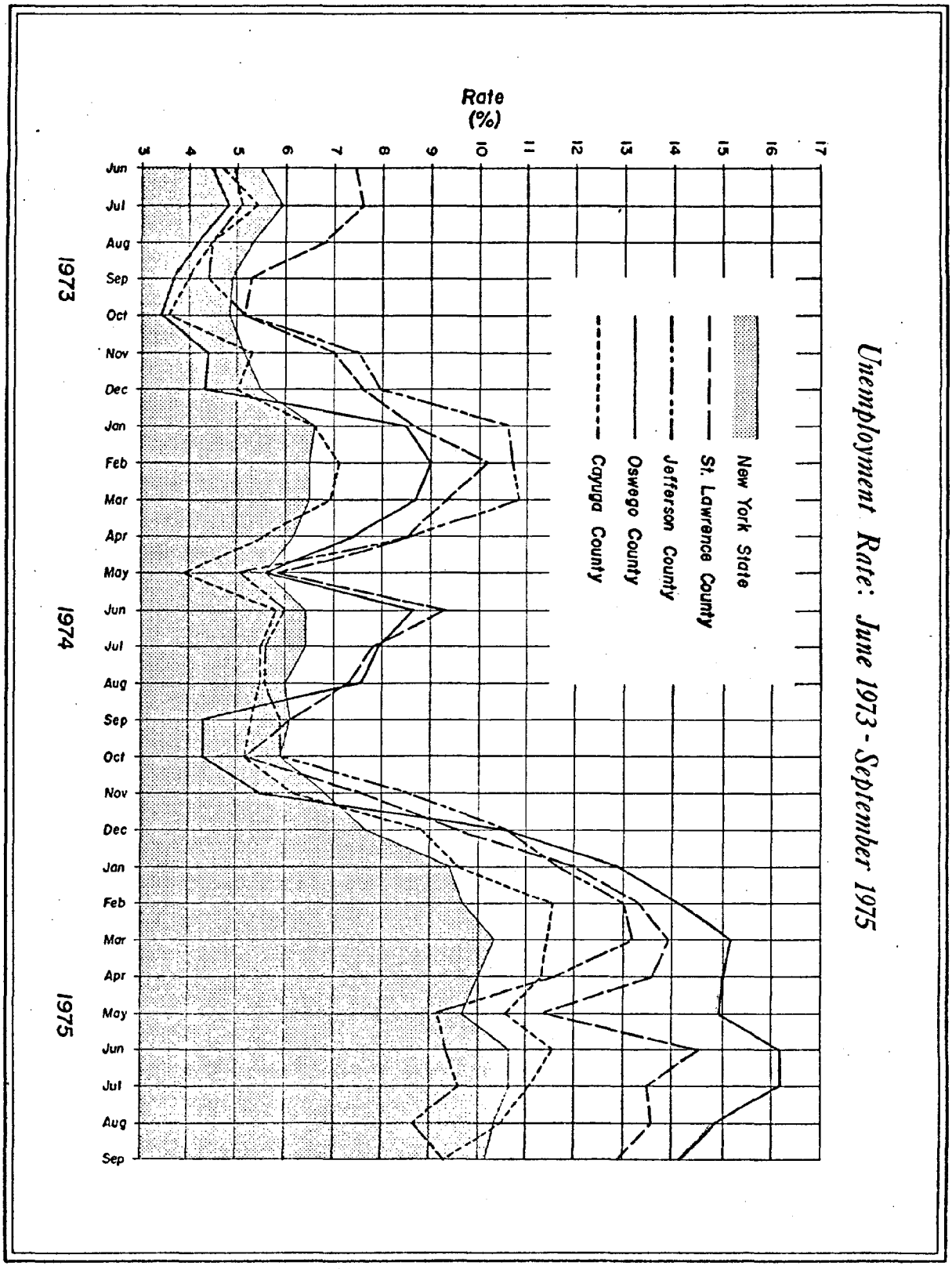


Figure 2. Unemployment: 1973-1975.

Unemployment data reflects the seasonality of the employment in the four-county area. This seasonality occurs in many sectors of the economy--mining, construction, services, retail trade and manufacturing. Seasonal variations in the area's economic activity are partially due to the ~~climate~~ climatic conditions. Due to the severity of the winters, there is a greater decline in economic activity in the four-county area than that normally occurs in most of the state ~~during~~ at that portion of ~~the~~ year.

Between 30 percent and 40 percent of those employed in each of the four counties are employed in manufacturing, ~~which can be~~ considered to be fairly stable and long-term. The impact of national trends, however, may influence local economic activity and employment, as it has recently in the service area. As stated, much of the employment in manufacturing falls outside the service area in major urban centers such as Watertown, Fulton, Auburn and Syracuse. Within the service area, centers such as Massena, Ogdensburg and Oswego are the primary locations of manufacturing establishments.

The importance of the agricultural sector in the manufacturing sector is shown in that about 12 percent of the employment in manufacturing is in food and food processing plants. Along with paper and paper products and machinery manufacturing, these three account for about 50 percent of manufacturing employment. However, the proportion of total employment in manufacturing has been declining ~~within~~ the service area as Table 7 reflects.

Table 7. Manufacturing Employment Trends: 1962-1972

County	Manufacturing Employment as Percent of Total Employment[a]		
	1962	1967	1972
Cayuga	52.0	51.2	42.5
Jefferson	37.1	38.9	30.9
Oswego	56.3	49.9	40.3
St. Lawrence	49.5	49.1	37.9

[a]Employment covered by unemployment insurance.

Source: Data provided by New York State Department of Labor, Albany, New York.

Within the four-county area, retail trade as a percentage of employment exceeds the state average. It has been a growing sector in all four counties over the past decade.

Work force employed in transportation, communication and public utilities accounts for 6.2 percent in the four-county area, which is less than the total state average although greater than the upstate portion. Employment in this sector in St. Lawrence County has declined over the past decade and has the lowest proportion of workers in this category of any of the four counties. This indicates that the St. Lawrence Seaway and Power Authority of the State of New York facilities, although stable employers, are not at this time a force in expanding the employment base of St. Lawrence County.

~~III-13~~

Normally, the economic growth potential in a specific area depends upon four primary factors: availability of a labor force, availability of raw material, advantages of location, and existence of community infrastructure. These factors are analyzed below in relation to the three major "industries" of the area--manufacturing, recreation/tourism, and agriculture--to help determine this potential in the St. Lawrence-Eastern Ontario area. Wholesale and retail trade, services, construction, and other activities are relatively minor and are considered to be dependent upon the three major industries for their growth or decline.

a) Manufacturing

There is a small work force of 30,000 employed in manufacturing in the four-county area. With a nominal unemployment rate of about 8 percent, and a total labor force of about 77,000, there are potentially some 7,000 additional persons to comprise a larger manufacturing work force, assuming they possess necessary skills. However, they are scattered over 6,000 square miles in the four-county area. The small size and dispersion of this available, largely unskilled pool of unemployed labor limits the prospects of new industries developing in the area.

Many natural resources required by industry are available in the area: ample supply of good quality water, vast amounts of open space suitable for development, some mineral resources, and the amenities of the area. The size of Lake Ontario and the St. Lawrence River also allows for the

discharge of some heated waste water. This is required for some designs of power-generating plants. However, many industries do not require a place to dispose of heated water, although they do require large quantities of water. These are not as closely tied to the shoreline since it is often feasible to transport water from its source to place of use.

The area's economy developed around the forest resources found in the region, and today considerable employment--22 percent of all manufacturing employment--is related to paper or paper products or the manufacture of paper-making machinery. However, since the shift of this industry to southern states, this segment of the manufacturing sector has been reduced and it is unlikely that a rejuvenation will occur.

Many of the natural resource attributes such as available space and scenic amenities are indicative of locational disadvantages. There is a lack of concentration of people in the area to make up a market for final products, nor does the area lie near or between major urban population centers within the United States. There are increased transportation costs for both raw and finished products for either producing, assembling or distributing products from this area. These costs are not compensated for by other location advantages for most types of manufacturing. An exception may be Canadian firms seeking to establish themselves in the United States market.

The existence of community infrastructure also influences the potential for growth in manufacturing. Three industrial parks have been developed in the four-county area. One is in the service area near Ogdensburg in St. Lawrence County and the others are near Watertown in Jefferson County and Fulton in Oswego County. Ogdensburg and the Oswego area in particular offer many of the services required to support manufacturing.

Transportation is provided by rail, water, air and highway within the area. Ogdensburg and Oswego are served by port facilities which presently provide most basic port service. Ogdensburg and Massena are served by regularly scheduled air service and are classed as airline facilities, while Alexandria Bay and Clayton are classed as commercial facilities. However, service at all four is limited.

Area rail service is declining with several branch lines being abandoned through the railroad reorganization that took place on April 1, 1976. Currently, efforts are being made to continue these branch line operations. Ogdensburg Bridge and Port Authority has assumed operation of the line between Ogdensburg-Norwood and the port of Waddington. Adequate rail service is available in the Fulton-Oswego area.

b) Recreation/Tourism

Currently, there is an adequate labor force available in the service area to support expansion of the recreation/tourism industry. Since most enterprises are relatively

small and in private ownership, a widely dispersed work force is an asset.

The service area has an abundance of raw material available to support expansion of the recreation/tourism industry. The principal asset is the extensive shoreline along Lake Ontario and the St. Lawrence River plus extensive inland lakes and rivers.

Topographically, the service area has little relief. However, it has many areas of historic, cultural and ecological value (see Sections D and E which follow). These areas combined with the shoreline have a potential that could be enhanced under proper management to facilitate significant expansion of the recreation/tourism industry.

Although relatively remote for industry location, the geographic location of much of the service area is not distant in terms of vacation travel time. It lies within 6 or 8 hours driving time from New York City and the urban concentrations along the eastern seaboard. Close proximity to the Adirondacks, Tug Hill, Finger Lakes and Canada is also an asset since it allows those vacationing to easily visit any of these areas.

A locational disadvantage not likely to be overcome by other advantages is the winter weather experienced at this latitude. Efforts directed at diversifying recreation facilities may increase the winter recreation season slightly, but the lack of adequate relief for a major ski area appears limiting. Also, the close proximity of the Tug Hill area

and the Adirondacks with their greater and more reliable snowfall reduces the probability of increasing snowmobiling as a major winter activity. Some ice fishing takes place, as discussed in Section E. Expansion of this activity could extend the winter season to a moderate extent.

Community infrastructure provided by governmental agencies to support the recreation/tourism industry is quite extensive. There are 23 state parks in the service area, primarily oriented toward camping, picnicking and water recreation. In addition, there are boat launch facilities, wildlife management areas, fishing access points, and two additional state parks centered around historic sites--Fort Ontario and the War of 1812 Museum at Sackets Harbor. Many localities provide park or recreational facilities in addition to the state facilities. (A more detailed discussion of recreation is found in Section E.)

c) Agribusiness

The labor force in the service area appears to be adequate to support the agribusiness sector. No radical changes are anticipated that will require a significantly larger labor force or the acquisition of technical skills differing dramatically from those that are currently known.

The major raw material required for farming is available in the service area. Although viable farmland is finite in amount, it can be upgraded through application of management techniques.

There are no major locational advantages. A minor one may be that there are no major urban areas expanding rapidly

into agricultural areas within the service area. The area's climate limits agriculture to an extent in that the growing season is not long enough for the production of many crops and the winters severe enough to preclude others. However, the climate is suitable for the production of crops required to carry on dairy farming. In the southern parts of the service area, some fruits and vegetables are grown where climate and soils allow.

Extensive community infrastructure exists in both the public and private sectors which provides support to agribusiness.

3. Selected Community Facilities

Community development resources include those facilities which enable society to function. Included are transportation networks, power production facilities and industrial parks. Detailed below in summary form are those resources that exist in the service area.

a) Transportation

1) Highways

The major New York State roads traversing the area are Routes 104, 3, 180, 12E, 12 and 37. These routes form a continuous roadway roughly paralleling the shore of Lake Ontario and the St. Lawrence River. Routes 11 and 81 parallel the lake portion of the St. Lawrence-Eastern Ontario Commission area to the east with Interstate 81 bisecting the area between Clayton and Alexandria Bay. This route is a major connector with roads in Canada.

Route 11 swings to the southeast of the river section of the St. Lawrence-Eastern Ontario Commission area and connects with Interstate 87 at Champlain (see Figure 3).

The miles of highway per square mile can be used as an indication of the accessibility of a region. The four-county average of miles of state highways per square mile is .24 and total miles of highway per square mile is 1.47. The average for the St. Lawrence-Eastern Ontario Commission service area is slightly higher at .26 and 2.13 respectively. The average for New York State is .28 and 2.12 respectively.

2) Railroads

Figure 4 reflects the current status of rail service in the service area. Shown are the lines where service is abandoned, proposed to be abandoned, and currently subsidized. Also reflected is the ownership of the lines.

3) Airports

Four airports are currently operating in the service area. Table 8 provides summary data relative to each of these. Basic services are provided and continuing efforts are being made to improve both the physical facilities and the service provided.

4) St. Lawrence Seaway and Ports

The service area is served by the St. Lawrence Seaway and Lake Ontario with connections through the Oswego River to the New York State Barge Canal system. Deep water ports at Oswego and Ogdensburg allow access to these waterways. The facilities of the system are described below:

Figure 3. Major Highways of Northern New York.

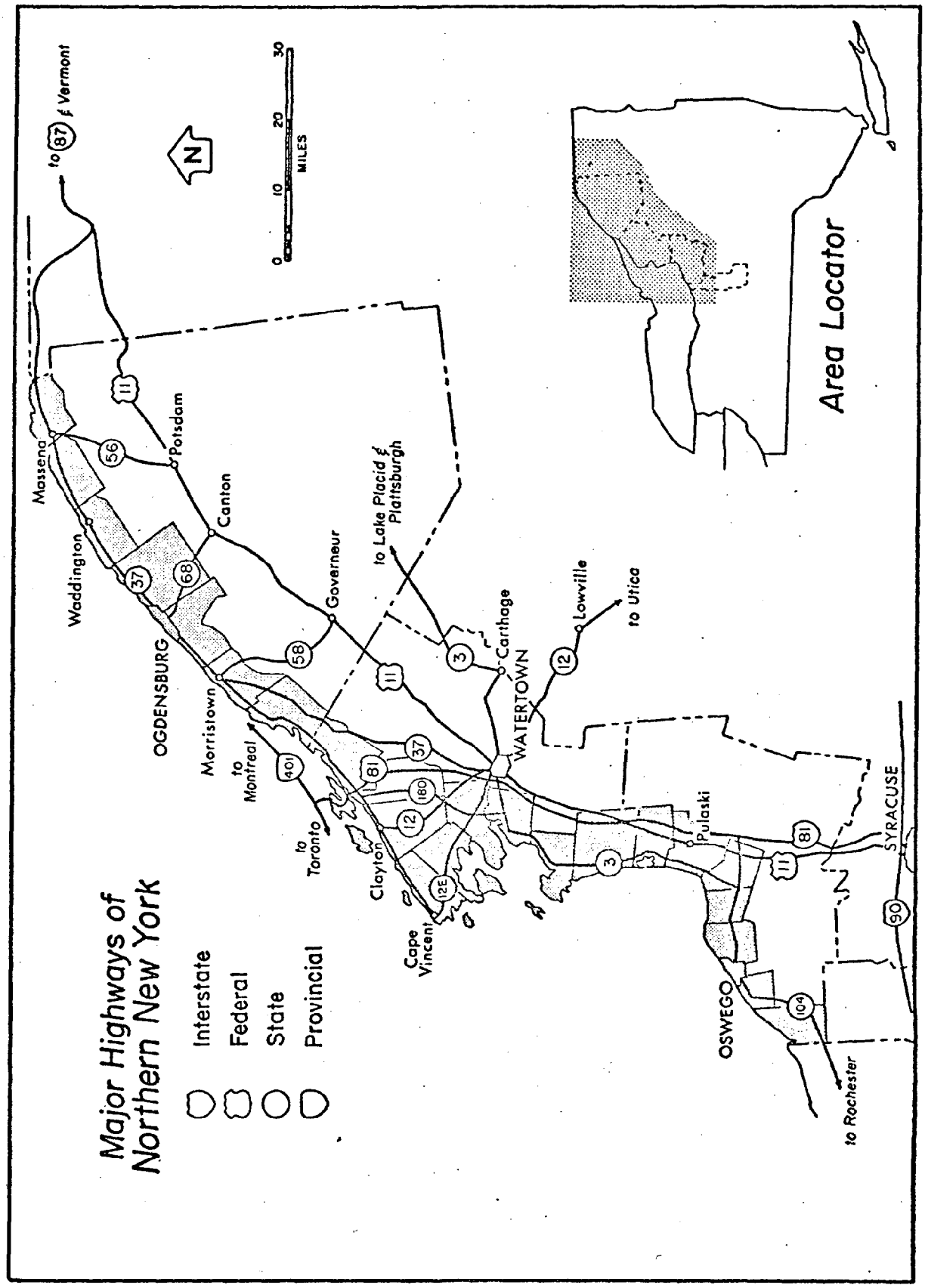


Figure 4. Rail Systems of Northern New York.

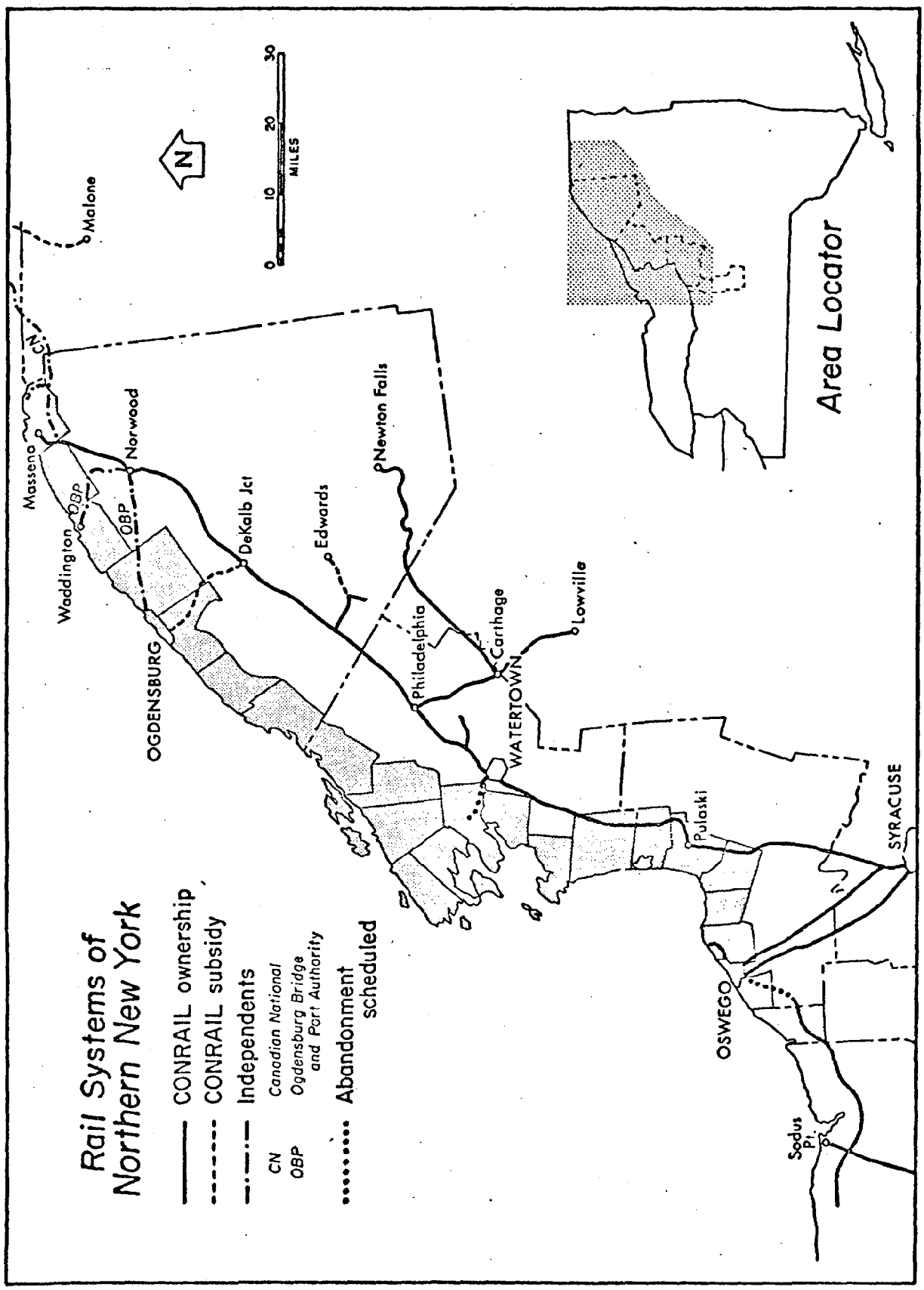


Table 8. Airports

Name	Location	Owner	Classification[a]	Runway Surface	Runway Length
Maxon Field	Alexandria Bay	Private	Commercial	Unpaved	2,250'
Massena Municipal	Massena	Town of Massena	Airline	Paved	5,000'
Ogdensburg In't.	Ogdensburg	Ogdensburg Bridge &PA	Airline	Paved	5,200; 3,000
Watertown In't.	Dexter	City of Watertown	Airline	Paved	5,000; 5,000

[a]Commercial - Open to public, aviation services and facilities offered on commercial basis.
Airline - All Commercial airports served by scheduled certificated air carriers.

(i) St. Lawrence Seaway

Within the United States portion of the Seaway are the Eisenhower and Snell locks and the Wiley-Dondero Ship Channel. These facilities are owned and operated by the St. Lawrence Seaway Development Corporation. Other physical works--Moses-Saunders Dam and Iroquois Dam--associated with the development of the Seaway are owned and operated by the Power Authority of the State of New York (PASNY).

During 1973 about 6,300 ships and 1,300 small craft transited the locks in the system. About 58 million tons of cargo were being transported by these ships. There is an upward trend of cargo carried over the system (see Table 9).

Table 9. Ten-Year Selected Traffic Summary--Montreal to Lake Ontario

	Cargo (in millions of tons)		
	General	Bulk	Total
1964	3.7	35.6	39.3
1965	5.6	37.8	43.4
1966	5.5	43.7	49.2
1967	6.0	38.0	44.0
1968	8.0	40.0	48.0
1969	7.0	34.0	41.0
1970	6.5	44.6	51.1
1971	8.6	44.3	52.9
1972	7.9	45.8	53.7
1973	5.8	51.8	57.6

Source: St. Lawrence Seaway Development Corporation, Massena New York - 1973 Annual Report

The Seaway provides a channel of a minimum depth of 27 feet from the Gulf of St. Lawrence to Lake Ontario. Ship size is limited to vessels up to 75 feet in beam and 730 feet in length with drafts of 25 feet or less. The limit is due to the size of the locks in the system. Many modern lake and ocean vessels are longer in length and are unable to transit the Seaway. Proposals have been advanced to enlarge the locks in the Seaway.

(ii) Port of Oswego

Oswego Harbor consists of a lake approach channel, an outer harbor, the Oswego River Harbor, a west outer harbor and an east outer harbor. Federal project depth for the approach channel is 27 feet, 25 feet for the 800-foot width of outer harbor, 24 feet for the northern 1,600 feet of the

Oswego River Harbor and 21 feet for the remainder of the harbor. Depth alongside the port's east side terminal is 27 feet and alongside the grain elevator, approximately 21 feet. The greatest annual water level fluctuation recorded was 3.58 feet and the least 0.69 feet. Currents in the harbor do not adversely affect shipping.

The earliest and latest opening and closing dates for navigation in Oswego Harbor during the years 1955-1964 are as follows:

	Opening	Closing
Earliest date	Apr. 17	Nov. 26
Latest date	Apr. 29	Dec. 3

No anchorage areas are available in Oswego Harbor and there are no pilotage requirements for the harbor. A 190-foot to 150-foot channel, 14-foot deep, on the east side of the river connects into the New York State Barge Canal System.

The Port of Oswego owns three terminal facilities. The east side terminal is a 1,800-foot general cargo and bulk wharf capable of berthing three vessels in the 500-foot length range simultaneously. A 1,000-foot pier berths two ships at the grain elevator facility located on the west bank. This pier is also used for unloading dry and liquid bulk cargo. The 1,000-foot coal dock formerly used by the Erie Lackawanna Railroad is currently inactive.

The east side terminal wharf, which opened in 1963 is in good condition. The grain elevator pier constructed around 1925

has no fendering and shows definite signs of deterioration. The coal pier (construction date unknown) has deteriorated somewhat due to lack of upkeep.

Facilities at the east side terminal include a 100,000-square-foot transit shed, a 28,000-square-foot covered bulk storage building and approximately 9 acres of open storage area. Mechanical equipment includes a conveyer, a pay-loader and fork lift trucks. Cranes are available locally. The wharf was constructed with two railroad tracks and tracks for a future gantry crane. Wharf railroad tracks connect the east side terminal to the Penn Central Railroad system. The west side pier is the site of the 1,038,000-bushel grain elevator and a 28,500-square-foot covered bulk storage building. The grain elevator, located on the west side of the Oswego River, is served by a section of track owned by Conrail Corporation. The track is scheduled for abandonment. A truck route leads into State Road 57 which connects directly to Interstate Road I-81 and I-90. There are no facilities at the old coal dock.

Waterborne commerce via Oswego port facilities has fluctuated on a year-to-year basis. Analysis of Port of Oswego records from 1965 through 1974 indicates a low of 25,860 tons and 4 vessel calls in 1968 to a peak annual volume of 135,883 tons and 90 vessel calls in 1965. Table 10 reflects the 1965-1974 vessel calls and tonnage volumes on a year-to-year basis. Table 11 summarizes the 1974 waterborne commerce movements.

Table 10. 1965-1974 Summary--Vessel Calls and Tonnage

Year	Grain	Other	Total Tons	# Vessel Calls
1974	23,332	28,560	51,892	8
1973	21,837	45,598	67,635	24
1972	32,638	55,909	88,547	28
1971	39,110	60,375	99,485	28
1970	17,681	56,931	74,612	17
1969	33,438	21,173	54,611	34
1968	25,860	---	25,860	4
1967	34,904	16,968	51,872	13
1966	83,531	38,588	122,119	44
1965	28,453	107,430	135,883	90

Table 11. Waterborne Commerce Movements[1]--1974 Port of Oswego

Commodity	City/Country of Origin	Shipping Units	City/ Country Destin.	Trans. Mode
		Imports		
Aluminum Alcan	Norway	Ingots 6-12 tons each 6,897 tons	Oswego	Rail & Truck
Potash Agway	Saskatchewan Via Thunder Bay	Bulk Vessel 21,663 Tons	Batavia Rochester Albany Elmira Big Flats	Rail & Truck
Total Imports--28,560 Tons				
		Domestic		
Grain (Barley)	Duluth	Bulk Vessel 979,000 Bushels 23,332 Tons	Sodus Bay	By Company-Owned Trucks
Total Domestic--23,332 Tons				
Total Tonnage-- 51,892 Tons				

[1]Handled by the public port.

Currently Port of Oswego operations include grain elevator storage and operations, general cargo warehousing and handling, marina and restaurant leases to private operators, cement and petroleum distribution by private operators on port-owned land and the leasing of acreage for industrial developing and farming. The acreage leasing on parcels not contiguous to the main port is the result of the acquisition of properties prior to the installation of the Alcan Aluminum rolling mill. The port was a decisive factor in locating the Alcan plant with an employment of over 500 in the Oswego area. As a result of the aluminum operation, Oswego port facilities are used for direct vessel delivery and open storage, as well as rail care and truck handling of aluminum ingots and billets railed directly to the port property. Aluminum products are stored and then loaded out for delivery to the plant on an "as requested" basis. All of these functions except the trucking to the plant are performed by port personnel.

While most aluminum is delivered by rail from Canada to the port, the use of direct vessel service is significant. In 1974, two vessels delivered 6,897 tones to the Port's docks. In 1973, more than 18,500 tons of aluminum moved in and out of the port. In 1972, 14,200 tons and in 1971, 8,300 tons moved by water. The water movements over the past 5 years represent foreign deliveries of aluminum ingots, while the railroads have handled all of the main supply originating in Arvida, Quebec.

Physically, the Port of Oswego vessel handling operations and facilities are limited by its proximity to the historic Fort Ontario on the east and by the City of Oswego and Oswego River on the west and south. Some physical rearrangement of facilities may be possible within present port boundaries. If port facilities are expanded, there could be a negative impact on Fort Ontario.

From a commerce development standpoint, cement distribution and tank farm operations, increased aluminum storage, additional grain product movement in the form of pelleted grain, potential import of cocoa beans for Nestles' Fulton plant and industrial development of the farm acreage appear to present possibilities for increased deep-draft waterborne commerce movement.

(iii) Port of Ogdensburg

The public Port of Ogdensburg is situated on the St. Lawrence River about one-quarter mile from the Seaway Channel. The Port Authority dock is located next to the 250-foot-wide lower east entrance channel which has a federal project depth of 19 feet. However, the Port Authority had dredged an entrance channel of 28 feet, and the 27 feet of water alongside the dock equals the Seaway limit. The lower basin area has a project depth of 21 feet. An area of hard material in the southwest corner of the basin is dredged to 20 feet.

Currents in the river reach a maximum of about 2.3 knots and do not adversely affect shipping at the terminal.

The Iroquois Dam downstream keeps the water surface fairly constant. The Prescott Anchorage area is located several miles upstream. Navigation season for the Port of Ogdensburg is the same as that given in the section on the St. Lawrence Seaway. There are no harbor pilotage requirements.

Berthing facilities include a recently constructed single general cargo berth 600 feet in length. About 1,200 feet of shoreline used for the anchoring of self-unloading bulk carriers. The general cargo berth is also capable of unloading petroleum products and some dry bulk cargo.

Physical plant facilities for the port include two transit sheds of approximately 16,000 square feet each plus a 20,000-square-foot warehouse. A 40,000-square-foot warehouse, generally in poor condition, is leased for storage. More than 8 acres of land is available for open dry bulk storage. A 500,000-bushel grain elevator is no longer in operation. Cranes are rented locally as required.

Access to and from State Road 37 is through local residential streets. A single track railroad terminates on the port facility.

The Port of Ogdensburg has recently acquired the former St. Regis Paper Company facility at Waddington, New York. This property has about 22 acres of open area, two railroad tracks, a 500-foot berth, and two cranes of circa 1900 vintage. Depth of water is reported to vary between 14 and 18 feet.

During the 1971-1974 period the Port of Ogdensburg commerce increased from about 5,050 tons to more than 71,300 tons. The commodity tonnages for the last 5 years are shown in Table 12. Fuel oil movements initiated in

Table 12. Commodity Tonnages--1971 to 1974

	1975	1974	1973	1972	1971
Exports					
Powdered Milk	--	--	--	2,050	2,750
Logs (hardwood)	--	--	--	--	200
Mixed General Cargo	950	1,500	--	--	150
Aluminum Ingots	1,012	--	--	--	--
Cryolite	902				
Subtotal	2,864	1,500	--	2,050	3,100
Imports					
Fruits & Nuts	--	--	--	--	1,000
Mixed General Cargo	--	--	--	8,050	1,100
Baler Twine-Bundles	--	--	350	1,100	--
Wood Pulp-Bales	--	--	6,500	--	--
Lead-Zinc Ores-Bulk	--	--	3,750	--	--
Powdered Milk	--	--	700	--	--
Road Salt-Bulk	5,300	12,250	21,500	--	--
Fuel Oils-Bulk	32,670	57,570	--	--	--
Scrap Steel Rails	991	--	--	--	--
Subtotal	38,961	69,820	32,800	9,150	2,100
TOTAL	41,925	71,320	32,800	11,200	5,200

in 1974 represent 81 percent of the total port commerce and are expected to continue as the major commodity movement. The tank farm is served by dual 12 inch and 10 inch pipeline from the main berth. Other commodities are

stored in the open areas or the four transit shed-warehouse areas which provide about 95,000 square feet for bulk and general cargo requiring covered storage.

Thus far, the newly acquired Waddington facility has not been used. However, Ogdensburg and Waddington combined provide more than adequate facilities to meet current waterborne commerce and warehousing requirements. The Ogdensburg Bridge and Port Authority has several promising possibilities for using both the Waddington and Ogdensburg facilities. Based on the current waterborne commerce commodity variety and volume, it is hoped that a considerable increase in volume over the next 4 to 5 years might occur. This increase would be primarily in energy commodities such as fuel oils, coal and coke. The Authority considers the port to be an important tool for attracting new industry to the Ogdensburg area.

While the present Ogdensburg facility includes a total of 600 feet of vessel berthing space, the Authority is actively pursuing new commerce. One of the more promising of these is coke breeze from Conneaut, Ohio, the major coal-coke handling port on Lake Erie, to the Jones and Laughlin plant at Star Lake, St. Lawrence County, New York, about 50 miles south of Ogdensburg. There are several shipping lines interested in this potential movement.

Other commodity movements the Authority is pursuing include the shipment of refined or cintered ore from the Star Lake mining area through the Port of Ogdensburg. This

could involve some 200,000 tons of coking coal, 150,000 tons of salt, and some crude steel castings (pigs) for export.

Coal presents still another possibility in the Authority plans. While total annual tonnage potential has not been determined at this time, it is known that several companies and institutions in the area use coal. One state hospital alone uses 18,000 tons per year, while Diamond International uses some 25,000 tons annually. Coal deliveries into Ogdensburg are currently by rail, but the participation of coal users in a group purchase plan could result in the Authority's serving as a coal distribution center. Other possibilities considered by the Authority include waterborne movement of engine blocks to Detroit as part of the future plans for promoting more extensive use of Ogdensburg-Waddington waterfront facilities.

The potential cargo volumes for the port will require a considerably greater intensity of usage of port facilities and port property than the present. Care will have to be exercised in locating stockpile areas so that safeguards against both air pollution from wind blown particles and water pollution from storm water runoff or leaching. Traffice movements through city streets will need to be planned so that congestion or unsafe conditions can be avoided.

Generally, however, the expansion as projected is an extension of the activities for which the port was originally designed and no adverse environmental impact is anticipated.

b) Energy Production

Currently there are 26,966 MW of power produced in New York State. Of this, 3,456 MW (12.5 percent) is produced in the service area. Statewide, 4,741 MW (17.6 percent) of the power is produced at publicly operated facilities and 22,225 MW (82.4 percent) at privately operated facilities. In comparison, within the service area, 1,821 MW (52.7 percent) are produced by public and 1,635 MW (47.3 percent) by privately operated facilities.

Eight operating facilities currently produce the 3,456 MW within the service area. Table 13 describes these and other proposed plants. Figure 5 shows their location. In addition to these facilities, there are 51 significant transmission lines of 115KV and more originating, terminating or passing through the service area.

c) Industrial Parks

Expansion of economic activity may be enhanced by the development of industrial parks. Currently there are two parks developed in the four-county area. ~~They are~~ located near Watertown and Ogdensburg. Table 14 provides information on the facilities provided at these sites.

4. Findings

. Most of the four-county area may be characterized as having a relatively small, widely dispersed labor force.

. With the exception of Oswego County, there has been considerable outmigration of college-educated and work-age people.

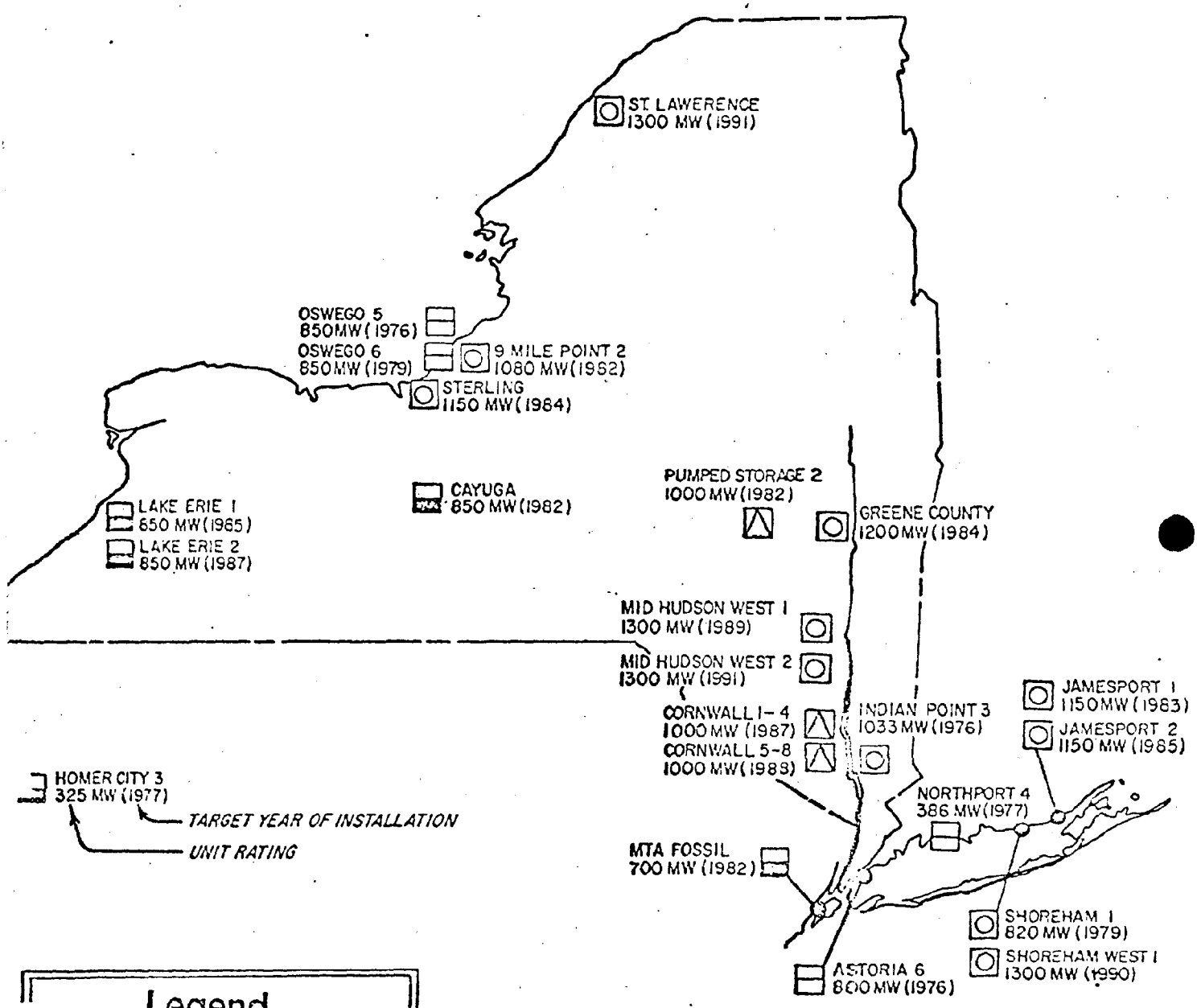
Table 13. Energy Production Facilities in the St. Lawrence-Eastern Ontario Commission Area

Name/ Location	Utility (Principle Owner)	Existing	Proposed	Type	Capacity (MW)
Sterling Power Plant-Sterling	RG&E		x	Nuclear	1150
Oswego #1	N-M	x		Fossil(oil)	90
Oswego #2	N-M	x		Fossil(oil)	90
Oswego #3	N-M	x		Fossil(oil)	95
Oswego #4	N-M	x		Fossil(oil)	100
Oswego #5	N-M	x		Fossil(oil)	650
Oswego #6 Oswego	N-M		x	Fossil(oil)	850
Nine Mile Point #1	N-M	x		Nuclear	610
Nine Mile Point #2	N-M		x	Nuclear	1100
James A. Fitzpatrick Nine Mile Point, Scriba	PASNY	x		Nuclear	821
St. Lawrence			x	Nuclear	1300
Moses-Saunders Power Dam Massena	PASNY	x		Hydro	1000

Table 14. Industrial Parks

	Developed	
	Jefferson	St. Lawrence
Developer	Jefferson County Ind., Inc.	Ogdensburg Bridge & PA
Location	Watertown	Ogdensburg
Size	130 Acres	725 Acres
Current Use	Light Manufacturing	Light Manufacturing
On Site Services	Electric, Gas, Sewage,Water	Electric, Gas, Sewage,Water
Transportation	Highway Rt. 12F, I-81	Highway - Rt. 37 Railroad
	Undeveloped	
Developer		Ogdensburg Bridge & PA
Location		Waddington
Size		22 Acres
Current Use		Unused
On Site Services		Limited
Transportation		Port Facility, Railroad Rt.37

Figure 15: Location of Major Generating Additions



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. Labor force participation rates are lower than the state average. Coupled with lower paying employment opportunities, average family incomes are significantly below the state average.

. A large number of employment opportunities are seasonal and of the low income type.

. Recent national economic trends have contributed significantly to unemployment problems in the four-county area. In addition, the completion of several major construction projects in Oswego-Fulton area (an important component of the local economy) has increased this problem.

. Formerly major sectors of the area's economy such as forestry and paper manufacture have shifted to southern states.

. There are several locational disadvantages in that much of the service area suffers from geographic separation from major urban population centers and sources of raw materials. Climatic factors limit the extent to which agriculture and related activities may be developed.

. Development and operation of the St. Lawrence Seaway has generally been of significant economic value, ~~generally,~~ but its positive contributions to the St. Lawrence-Eastern Ontario area have been relatively minor. To ~~an~~ some extent, as detailed in the Upstate Public Ports Study by NYS Department of Transportation, increased usage of the area's commercial port facilities will depend upon factors not entirely subject to local control.

. In addition to economic benefits, operation of the Seaway is a source of potential environmental hazard to the area. The complex and varying conditions of river currents and wind can challenge the skills of highly experienced masters and pilots. Control and clean-up of a spill of oil or other toxic material is difficult, costly, and in the case of sizable spills, cannot preclude damage to shoreline property and natural resources. Extended season and winter Seaway navigation now being evaluated would pose substantial problems in the event of a spill. Contingency planning to mitigate spill impact is a matter of continuing concern to the responsible federal agencies (USCG, SLSDC, EPA) and state and local officials, as well as shoreline property owners.

. Completion of major highway improvements, particularly elements of the Interstate highway system, has improved accessibility to much of the area. The functions of some older roads have been altered as a consequence. Additional highway improvements of subregional scale will be needed.

. The St. Lawrence-Eastern Ontario area has a number of advantages for the location of thermal electric generation facilities: proximity to established interregional transmission corridors, abundant water for cooling purposes, substantial open space facilitating site assembly. Major stations have been developed in Oswego County and others are at various proposal stages there and elsewhere in the area. The siting of major electric generation facilities

is of state and regional concern and is governed by a complex, costly and time-consuming process designed to assess the need for the added capacity; relative merits of alternative locations, fuels and system designs; and economic, social and ecologic impacts of the proposal and its alternatives. On all points, local residents are presented with authoritative but conflicting viewpoints from various sources. Construction and operation of large fossil and nuclear fueled electric generation plants pose substantial economic and environmental issues that have not been resolved.

. Manufacturing is the largest segment of the economy of the four counties that include the St. Lawrence-Eastern Ontario area (with nearly 40 percent of the labor force). Its maintenance and further development depends substantially upon external factors and trends that cannot be affected by local effort. Most of the four counties' present industry and future development potential is inland from the coastal area. It is of local importance that those firms that do locate or expand within the area do so in a manner consistent with local community development objectives and plans. The most appropriate areas for further industrial development are those with the established industrial base, offering an available labor market, adequate utility capacities, maximum transportation advantages and the potential for inter-industry linkages.

. The proliferation of shoreline development, primarily seasonal residences and related public recreation and commercial facilities, constitutes the single most important factor affecting the character of much of the coastal area. At this point seasonal residences alone comprise nearly 20 percent of all properties in the St. Lawrence-Eastern Ontario area, and over 50 percent in some towns. Overall, 97 percent are on shoreline sites.

. Most of the area's shoreline development has occurred (and is occurring) prior to adoption of local land use and development regulations. The consequence in many instances has been unplanned and inappropriate conversion of the area's most distinctive and valuable land resource. A variety of environmental problems has resulted from scenic pollution to water pollution.

. The majority of seasonal residences are owned by persons who live elsewhere in the state or out of state. These seasonal residents lack any effective voice in local government in the coastal area. A majority of them, unlike local residents, perceive growing environmental problems along the shoreline and feel that local government is not concerned with their problems. When surveyed, 25 percent stated that they intended to go elsewhere in the future for those reasons.

. A substantial proportion of shoreline development consists of land divisions limited to fewer than five lots, or disposition by means of land contracts. As a

consequence, much of the shoreline has been developed without adequate review by either state or local agencies.

B. Coastal Land Resources

Land resources as discussed here involves geologic and soil characteristics which influence man's activities in the St. Lawrence-Eastern Ontario area. The physical uniqueness of the 23 shoreline towns is a product of geology. The combination of glaciation, marine inundations, uplift, erosion, deposition and weathering has resulted in a shoreline and immediate uplands which provide natural, economic, scenic and recreational resources.

This section summarizes the characteristics of the St. Lawrence-Eastern Ontario area land features in regard to geology, prime agricultural soils, and limitations imposed upon development because of unsuitable soil conditions.*

1. Geologic Resources

The bedrock formations in the area have a geologic history of over 400 million years. In contrast, the area's surficial land forms have a history going back to the final advance and retreat of the continental glacier 10,000 to 20,000 years ago. It is the action and effects of the last glacier during the Wisconsin glaciation plus postglacial erosion and weathering that are responsible for our present surface features.

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*For a complete discussion, refer to the St. Lawrence-Eastern Ontario Commission's technical reports on geology and on soils.

Eleven bedrock formations underlie or outcrop in the St. Lawrence-Eastern Ontario area, as shown in Figure 6. Bedrock may either be a natural resource in itself or an indicator of natural resource potential. Table 15 shows the natural potential of the area's coastal formations for a variety of purposes or resources. Non-minerals (such as gas and water) are more abundant in porous or jointed and bedded formations such as limestone. Resistance to weathering and an attractive finish are prerequisites to good building stone, qualities associated with sandstone and granitic formations.

The high lime content of a number of formations in the area make them potentially valuable as sources of lime for the production of cement, or a variety of forms of agricultural or commercial lime products. Limestone is also the most commonly crushed stone for construction purposes.

Fossils, while not necessarily a commercial resource, are an academic and recreational resource. The most fossiliferous formations in the coastal area are the limestones and the high lime shales. However, with the exception of the Grenville Formation, all of the rocks have some record of life forms which inhabited the waters during the geologic period in which their sediments were deposited.

Although the opportunity is rare, semi-precious gem stones such as the quarts "Herkimer Diamond" may be found in the sandstone or granitic formations of the area. Flourite,

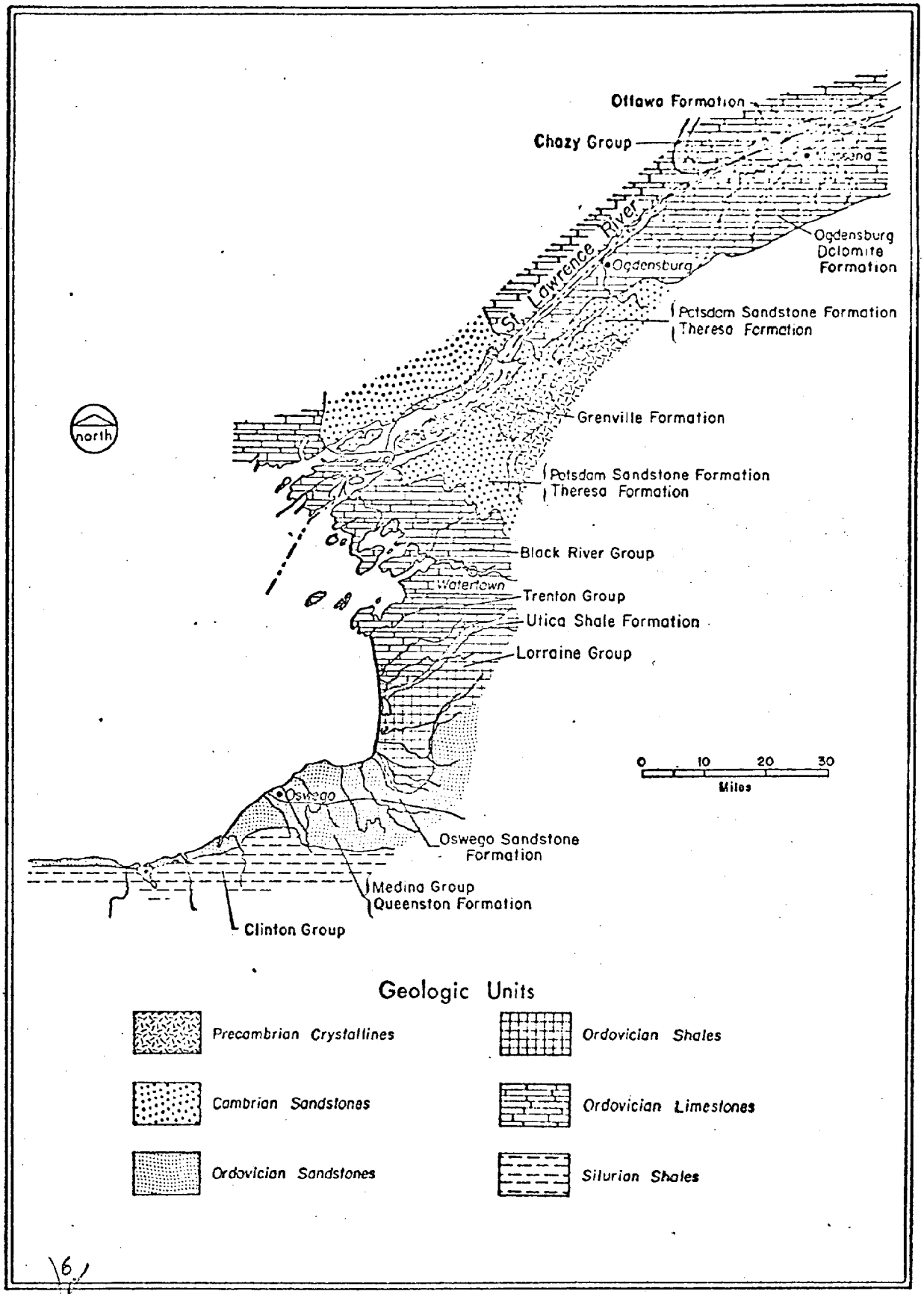

Figure 1. Bedrock Geology in the St. Lawrence-Eastern Ontario Area
(Source: Broughton, et. al., 1966; and NYS Museum and Science Service, 1962).

Table 1. Natural Resource Potential of Coastal Area Bedrock Formations

	Natural Gas	Water	Building Stone	Lime for Cement	Aggregate for Concrete	Other Construction Material	Gem Stones	Fossils	Other
Ogdensburg Dolomite Formation		xxxx	xx	xx	xxx	xxxx[1]		xxxx	xx[2]
Theresa Formation	xx	xx	xxx				x	xx	
Potsdam Sandstone Formation	xx	xx	xxxx		xxxx		x	xx	
Grenville Formation			xx				x		
Black River Group		xxxx	xx	xxxx	xxxx	xxxx[1]		xxxxx	xxxxx[2]
Trenton Group	xxxxx	xxxx		xxxx	xxxx	xxxx[1]		xxxxx	xxxx[2]
Utica Shale Formation	xxx	xx						xxxx	
Lorraine Group		xx						xx	
Oswego Sandstone Formation	x	xx	xxxx						
Medina Group and Queenston Formation	x	xx	xx						
Clinton Group	x	xx			x			xx	

x Exist in either poor quality or quantity
xx Fair potential for local use
xxx Good potential for local use (may have broader commercial value)
xxxx Good potential and supply of commercial value
xxxxx High quality and abundant supply

[1] crushed stone
[2] agricultural lime

Source: CNY RP&DB, 1970; and Tuttle, 1973.

Another aspect of bedrock geology is seismic stability. Although no active faults are visible within the service area of the St. Lawrence-Eastern Ontario Commission,[1] two are found nearby. The closest one is the Ottawa-Bonnechere Graben, a northwest-southeast belt of faults paralleling the Ottawa River from Montreal to northeast of Ottawa.[2] Shocks from this belt have caused structural damage in the past to property in towns along the St. Lawrence River.

The southern and eastern shores of Lake Ontario receive tremor activity from the Clarendon-Linden Structure in the vicinity of Batavia-Warsaw, Wyoming County, New York.[3] Tremors causing local damage have occurred in the Warsaw-Batavia-Attica area.

A total of four tremors have been detected in or near the St. Lawrence River during the past 15 years.[4] Seismic activity is particularly significant in the planning and design of certain structures such as nuclear power plants. Modern engineering and technology can effectively reduce or eliminate the risk of structural damage due to earthquakes of moderate intensity.

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[1]Recent investigation has discovered two faults in the Nine Mile Point area. The effect of these faults on the area's seismic risk has not been determined.

[2]Rochester Gas and Electric Corporation SNUPPS Report, Volume 1, 1974.

[3]Ibid.

[4]The Technical Report entitled Geology contains a more detailed discussion.

apatite, baritic, garnet serpentine, and jasper are just a few of the documented gemstone discoveries in Jefferson and St. Lawrence Counties.[1]

There are a few low-production natural gas wells in the service area in the Theresa-Potsdam Formations. The Trenton Group and Utica Shale Formation--highly rated in Table 15 for natural gas--are not productive in this area because the rocks are too close to the surface. Any gas build-up would escape naturally through the joints and crevices of the rock.

There have been some low-production gas explorations of the Trenton Group in Oswego County where it is capped by the Medina-Queenston sandstone. During the late 1800's over 200 gas wells were drilled in the Sandy Creek-Pulaski-Baldwinsville area. Since then, however, the gas supply has been exhausted and recent explorations have not been of commercial value.[2] The good potential ratings for these formations refer to the Central New York region where they occur at great depth under younger formations.

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[1]Tuttle, Donald L., "The Lore and Magic of Gem Stones," The Conservationist, August-September 1973, N.Y.S. Department of Environmental Conservation, p. 26.

[2]Central New York Regional Planning and Development Board, Geologic Inventory, Central New York Region, 1970.

There are six general surficial provinces that may be identified in the coastal area, as shown in Figure 7.

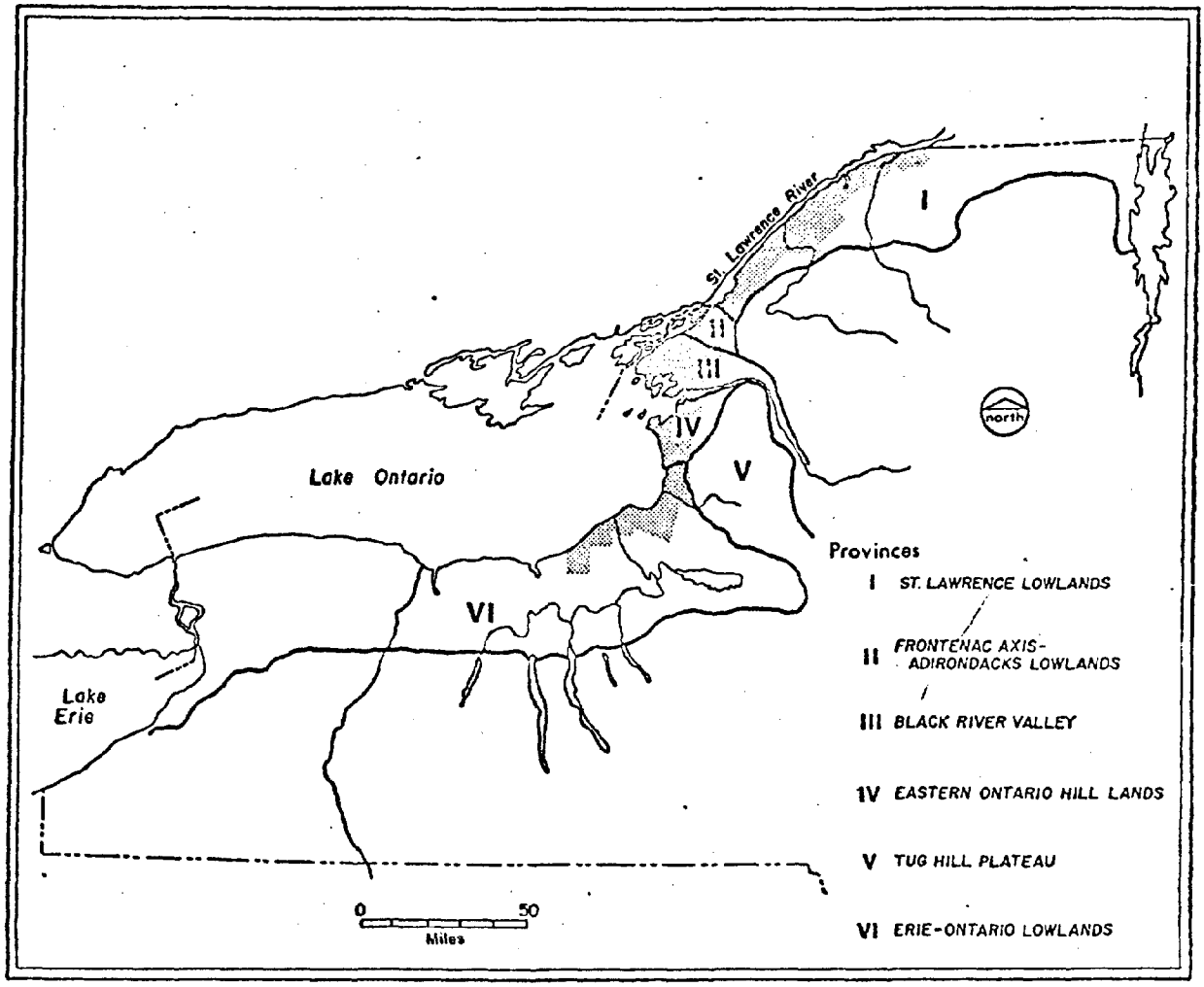

Figure 7: Surficial Geologic Provinces of the St. Lawrence-Eastern Ontario Area (Source: Broughton, et. al., 1966).

a) St. Lawrence Lowlands (I)--Major drainage of final glacial waters and the Great Lakes today. Weather and wave action have reduced soil overlay to bare rock in many areas. Valley lowlands are relatively flat in most areas, and clay soils combined with little relief impose development problems.

b) Frontenac Axis-Adirondack Lowlands (II)--This area is characterized by exposed crystalline rock at or very near to the surface creating severe development problems. However, the aesthetic and recreational qualities of the area, largely due to the landscape, make the area scenic and of major importance as a recreation area.

c) Black River Valley (III)--Part of the advancing glacier pushed up the Black River Valley accentuating the escarpment of the Tug Hill and widening the valley. Deposits of built up deltaic sands and outwash gravel are found throughout the Black River Valley. Valley relief is slight and drainage is poor. Bedrock is at or near the surface, posing development problems.

d) Eastern Ontario Hill Lands (IV)--An area where more resistant limestones underlaid softer shales. Sand and gravel outwash from the Tug Hill fill level inter-hill or inter-drumlin areas of Eastern Ontario Hill Lands. Extensive drumlin areas are found in this area. The diversity of surficial deposits and the presence of relief to promote better drainage make this area more suited to a variety of uses. However, slope is a limitation on development and

agricultural activities. Shoreline areas of sandy beaches of other unconsolidated erodible material are common.

e) Tug Hill Plateau (V)--Although not a coastal formation, the western toe of the Tug Hill escarpment extends into some coastal towns. Today, the highlands of the Tug Hill produce much of the runoff flowing through tributary streams to Lake Ontario.

f) Erie-Ontario Lowlands (VI)--The largest and most continuous of the coastal surficial provinces. This area best exemplifies the state's glacial till or morainic land forms. Drumlins and inter-drumlin outwash plains are well expressed; glacial drift deposits are deeper here than elsewhere. In some areas in the southeastern side of Lake Ontario, sediments settled out in inter-beach areas. Lake action formed truncated glacial till land forms, producing bluffs.

2. Soils

Knowing the characteristics of soils is important in evaluating the developmental potential of an area for structural development (residential or commercial), recreation, or agriculture. Soils must be investigated to determine the feasibility and relative difficulty involved in adapting specific use to a specified location. As discussed, the area's complex geologic history has left some soil resources not well suited for development. Based on the suitability of soils for particular uses and other related factors, land use decisions can be made more intelligently.

Present material of a soil is the initial mineral material, deposited from an outside area or developed in place from consolidated rock material. Since all of the soils in the St. Lawrence-Eastern Ontario area have developed in parent material transported and deposited either by ice or water, they vary from fine textured clay soils on the lake plains to well graded till soils south of the Black River to the sandy soils of the Oswego County shoreline. Each of these soils has differing potential for use for a variety of purposes. Management required to adapt these soils to various uses may also differ, whether for agriculture or structural development.

a) Development Potentials

Soils can be rated in terms of their limitations for different uses or types of development, such as structures with basements, structures without basements, septic systems, shallow excavations, streets or lawns. Two significant types of development with which coastal residents are likely to encounter problems regarding soils involve structures with basements, and septic systems.[1]

1) Dwellings with basements

Typically, these include single-family dwellings, homes and cottages and similar structures with similar foundation requirements. Soils may be rated exclusively in terms of

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[1]The Commission's technical report on soils contains a complete discussion of these types of development, as well as other development activities.

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properties affecting foundation construction and bearing strength, and properties influencing excavation and installation of underground utilities. These properties include slope, susceptibility to flooding, depth to water table, drainage, frost action, stoniness, rockiness and depth to bedrock. A composite of these characteristics determines whether the soils in a particular area pose slight, moderate, severe or very severe limitations on the construction of a building with a basement (see Table 16).

Table 16. Degree of Soil Limitation on Structures with Basements.

SLIGHT	MODERATE
Excessively, somewhat excessively well drained Seasonal high water table below 60 inches Not subject to flooding Slopes of less than 8 percent Low shrink swell potential Low frost action potential Less than 0.1 percent surface stones No rock outcrops deeper than 60 inches to bedrock	Moderately well drained Seasonal high water table below 30 inches Not subject to flooding Slopes of 8 to 15 percent Moderate shrink swell potential Moderate frost action potential 0.1 to 3 percent surface stones 2 to 10 percent surface area rock outcrops 40 to 60 inches deep in bedrock
SEVERE	**VERY SEVERE**
Somewhat poorly drained Seasonal high water table above 30 inches Subject to flooding once in 5 years Slopes 15 to 25 percent High shrink swell potential High frost action potential 3 to 15 percent surface stones 10 to 50 percent surface rock outcrops Bedrock at 20 to 40 inches	Poorly or very poorly drained Seasonal high water table above 12 inches Flooded more than once in 5 years Slopes steeper than 25 percent More than 15 percent of the surface is covered with stones More than 50 percent of the surface is covered with rock outcrops Bedrock at less than 20 inches from the surface

2) Septic system

The septic tank and absorption field is the most common soil absorption system for on-site sewage disposal. It consists of a subsurface tile system laid in such a way that effluent from the septic tank is distributed with reasonable uniformity into the surrounding soil. Criteria and standards used for rating soils are based on the limitations of the soil to absorb effluent. Factors which relate to the ability of the soil to support septic systems include susceptibility of flooding, depth to water table, depth to bedrock, slope and permeability. A composite of these factors determines whether the soils in a particular area pose slight, moderate, severe or very severe limitations on the use of a septic system (see Table 17).

Table 17. Degree of Soil Limitation for Septic Systems

SLIGHT	MODERATE
Not subject to flooding Seasonal high water table below 72 inches Bedrock deeper than 72 inches 0 to 8 percent slopes Permeability rates faster than 1.0 inches per hour	Not subject to flooding Seasonal high water table between 72 to 40 inches from the surface Bedrock at 40 to 72 inches Slopes of 8 to 15 percent Permeability rates 6 to 1.0 inches per hour
SEVERE	**VERY SEVERE**
Subject to occasional flooding Seasonal high water table between 20 and 40 inches from the surface Bedrock between 20 and 40 inches Slopes of 15 to 25 percent Permeability rates of .06 to .6 inches per hour	Subject to frequent flooding Seasonal high water table above 20 inches Creviced limestone bedrock at less than 40 inches or non-creviced bedrock at less than 20 inches Slopes steeper than 25 percent Permeability rates slower than .06 inches per hour

b) Managing and Upgrading Soils

Although soils may pose certain limitations on a particular development, engineering and architectural designs can modify either the natural soil condition or the structure to minimize the effects of the soil limitation. Some management techniques are common sense practices, such as removing large stones from the construction site. Other techniques are much more sophisticated and expensive. A site may be ideally suited to a particular use with no management required, or a site may pose limitations which may be overcome through the application of special management techniques.[1] Uses of the site which may then be made are indicative of the development potential. Sites with limitations so severe for a particular use that they cannot be overcome through management practices should probably be avoided. Table 18 defines the relative potential after conventional management practices have been applied.

The Commission has analyzed soils of the St. Lawrence-Eastern Ontario area and determined their potential relative to the development of structures with basements and of septic systems.

c) Soils for Agriculture: Prime Farmlands

Factors which contribute to the type and success of agriculture in an area include the resource, climate, geography and attitudes.

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[1]The St. Lawrence-Eastern Ontario Commission has rated soils, determined their limitations, and developed a process for overcoming such limitations through management. The technical report on soils provides a more complete discussion.

Table 18. Potential of Managed Soils

Good—Soils with good managed potential would be relatively free of soil related maintenance once natural limitations if any had been overcome.

Fair—Soils with a fair managed potential for structures without basements would have some soil related maintenance even though the most prohibitive aspects of the limitation had been overcome. Generally these maintenance factors would not outweigh the positive potential of the site for its intended use.

Poor—Soils with a poor managed potential for structures without basements should be carefully considered before proceeding with a structure. Such soils would require entensive maintenance and both time and money to protect any investment in a structure.

Very Poor—Soils rated very poor for managed potential would require extensive technical and financial maintenance expenditures. This type of maintenance would be out of the reach of most individuals for conventional use as a home or small business.

The most basic resource to agriculture is soil. Soils in the St. Lawrence-Eastern Ontario area range from heavy clays on the northern Jefferson and St. Lawrence Counties lake plains to the deep loamy tills of southern Jefferson County to the sandy soils and gravelly soils and mucklands of the southeastern Lake Ontario shorelands.

Soils differ in their natural suitability for various types of farming. So, as soils change so do the methods, the intensity or even the type of farm operation. The moderately deep, clayey soils of the lake plain are not as easily managed as the deep rolling till soils of areas such as Ellisburg. However, in each area, farming is a vital land use and a significant contributor to the economy of the area.

Nationally and statewide there has been recognition of the importance of soil as an agricultural resource. The United States Department of Agriculture has developed national guidelines for classifying farmland. The main classification is prime farmland, which is defined as land best suited and available for producing food, feed, forage, fiber and oilseed crops. The land could be cropland, pasture-land, rangeland, forest land or other land, but not urban built-up land or water. It has the soil quality, growing season and moisture supply needed to produce sustained high yields of crops economically when treated and managed according to modern farming methods.

There are also classifications for unique farmlands, and farmlands of statewide or local importance. New York State has adopted the national criteria as a method for inventorying areas of soils valuable for farming.[1]

Agricultural suitability is determined by the soil characteristics affecting crop yields (land use capability

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[1] In addition to the USDA prime land criteria, there is also criteria developed by Professor Howard Conklin at Cornell which rates areas according to agricultural viability. While the USDA criteria simply rates the resource, the Conklin criteria takes into account many agriculturally related factors such as management and marketing. Also available is USDA land capability class which rates soils according to the relative difficulty in producing a crop on a particular soil.

class, natural fertility, lime requirements and soils) for agricultural crops under good management.[1] Important crops in this area are grain and silage, corn, oats, wheat alfalfa, trefoil and pasture.

3. Agricultural Districts

In many parts of the state, agricultural lands have come under pressure from expanding metropolitan areas. This pressure from scattered development in wide belts around urban areas creates conflicts in land use, raises costs for public services, and stimulates land speculation. When this scattered development extends into good farm areas, ordinances inhibiting farming tend to follow, farm taxes rise, and investments in farm improvement are discouraged by hopes for speculative gains. Thus, much farmland in New York State is in danger of being lost for agricultural purposes.

As a result of pressures on farmers to profit more from selling land than from producing food, the State Legislature amended the Agricultural and Markets Law in 1971 to allow for creation of agricultural districts.

In the St. Lawrence County shorelands there are currently agricultural districts in effect in parts of Hammond,

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[1]Good management practices that include minimum tillage, return of crop residue to soil, terracing or strip cropping on steep slopes, careful crop rotation programs and proper lime and fertilizer applications are assumed in rating the suitability of these selected crops.

Morristown, Oswegatchie, Lisbon, Waddington, Louisville and Massena. These ag districts extend to inland towns as well. An agricultural district has been proposed for areas within 10 towns in southern and eastern Jefferson County. Coastal towns included are Hounsfield, Henderson and Ellisburg. Agricultural districts are pending in at least four towns in Oswego County, including shoreline towns of Mexico, New Haven and Scriba. The Town of Sterling in Cayuga County is not in an agricultural district. Figure 8 reflects the general location of these districts.

4. Shoreline Processes

The forces of Lake Ontario are both constructive and destructive in terms of shoreline development. Wave action may be eroding and tearing down the shoreline in one place while in another area, deposition is building the shoreline up. Sand from eroded till, outwash and alluvium is deposited along the south shore of Lake Ontario and is carried by the littoral drift of the lake east or northeast of the point where it entered the lake. This process of erosion and deposition contributes to the maintenance of today's eastern Lake Ontario beaches.

Along the lake shoreline in the Towns of Richland and Sandy Creek, sand deposition was sufficient to create sand dunes during a time when lake levels were some 30 to 40 feet lower than they are today. In some places sandy beach areas as wide as 1 mile were exposed to the prevailing westerly winds.

Narrow

Figure 8

Map -

Ag Districts

A portion of these dunes (the only remaining ones associated with Lake Ontario) is still visible and active where they have not been excavated or developed. Because of higher present day lake levels and reduction in the recharge of sand into the lake due to man-induced shoreline stabilization, the processes that formed the dunes are no longer effective. Even now, recreational sand beaches at Southwicks, Selkirk Shores and Fair Haven are diminishing due to reduced sand deposition.

As a result, the aesthetic and recreational value of the sandy shoreline may be in jeopardy. Studies of the littoral migration of sand along the Lake Ontario shoreline show it is moving north along the Oswego-southern Jefferson County shoreline to a point off the shore south of Stony Point. There the sand is deposited in an underwater trough, its recharge cycle terminated.

The tremendous energy generated by wave action (especially during storm periods) has long been underestimated by many people hoping to stabilize and protect shoreline property against the erosive impact of wave action. The configuration of stretches of unconsolidated shoreline--be it till, clay or sand--can change drastically as the result of wave action driven by storm winds even for a brief period of time.

Figure 9 shows changes in configuration of the barrier beach separating North Sandy Pond from Lake Ontario in the Town of Sandy Creek. High water levels in 1973 during

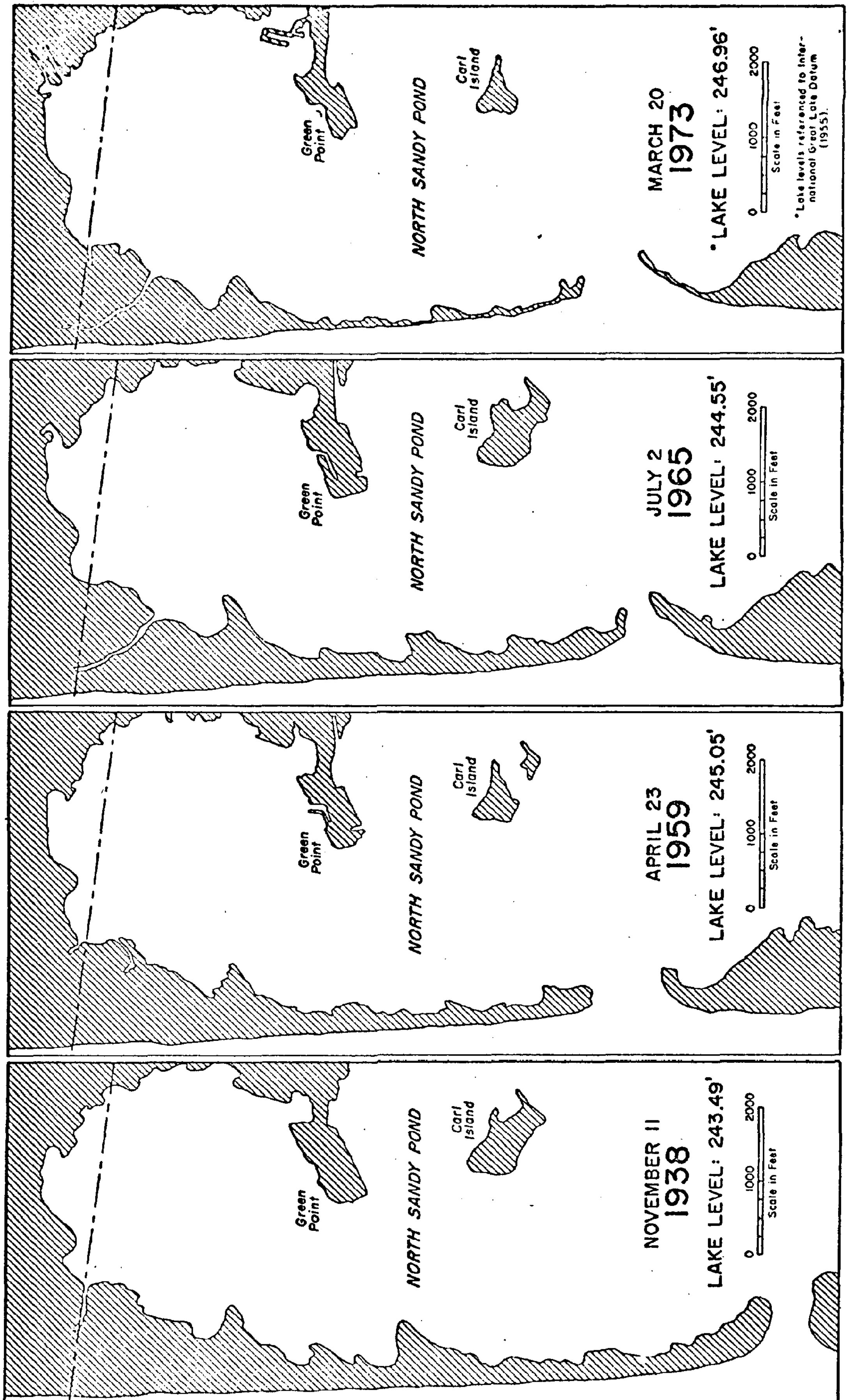

Figure 9. North Sandy Pond Barrier Beach Configuration Sequence, 1938–1973
(Source: St. Lawrence–Eastern Ontario Commission, 1975).

periods of storms nearly eliminated the north spit and over $2,000,000 was requested by Oswego County land owners to repair shoreline damage.

In the lake bluff stretches of Oswego County average annual shoreline recession rates as high as 2.35 feet per year have been computed. The average rate is not representative of the possible changes in the shoreline at specific points during high water or storm surges. The 2.35-foot average includes areas of relatively stable shoreline which do not recede noticeably, as well as particularly vulnerable stretches of shoreline which may be changed by tens of feet during a single storm. Most rapid rates have occurred in the Town of Richland, New Haven and Mexico, respectively. The high bluffs in the Town of Sterling are also actively receding due to wave action, upland weathering and other erosion elements.

Bedrock shoreline, while not as vulnerable to recession by wave action, does show the effects of centuries of shoreline weathering. Where the rock is low and flat extending into the lake, the surface is washed clean and broken edges are worn smooth. Where rock ledges exist along the shore, undercutting of the surface rock may occur if the underlying rock is less resistant, creating a recessional process.

Sandstone and granitic shoreline formations are considered relatively stable in terms of shoreline erosion. Limestone often has differential resistance to shoreline weathering and may yield either to undercutting or wave and

frost action. Upland runoff may cause vertical erosion and expansion of joints in limestone bedrock. Erosion along the vertical joints in the limestone shore formation in Hounsfield and Brownville give the shoreline a pillared effect visible from offshore at Pillar Point and the Sackets Harbor Battlefield.

The main extractable resource of surficial geological origin is sand and gravel for construction purposes and sand for molding in the foundry industry. Significant quantities of suitable sand and gravel for construction purposes occur in the Rural Hill areas of Jefferson County in the Town of Ellisburg. In addition, there are active sand and gravel operations in the Town of Cape Vincent near Cedar Point State Park and in the St. Lawrence Corners area of Clayton. Generally, sand and gravel operations in the four-county region serve a local demand, mainly for highway construction and maintenance.

In Oswego County, foundry sand from the Town of Richland is shipped as far as Watertown and Syracuse for industrial purposes. However, experimental use of synthetic molding materials is reducing the demand for molding sand in some industries.

5. Findings

. The geologic history of the St. Lawrence-Eastern Ontario coastal area produced slight to moderate surface relief, and a complex variety of bedrock and soil conditions. The principal mineral resources now exploited are crushed

stone (limestone), gravel and sand used for construction purposes. Demand for such material in nearby inland urban centers, such as Syracuse, will increase. Specialty sand (for foundry molding) is extracted from coastal dunes.

. Throughout much of the area, soil properties present a variety of developmental limitations that cannot be overcome by conventional construction techniques: high water table, bedrock at or near the surface, steep slopes, high erodibility, seasonal flooding and so forth. In many instances, particularly along the shoreline, these limitations have not been observed. Results include soil loss, property damage due to flooding or erosion, and water pollution due to inadequate waste disposal facilities.

. The area's soils vary widely in character and in suitability for agricultural use. Despite wide differences in how these soils can be managed, farming is a major land use throughout the area and a significant factor in the local economy. Prime farmlands, classified according to uniform national and state criteria, are widely distributed throughout the area. These soils have physical properties, such as growing season and moisture supply needed to sustain high yields economically under modern farming practices. Prime farmland does not predominate throughout most of the area. In many instances non-prime lands are also productive under proper management.

. Shoreline erosion and flood hazards pose a continuing threat to a substantial share of the area's coastline,

particularly when Lake Ontario is well above its long-term average water level. Study of a fifty-mile sample of the area's coastline showed that nearly $4.4 million damage to property was sustained over a 2-year period. That occurred despite landowners' expenditures of over $1.5 million for protective structures. This hazard is not adequately lessened by existing development controls in effect along the shoreline.

. Of nearly 470 protective structures examined in the study, over half were of only limited effectiveness in preventing property damage. Except in urban areas of high property values, the cost of a structure designed and built to provide permanent and effective shoreline protection is often greater than can be economically justified for most shoreline developments.

. Numerous shoreline properties were developed during periods of relatively low lake levels, and accordingly have been subject to increasing hazard during the present period of rising water levels. Applications to the Corps of Engineers for permits to build seawalls, groins and other protective devices in the St. Lawrence-Eastern Ontario area have increased annually(none in 1970 to 86 in 1975) as water levels have risen. As a consequence, a significant proportion of the area's shoreline is now essentially artificial (34 percent of Chaumont Bay, 28 percent of North Sandy Pond, 37 percent of Oswego County's lake shoreline). Cumulative environmental effects (on particle

transport, fish habitat) of these incremental changes are not now assessed.

C. Water Resources

The quality of water influences the resources of the St. Lawrence-Eastern Ontario area, just as use of those resources affects water quality. Understanding the cause-effect relationship is vital to solving present problems as well as preventing future problems.

1. Sources of Water Pollutants

Many of man's activities lead to the production of products and by-products which interfere with man's uses of the water environment.

Industrial activities often lead to the discharge of toxic chemicals. Nutrients, sediments and biocides result from agricultural activities. Thermal and nuclear power plants discharge heated waters and nuclear plants also release low level radioactive materials.

Municipalities and shoreline strip development add nutrients to waterways. Ships are a source of nutrients (via human wastes) and are also a potential source for spills of oil and other hazardous materials. Pollutants may be released directly to Lake Ontario and the St. Lawrence River or from the surrounding watershed through tributaries. Since 85 percent of the water entering Lake Ontario comes through the Niagara River, water quality of the other four Great Lakes affects Lake Ontario and the St. Lawrence River.

2. Consequences of Water Pollutants

Currents in Lake Ontario and the St. Lawrence River affect the distribution of pollutants. In general, net circulation in Lake Ontario is counterclockwise. However, local conditions vary due to wind direction and bottom and shoreline configuration.

a) Toxic Chemicals

Currently Lake Ontario receives, either through direct discharge from industrial plants or through its tributary streams, toxic waste material from the industrial development that has occurred in both this basin and the upper lake basins. Although most of the industrial wastes receive treatment of one type or another, toxic chemicals have reached the waters of Lake Ontario. While these substances may occur in minute amounts in the water, they are incorporated in the body tissues of aquatic organisms. The concentration is increased with each step up in the food chain (from plants to invertebrates to forage fish to game fish). Sport fish or waterfowl are near the top of a food chain and sustain a high concentration of a particular contaminant. Depending upon the species and contaminant, this process can lead to concentrations that impair normal reproduction or interfere with other vital processes.

In 1970 mercury was discovered at levels exceeding the limit established by health officials. In 1974 polychorinated biphenyls (PCB's) reached high enough concentrations in some sports fish that health officials issued warnings

about consuming these species. In 1976 mirex concentrations reached such high levels in six Lake Ontario species of sports fish that their possession was banned by New York State officials. The species included under the ban were coho and chinook salmon, lake trout, brown bullhead, black bass and catfish. In addition, the ban on possession included the alewife-herring family. In 1977 the ban was lifted for bullhead in Chaumont Bay and further revisions of the ban are likely. The full economic impact of the ban is unknown.

These are examples where the presence of toxic chemicals has directly impacted resources of Lake Ontario. Another example is the recent decreased reproductive success of herring gulls in Lake Ontario (Fox et. al, 1975). Research efforts have suggested the cause to be high levels of organochlorine and polynuclear aromatic compounds including several known carcinogens. Efforts are underway to isolate and identify, if possible, those compounds causing the problem.

The difficulty of identifying and controlling remote pollution sources of possible significance to the area is illustrated by another example. In recent years some Adirondack lakes have become too acidic for fish, and highly acid rain has been identified as a possible cause. Sources of the acid are not known, but most likely will be found in heavily urbanized mid-western areas. More recently, acid rainfall has been identified by the Tug Hill

Commission in areas tributary to eastern Lake Ontario. This increases the potential for vegetative damage, alteration of soil conditions, and impaired salmonid reproduction and survival. Due to dilution, no direct impact on coastal waters or habitat is likely. Indirect impacts could in time include increased stream silation (due to impaired upland plant cover) and additional pressures on coastal fisheries (due to loss of upland fisheries).

Progress has been made in reducing discharge of toxic chemicals through such efforts as state and federal discharge permit systems, construction of sewage treatment plants and international efforts such as those set forth in the U.S.-Canadian Water Quality Agreement of 1972. However, there is a lack of knowledge on the interactive (additive, synergistic, or antagonistic) effect of various chemicals. More research and management efforts are required if the problems are to be resolved.

b) Thermal Pollution

Thermal electric generating plants (powered by nuclear or fossil fuels) are a major source of heated waste water in this area. In Oswego County there are two operating nuclear power plants at Nine Mile Point and five oil fired plants in the City of Oswego. A third nuclear plant is under construction at Nine Mile Point and another oil fired plant in the city will soon be operational. Additional plants have been proposed at Sterling in Cayuga County and along the St. Lawrence River.

On the Canadian side, there are plants operating east of Toronto, with proposed. These plants, particularly those nuclear powered, require large quantitites of water for cooling purposes. The resulting discharge forms a plume (or area of higher water temperature) in the lake or river that spreads out in a manner determined largely by wind and current.

From 1969 through 1975 the area of the plume at Nine Mile Point Unit 1 which had at least 2°C rise in temperature exceeded 160 acres 30 percent of the time. A symmetrical 160-acre plume would extend approximately 2,365 feet offshore and 3,750 feet along shore.

EPA regulations require that thermal discharges must assure the "...protection and propogation of a balanced indigeous population..." (EPA, 1974). Existing plants are now attempting to show that they meet this requirement without more stringent thermal effluent limitations. New plants are required to construct cooling towers unless they can prove that this requirement is more stringent than necessary to meet the "...balanced indigenous population..." requirement.

The effects of discharges of heated water are still being studied. These studies include reduction in dissolved oxygen concentrations (warm water holds less oxygen), alteration of existing water currents, changes in associated water, wetland and littoral vegetation, and prolongation of open water in the winter. These conditions can

affect the plant and animal communities in the immediate area, but the nature and significance of such effects have not been satisfactorily established.

The Nine Mile Point area is an excellent area for salmonid fishing during the cold months. Thermal discharge areas in Lake Michigan have been popular and productive sports fishing locations. However, on-going study of Niagara Mohawk's Nine Mile Point nuclear power plants has not revealed any striking effects on fish species composition, distribution, growth habits or spawning.

Thermal pollution is also produced in other less obvious ways. For instance, upland development, farming and timber harvesting that have greatly reduced vegetation cover along the banks of cold water streams have historically caused increases in water temperature beyond the optimum levels acceptable to both native and introduced game fish. For that reason it is especially important that the need to maintain streamside cover be reflected in the land management practices in the watersheds of identified salmonid streams tributary to the coastal area.

c) Radioactive Wastes

There are three categories of radioactive wastes resulting from nuclear power plant operations:

1) High level wastes (liquids or solids too dangerous to be released in the biosphere, so they are contained in storage tanks underground),

2) Intermediate-level wastes (those with radioactivity high enough to separate out high-level or long-lived components and handle the bulk as low-level wastes), and

3) Low-level wastes (liquids, solids and gases that have very low radioactivity per unit volume, but are too voluminous to be contained completely).

Although precautions are taken, even the low levels of radioactive wastes released by these plants into the lake can be concentrated in the aquatic food chain. The wastes enter the environment in the form of radioactive isotopes or radionuclides, such as strontium-90. The accumulation of such materials can have detrimental effects on body tissues. Detailed federal studies on the presence of radioactive wastes have been started recently. Under study are various fish species, freshwater clams and muskrats. Elevated levels of radiation products have been identified in aquatic plants 3 miles downdrift from Nine Mile Point. However, at the present level of investigation, no problems have been identified in the St. Lawrence-Eastern Ontario area.

d) Organic Wastes

Organic wastes are most often indicated as contributors to the process of accelerated eutrophication, or aging. Eutrophication is a natural aging process in lakes whereby they progress from usually deep lakes with low productivity (oligotrophic) to shallower lakes, with increased productivity (eutrophic). A lake in the intermediate stage is called mesotrophic.

Eutrophication in nature usually takes hundreds of years, but organic pollution will accelerate this process. One of the primary activities that causes cultural eutrophication is recent changes in agricultural production whereby large quantities of nutrients are applied in the production of crops. Runoff carries a portion of these nutrients plus those present in animal wastes into the waters of the service area.

The other primary activity that has increased the rate of eutrophication is the practice of discharging improperly treated wastes from homes and seasonal cottages. There are now about 9,200 seasonal cottages in the service area. There has been a rapid increase in the numbers of seasonal cottages over the past 20 years. This combined with the abundance of soils incapable of fully absorbing domestic wastes has lead to large quantities of nutrients being introduced into the water of the service area.

These nutrients, especially when present in the shallower nearshore waters, result in increased growth of aquatic plants. Some of the areas where this growth has become a major problem are Little Sodus Bay; North and South Ponds; Chaumont, Chippewa and Goose Bays.

Weed cutting or chemical treatment can be used to temporarily reduce weed growth. Neither of these methods address the source of the nutrients and are therefore only short-term efforts to alleviate the problem. In addition, water usage must be curtailed for a period of time.

(generally two weeks) after chemical treatment.

Weed harvest (cutting plus removal from the water body) removes the weed growth and the nutrients contained in that growth. Although it does not affect the source of the nutrients, it does remove a portion of the accumulated nutrients from the water. Therefore, this method is the most advantageous where weeds are ~~currently~~ a problem. However, actions to reduce the inflow of nutrients is the most acceptable long-term solution.

Chemical applications to temporarily eliminate weeds have been used within the service area. Its effects on other aquatic organisms is not fully known, nor are its long-term effects on the water body ~~known~~. Until these effects are determined, this method is not advocated.

Accelerated eutrophication has also been observed in Lake Ontario as a whole. Substantial increases in the chemical content of the water have occurred since 1910, corresponding to a sharp increase in the rate of population growth in the Great Lakes Basin. Although still oligotrophic from a physical standpoint, it is considered mesotrophic in nutrient levels (especially phosphorus and nitrogen) and approaching mesotrophy is its phytoplankton and zooplankton populations.

The lake is still able to support populations of cold-water fishes (salmon and trout). However, tributaries to Lake Ontario have declined in water quality and are generally unfavorable for successful spawning of these species. Thus,

populations have to be maintained by stocking. If it were not for the depth of Lake Ontario and the resultant large oxygen reserves in the bottom waters, Lake Ontario's high nutrient levels and productivity would result in degraded water quality conditions similar to that of Lake Erie.

Efforts within the United States to limit nutrients from entering surface waters include construction of sewage treatment plants, education in the application of nutrients to soil to minimize loss, experimentation in disposal of farm and domestic wastes, and cooperation with Canada. Through the Water Quality Agreement of 1972, the United States and Canada agreed that all sewage treatment plants discharging over one million gallons per day into the Great Lakes system must have no more than 1 mg/l of phosphorus in their effluent. The State Department of Environmental Conservation has not yet included sewage treatment plants in the St. Lawrence River Basin in the phosphorus limitation and few plants in the Lake Ontario watershed are now meeting the requirement.

e) Pathogenic Organisms

The presence of pathogenic organisms in surface or ground waters can result in a health hazard if the water is used for water supply or contact water sports. As discussed in the previous section, improper disposal of domestic wastes is the prime means by which these reach waters in the service area.

New York State Department of Health recommends a 100-foot minimum distance from septic tank leach fields to a water body. However Health Department regulations do not require permits for developments of less than five lots, and DEC has jurisdiction over direct discharges. As a result, there is little control over individual sewage disposal systems along the waterways within the service area.

Additional efforts are needed to fully understand the process of nonpoint pollution and to develop feasible means of reducing it. These efforts are currently being undertaken in New York State under efforts funded through Section 208 of the Water Pollution Control Act Amendments of 1972.

f) Spills of Oil and Other Hazardous Materials

Due to the St. Lawrence Seaway along the St. Lawrence River, shipping activities occur about nine months a year. However, substantial efforts are underway to determine the feasibility of extending this to the entire year.

In the recent past, three major oil spills have occurred on the St. Lawrence River. The most recent spill occurred on June 23, 1976 when 308,000 gallons of oil were released after a barge grounded upstream of Alexandria Bay. With the extension of the navigation season, increased potential for additional spills exists.

The impacts of such incidents is not fully understood. Currently the Commission, through a grant from the United States Environmental Protection Agency, is attempting to

determine these impacts. However, additional efforts are needed in the area of developing techniques for preventing spills and for dealing with them promptly and effectively when they do occur. To date, the limited efforts have emphasized oil, but other hazardous materials which are regularly transported through the seaway should be considered.

g) Sediment

Runoff from agricultural lands, runoff from construction sites, and stream bank or lake shore erosion are the three primary sources of sediments that reach the surface waters of the service area. The importance of each of these varies by location.

Excessive sediment loads can have negative effects on nearshore waters. Aesthetically it makes the water displeasing in appearance and to an extent, limits its value as a recreation resource. This is ~~of~~ significance in the service area where recreation is a major segment of the economy, particularly in the summer.

Silt and other solids settle out of the water and can destroy the sand and gravel spawning areas of the smallmouth bass and rock bass by simply covering the areas with sediment. Fishery management studies have identified this condition in the Cape Vincent littoral waters, and it is probably occurring elsewhere. Silt can seriously affect the survival rates of eggs and fry by interfering with the water flow around eggs and reducing their oxygen supply. Spawning and nursery habitats of the majority of the area's

warm water fish species are vulnerable to such impacts.

In addition, large quantities of settling sediment can smother bottom organisms and upset the food chain in the area. If the organism disturbed is critical to higher organisms, the ability of the water to support higher organisms may be jeopardized.

Efforts to reduce sediment loads reaching water within the service area include efforts to improve agricultural land management techniques, regulation of activities on construction sites, and efforts to stabilize stream banks and lake shores where erosion is occurring. Success of these efforts has been somewhat limited to date.

3. Fisheries

Lake Ontario consists of two major areas: the central basin and the eastern basin. Most of the eastern basin is less than 300 feet deep and includes numerous islands and shoals, several major bay areas (Mexico and Chaumont-Black River-Henderson in the St. Lawrence-Eastern Ontario area), and is the major area for commercial and sports fishing. The St. Lawrence River is also particularly valuable to the sports fishery of the region.

a) Historical Background

During the late nineteenth century, a thriving commercial fishery developed in the Great Lakes, primarily for lake trout, whitefish, and lake herring. Other fish present in the lake were deepwater ciscoes (planktivores and bottom feeders), and sculpins, emerald shiner, and spottail shiner (forage fish).

Nearshore water populations varied, but areas of shallow water supported profuse communities of basically warmwater species such as sunfishes, bass, pike and perch. Species including lake trout, whitefish, ciscoes, and sculpins occupied the deep water of the Great Lakes. The Atlantic salmon was also present in Lake Ontario. In a little over one hundred years, the open-lake popualtions of Atlantic salmon, lake trout, lake whitefish and deepwater ciscoes have all but disappeared, leaving the lake populated mainly with the introduced smelt and alewife.

Major specific causes for the decline include overfishing of some species such as the Atlantic salmon, deforestation of the watershed for agricultural purposes (thus increasing detrimental sediments in the lake), and the introduction of the parasitic sea lamprey.[1]

b) Present Situation

The most abundant fish in the lake today are three introduced species; the alewife, rainbow smelt, and white perch. The alewife and rainbow smelt are found in appreciable numbers, living in the middle and upper waters from close to shore to regions of great depth. The bottom at medium depth is densely populated by slimy sculpins.

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[1]The Commission's technical report on the area's fishery gives a more complete review of the past and present situation.

Inshore areas are populated by yellow perch, northern pike, bullheads, white perch, sunfishes and other warmwater species.

The commercial fishery operating in the eastern lake has been considerably reduced as the stocks of desirable fish have declined. The area's commercial fishery involves one offshore fisherman operating out of Oswego and a few part-time trapnet fishermen operating out of the Chaumont Bay area. Total New York commercial harvest has declined from 5.5-million pounds in 1917 to a quarter million pounds in 1975.[2]

The ten most important fish species harvested in 1975 (based on value) were bullheads, yellow perch, American eel, white perch, rainbow smelt, sunfishes, rock bass, crappies, suckers and catfish. In contrast, in 1950 the bulk of the American commercial catch from Lake Ontario consisted of blue pike, cisco, lake whitefish and yellow perch.

In the New York portion of Lake Ontario, the commercial fishery has been secondary to recreational or sport fishing for some time. In Canada, fishery management was geared towards the commercial fishery until the late 1960's. With the stocks of valuable fish depleted and with population expanding along the lakeshore, sports fishing is now becoming increasingly important there also.

The sport fishery in the St. Lawrence-Eastern Ontario area is definitely more important economically. The commercial fishery involves a small group of people (by

[2]Great Lakes Basin Commission, Great Lakes Newsletter, XIX (6), July-August 1975.

law) and a relatively small amount of money in the area's economy. In contrast, the sports fishery encompasses many people and is estimated by the State Department of Environmental Conservation personnel to be a multimillion dollar resource.

There is an abundance of warmwater sport fishing throughout most of the area. The smallmouth bass fishery in the St. Lawrence-Eastern Ontario area is one of the most productive smallmouth bass fisheries in the state. Waters of the region also provide excellent angling for panfish, northern pike, yellow perch and muskellunge. Important warmwater fishing sports are North and South Sandy Ponds, Henderson Harbor, Chaumont Bay, Stony and Galloo Islands, Point Peninsula, Sackets Harbor and Cape Vincent.

Attempts are being made to re-establish an open-water fishery. The success of the salmonid stocking program in Lake Michigan has given new impetus for to establish a similar program for Lake Ontario. The abundance of alewife as forage and the reduced sea lamprey population, as a result of the lamprey control program initiated in 1971, set the stage for the introduction of the two Pacific salmon, the coho and chinook, in Lake Ontario in the late 1960's.

These introductions have succeeded in establishing a thriving fishery for the chinook and coho salmon which use the alewife as forage. Stockings of brown and lake trout and steelhead have also been highly successful.

Lake Ontario tributaries expected to become important salmonid streams include the Oswego and Salmon Rivers, South and North Sandy Creek, Skinner Creek, Lindsey Creek and Stony Creek. There is spring fishing for lake trout near Stony Point and for brown trout from Stony Point southward.

It appeared that the Lake Ontario salmonid fishery was off to a promising start. In 1976, however, the Department of Environmental Conservation (DEC) placed a ban on possession of coho and chinook salmon, lake trout, brown bullhead, smallmouth bass, catfish and members of the alewife-herring family due to mirex contamination. The ban has since been lifted on smallmouth bass in Chaumont Bay and further changes in the ban are expected. However, the future of the salmonid stocking program is in doubt because of the mirex problem.

c) Life Cycles of the Major Fish Species of the Area

The fishery resources in the St. Lawrence-Eastern Ontario area can be roughly divided into four groups: (1) the inshore, warmwater species (smallmouth bass, yellow perch, northern pike, brown bullhead, muskellunge, rock bass, white perch, pumpkinseed); (2) the open-lake, cold water species (lake trout, rainbow trout, brown trout, coho salmon, chinook salmon); (3) forage species (alewife, rainbow smelt, slimy sculpin, spottail shiner); and (4) other low value, "coarse" species such as carp and suckers. The American eel is also significant for its importance as a commercial species.

The survival and distribution of any organism is dependent upon the interaction of a set of complex factors, both biological and physical. There is always a range of conditions that the organism can tolerate, bounded by upper and lower limits beyond which the organism cannot survive.

In the life cycle of a fish, the most critical stage is during the period of reproduction. This is a time when environmental factors are likely to be limiting, because the eggs and newly hatched young are more vulnerable than the older and adult fish. Thus, an adult fish may be able to grow and survive in a body of water, but may be unable to successfully reproduce. This can be due to the lack of favorable spawning sites or the presence of unfavorable conditions for the survival of the eggs and young.

Intervention by man, in the form of stocking or rectifying the unfavorable conditions, would be required to maintain the survival of a fish population in this situation. Before attempts can be made to manage any species, it is necessary to know the organism's life history.

Table 19 summarizes the life cycle of major warmwater and cold water sport and commercial fish in the St. Lawrence-Eastern Ontario area, and identifies critical habitat requirements. Figures 10 through 15 indicate locations of important fish habitat.

d) Important Habitat Areas

The open-lake waters have fewer significant habitat areas for fish than inland and embayed areas. The open

Table 19. Life History Summary of Major Sport and Commercial Fish in St. Lawrence-Eastern Ontario Area

Specie	Adult Habitat Spring	Adult Habitat Summer	Adult Habitat Fall/Winter	Adult Food Supply	Spawning Period	Spawning Habitat	Young Habitat	Young Food Supply
				Warm-Water Fish[1]				
Northern Pike	Shallow weedy areas of creeks, wetlands	Weedy bays, slow moving rivers	Weedy bays, slow moving rivers	Vertebrates mainly fish	April to early May	Shallow wetland areas, weedy bays	Remain near spawning grounds, move out in July	Zooplankton, fish after one week
Muskellunge	Wetlands, weedy bays	Weedy bays, slow moving rivers	Weedy bays, slow moving rivers	Vertebrates mainly fish	Late April to early May	Shallow wetland areas, weedy bays	Remain near spawning grounds, move out in July	Zooplankton, fish after 3-4 weeks
Smallmouth Bass	Shallow inshore waters	Seek deeper water	1 to 30 ft. range	Insects, crayfishes, fishes	Late May to early June	Shallow gravelly bottom areas of lake, some streams	Same as adult	Insects, crayfishes by time they reach 50 mm length
Yellow Perch	Shallow inshore waters	Open lake in areas of moderate vegetation (under 30 ft. deep)	Under 30 ft. depth, school in lake, active all winter	Insects, invertebrates, fish	Mid-April to May	Shallows of lake and tributary rivers	Shallow water near vegetation	Insects, invertebrates
Brown Bullhead	Shallow bays, slow moving rivers	Shallow bays and streams	Open bays	Insects, leeches, worms, plant materials	April to June	Mud or sand in shallow water of lake and streams	Same as adult	Same as adult
Rock Bass	Shallow inshore waters	Shallow water, associated with bass	Shallow water, associated with bass	Aquatic insects, crayfishes, small fishes	Spring to early summer	Inshore gravel bottom areas	Same as adult but with more vegetation	Same as adult
Pumpkinseed	Shallow inshore waters	Cover of submerged vegetation	Cover of submerged vegetation	Insects and other invertebrates	Late spring to early summer	6-12 in. of water along lake shore with vegetation	Same as adult but with more vegetation	Same as adult
American Eel	Shallow inshore waters	Inshore shallow areas in vegetation	Inshore shallow areas in vegetation	Fish and invertebrates	Fall	Vicinity of Sargasso Sea	Drift in ocean for a year	Unknown

Table 19 (con't.)

Cold-Water Fish[2]

Specie	Adult Habitat Spring	Adult Habitat Summer	Adult Habitat Fall/Winter	Adult Food Supply	Spawning Period	Spawning Habitat	Young Habitat	Young Food Supply
Lake Trout	Move inshore, but away from shallows	Below thermocline	Move shoreward during fall	Alewives, smelt, sculpin	September to November	Rocky shoals at depths less than 120 ft.	Seek deep water within one month	Sculpins
Rainbow Trout	Close to shore, in and near spawning streams	Scattered throughout lake in thermocline area	Move inshore in fall, some ascend stream with salmon	Bottom invertebrates, plankton, forage fish	Mid-April to late June	Tributary streams with fine gravel areas	Move to lake immediately or remain 1 to 2 years in the stream	Crustaceans and other bottom invertebrates
Brown Trout	Very close to shore	Move just offshore in preferred temperature range	Move inshore with cooling temperature, congregate in shallow bays and streams	Alewife, insects	Late fall to early winter	Shallow, gravelly headwaters	Same as adult in the lake	Aquatic and terrestrial insects and larvae, crustaceans
Coho Salmon	Inshore at first, later moving offshore into the open lake	In the open lake, schooling at the thermocline	Move inshore to parent streams, ascend streams to spawn and die	Smelt, alewife, invertebrates	Early September to early October	Parent streams, shallow, gravelly areas of tributaries	Remain in streams until smolt stage, move into lake during second spring	Aquatic insects and larvae, small fish
Chinook Salmon	Scattered throughout open lake	Open lake where thermocline meets bottom	Move inshore to spawning streams, spawn and die	Smelt, shad, invertebrates	October to December	Parent streams, larger rivers or tributaries	Move to the lakes as fingerlings during first summer	Invertebrates mainly insects

[1]These species are found both in Lake Ontario and the St. Lawrence River and all spawn successfully in nature.

[2]These species spend most of their lives in Lake Ontario. A limited amount of successful spawning probably occurs with the lake trout, rainbow trout and coho salmon. Brown trout and chinook spawnings are not usually viable.

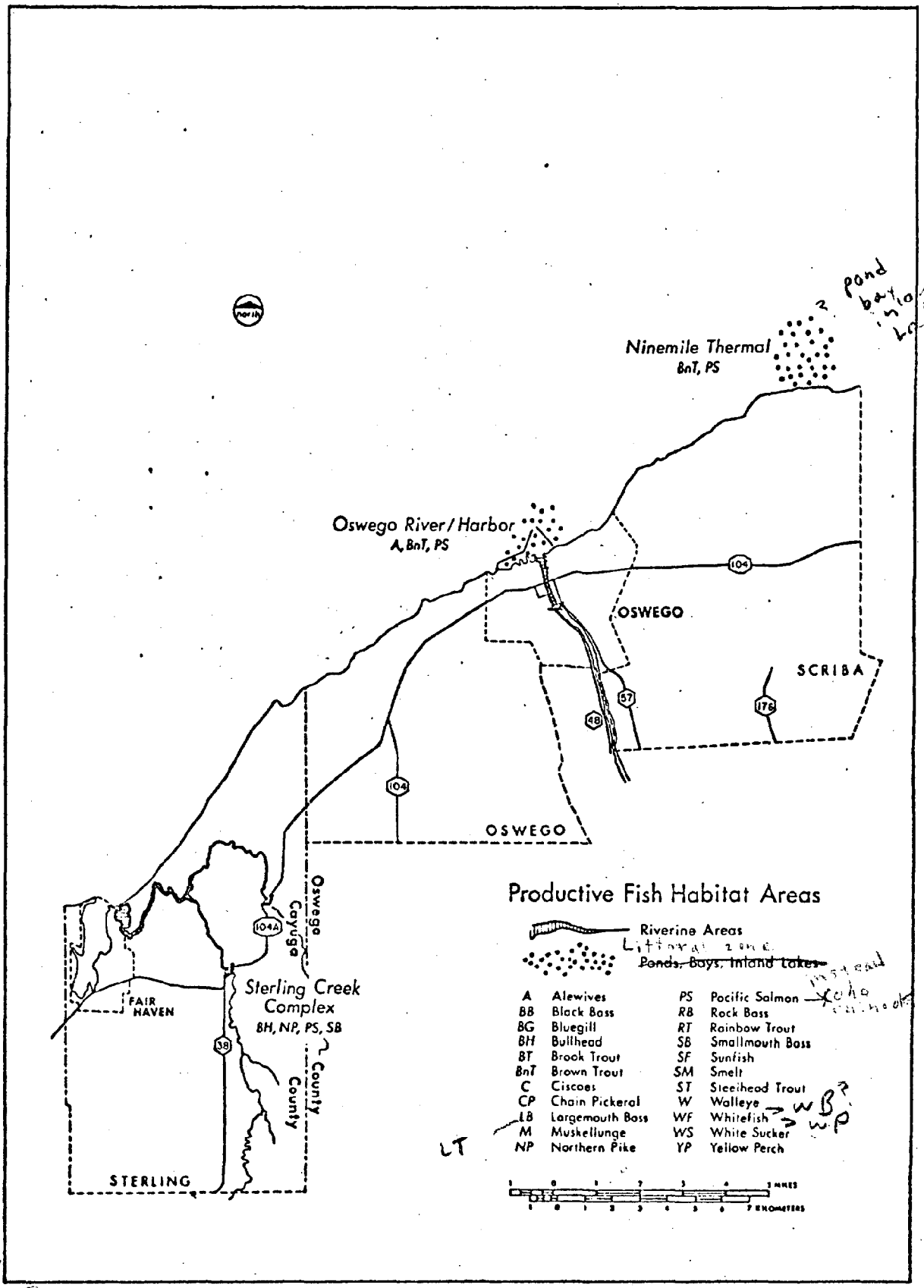

Figure 10.
~~II-E-1~~ Productive Fish Habitat Areas: Sub Area I

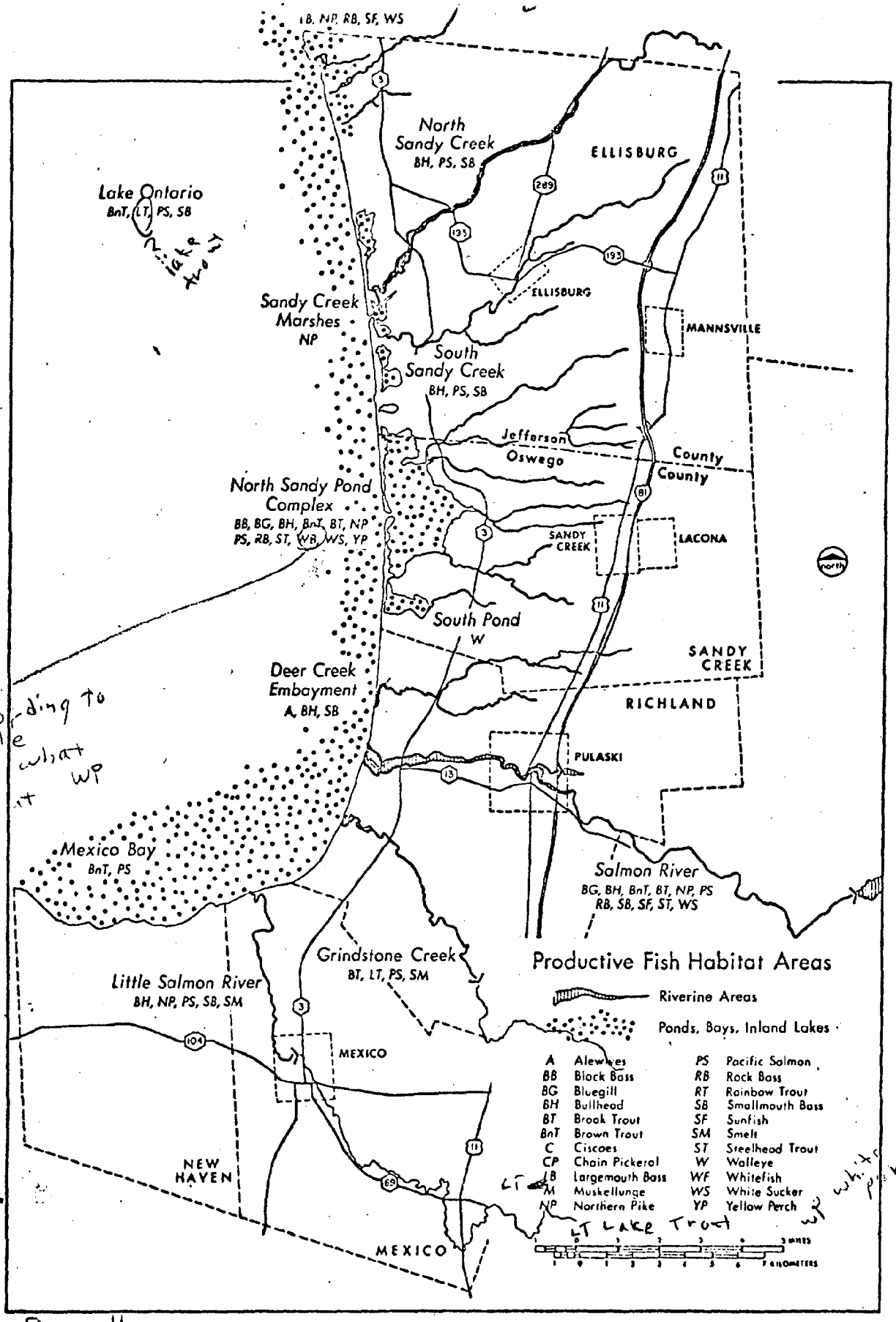

Figure II.

~~II-12~~ Productive Fish Habitat Areas: Sub Area II

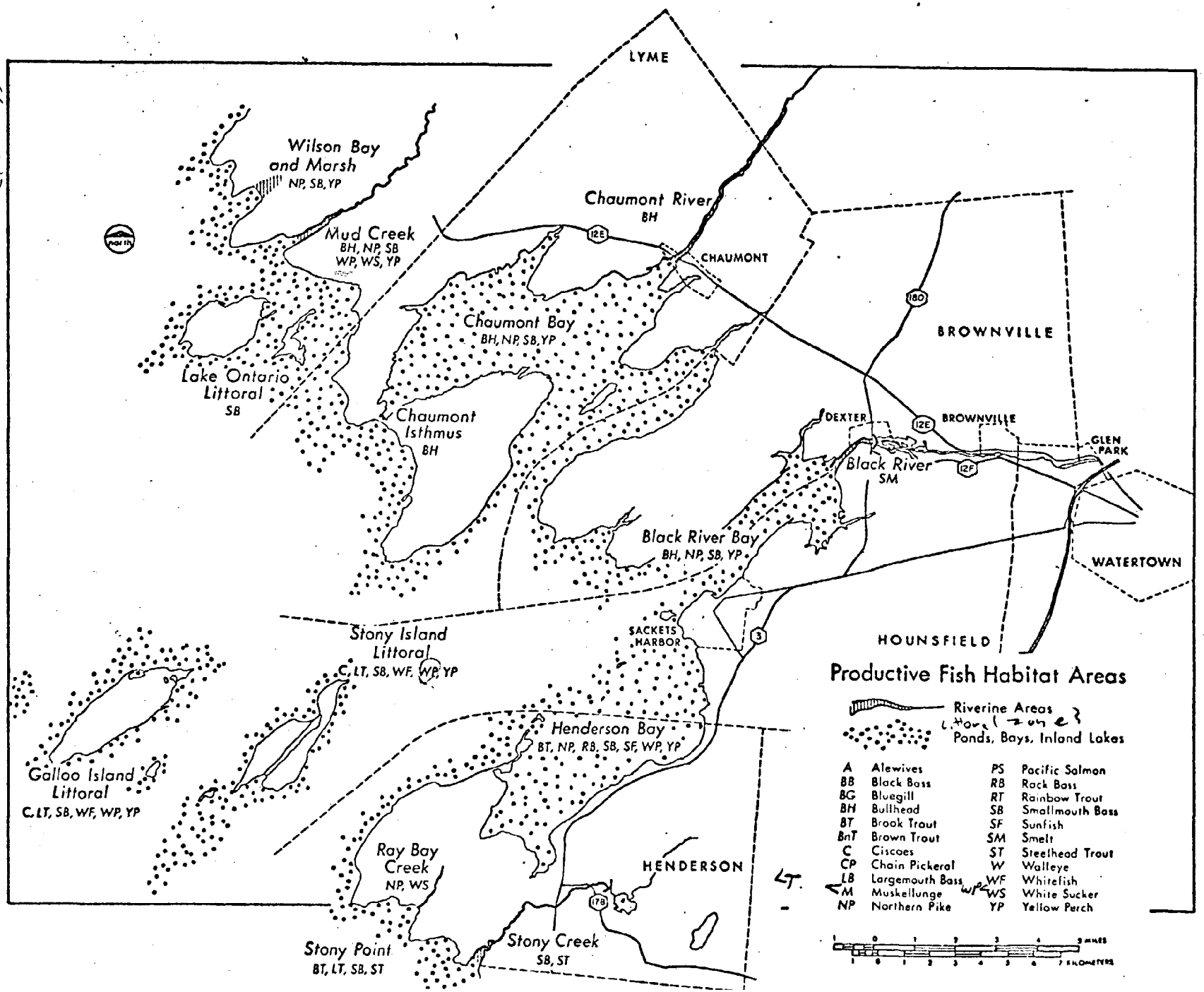

Figure 12.
Productive Fish Habitat Areas: Sub Area III

III-87

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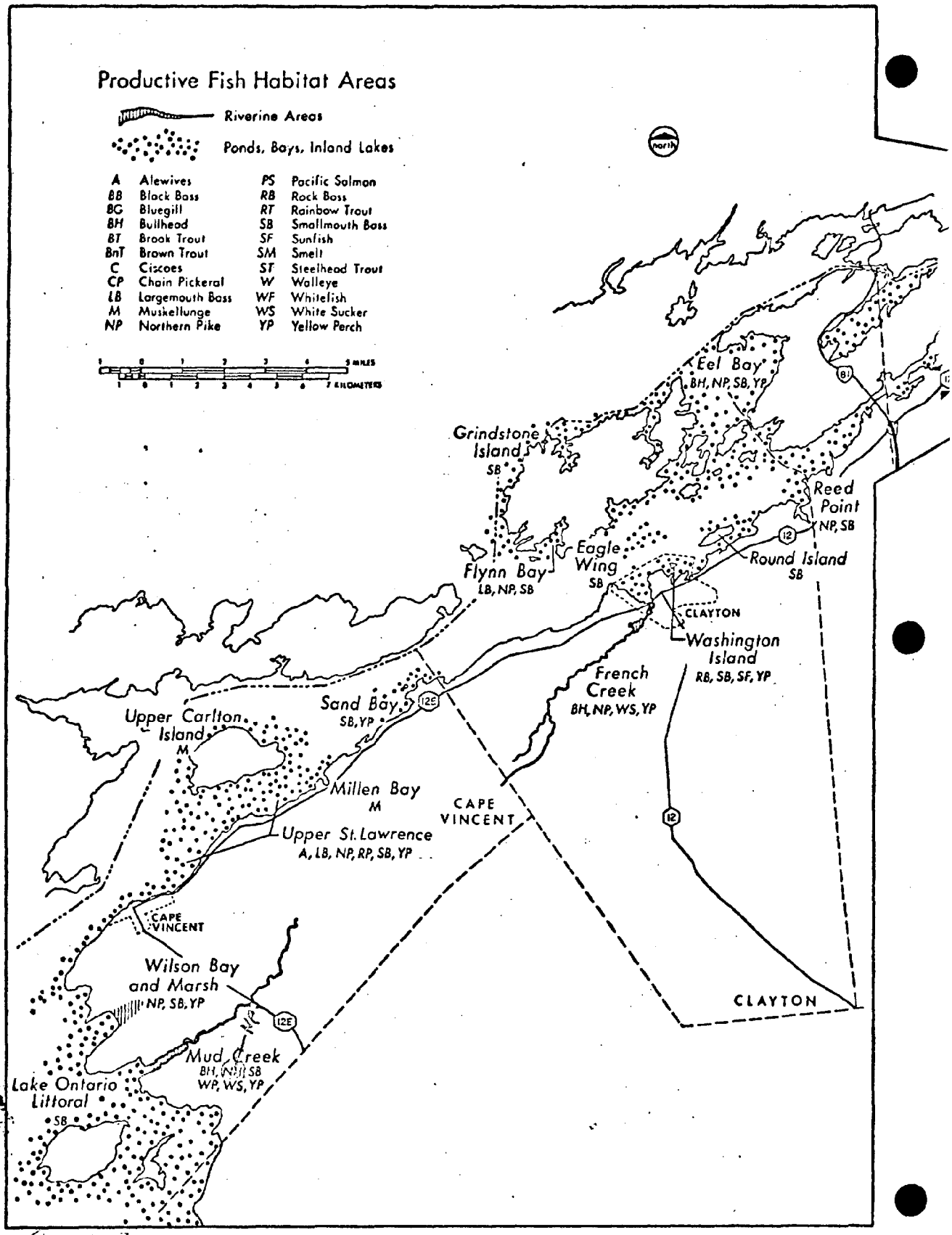

Figure 13a.

~~II-E-4~~ Productive Fish Habitat Areas: Sub Area IV, Upriver Section

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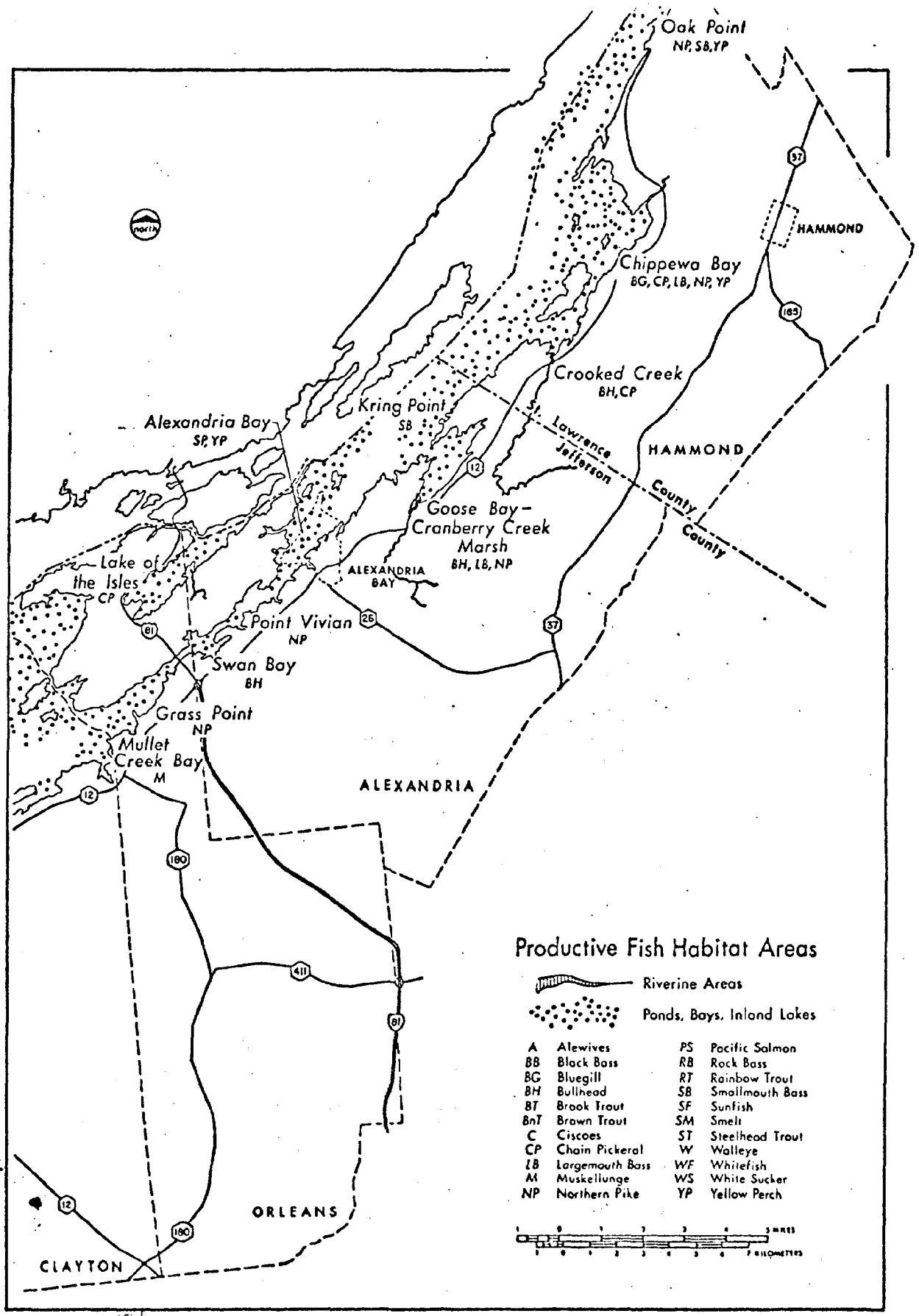

Figure 13b.

~~III-24~~ Productive Fish Habitat Areas: Sub Area IV, Downriver Section

Figure 14.

Productive Fish Habitat Areas: Sub Area V

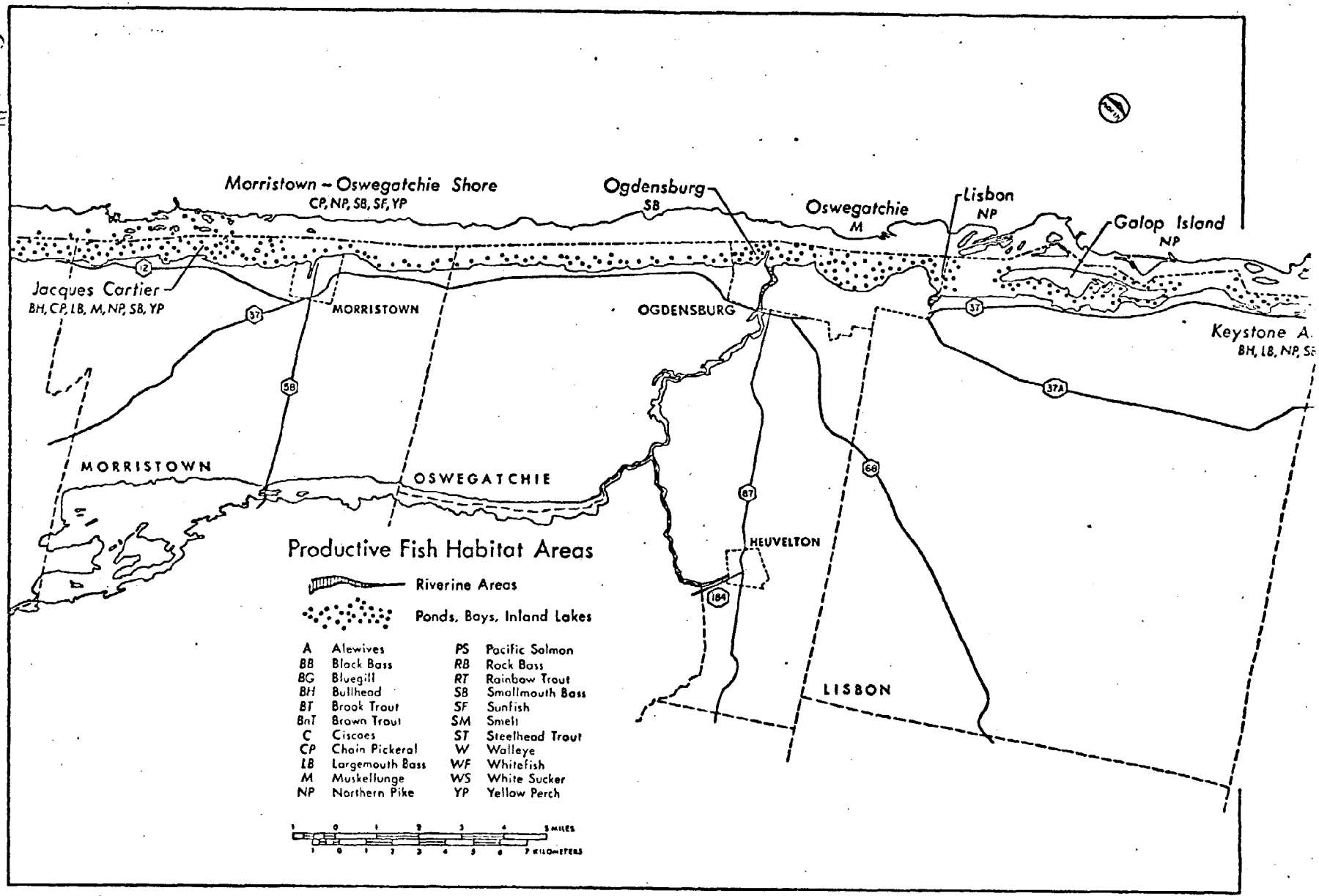

Figure 15.

Productive Fish Habitat Areas: Sub Area VI

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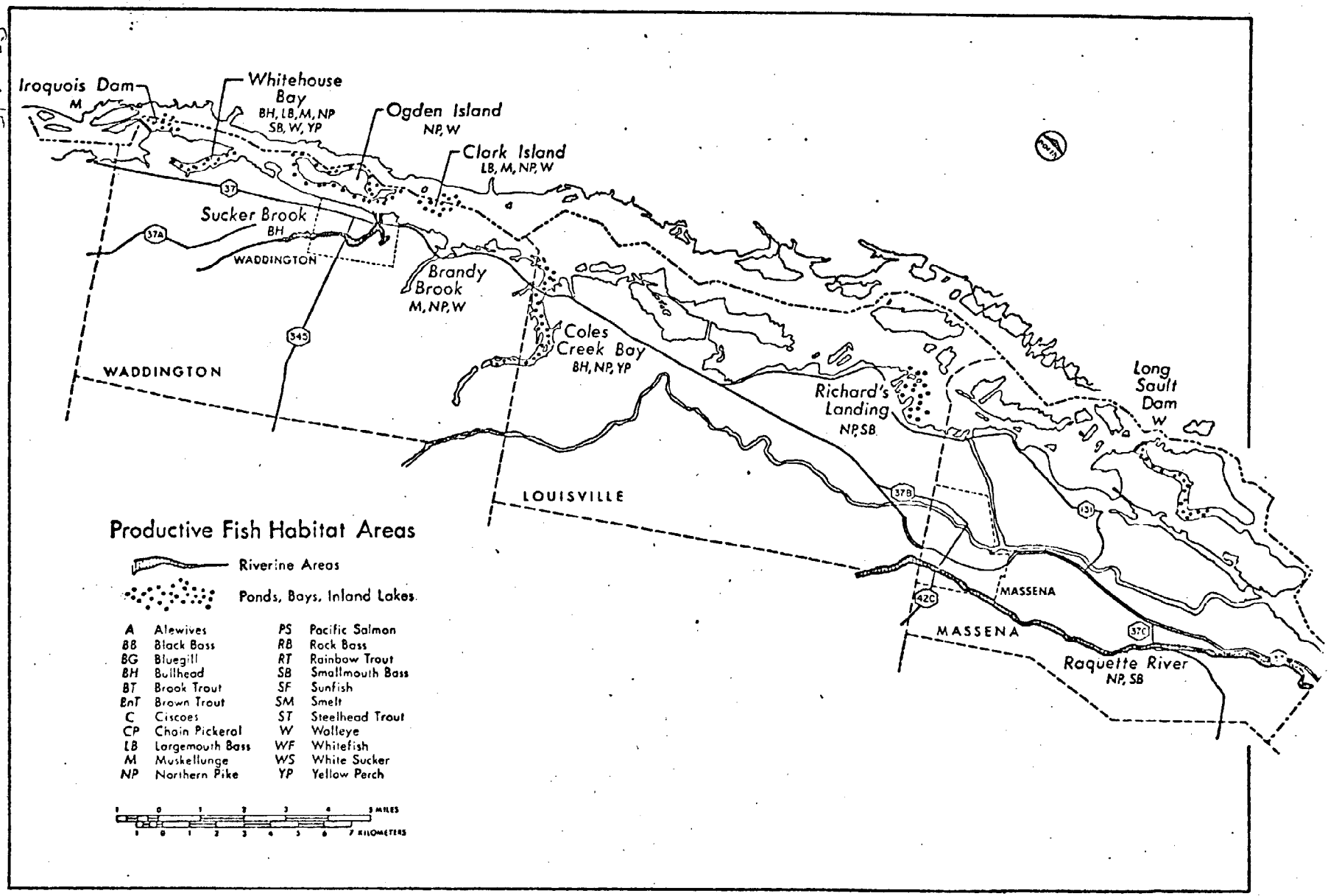

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lake offers little protection from wave and wind action during crucial periods in fish life cycles. Most of the area's productive fishery habitat is located in the lake and river tributaries, bays, and in coastal ponds and wetlands (see Figures 10-15).[1]

Fish require a specific habitat (as indicated in the life history summaries) as well as tolerable water quality conditions. Both water quality and habitat quality in the St. Lawrence-Eastern Ontario area have been deteriorating since man first settled the region.

e) Habitat Quality

As discussed above, there are several habitats required for the full cycle of a particular fish species' life. The most important is the presence of adequate quality spawning habitat, since without it the population cannot survive. Warmwater fish of the region are especially dependent upon suitable spawning habitat to ensure an abundance of fish. Currently, the lake's cold water fishery is being maintained by DEC through stocking because trout and other salmonids no longer find sufficient suitable spawning ground to sustain naturally abundant populations.

For warmwater species there is a wide variety of spawning habitats in nearshore lake waters, streams and

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[1]More information on fish habitat including maps of fish concentration areas, fishing areas and other significant areas is included in the St. Lawrence-Eastern Ontario Commission's technical report on the area's fishery.

wetlands. Smallmouth bass, yellow perch, brown bullhead and pumpkinseed all use inshore habitat and some streams to spawn. Northern pike and muskellunge spawn in wetland areas, usually near the mouths of tributaries of Lake Ontario and the St. Lawrence River and in bays along the lakeshore.

The potential harm of these changes in the area's sports fishery is great. For instance, the smallmouth bass population is actually composed of local populations which remain within a short radius of their spawning area. If it is destroyed, the local segment of that particular fishery will be destroyed. The famous northern pike fishery of the Thousand Islands area and in the lake from Cape Vincent to Henderson Harbor is vitally linked to the wetlands along that sector of the shoreline.

Besides providing spawning and nursery grounds for many of the area's warmwater sport fish, the littoral waters and wetlands also produce habitat and food for forage species and for the predator fish of the lake and river.

Reduction of wetland areas has historically occurred at a high rate. In New York State as a whole in 1959, major state-owned wetlands constituted approximately 39,000 acres (42 percent of all wetlands of high to moderate productive value). Of these, 1,041 acres were physically destroyed between 1959 and 1967. During the same period, construction on adjacent uplands caused over 17,500 acres (45 percent of state holdings) to sustain significant loss of fish and wildlife values.

In the St. Lawrence-Eastern Ontario area, 18,400 acres of productive wetlands were identified in 1959. Of these, 47 percent sustained wildlife loss attributed to the shoreline disturbances between 1959 and 1967. The state Department of Environmental Conservation is now conducting a wetlands inventory for all wetlands over 12.4 acres.

Streams are almost as important as the lake itself for the sport fish of the area. Most of the salmonid fishing at the present time is a stream fishery. Almost all the coho, chinook and steelhead in Lake Ontario are stocked in streams which is where the fish return in their spawning period. Thus, it is in the streams where most are caught.

Streams provide spawning sites for fish during spring. Northern pike run upstream in search of wetlands and flooded plains, while smallmouth bass search for protected gravel beds which may not be available in some parts of the lake. The Mexico Bay coastline, for example, offers little suitable spawning habitat in many areas. Large numbers of spawning fish use the tributary streams, which are very suitable for nesting. Brown bullheads run the streams in large numbers in early spring in search of food and spawning areas.

Of 55 tributaries of the St. Lawrence River originally recognized by New York biological surveys conducted in the early 1930's, only 18 remain of any value to the river fishery. The others either no longer exist or are of little value. Of 45 Lake Ontario tributaries originally recognized,

26 no longer exist or are of little value. This leaves 19 tributaries with some value to the fishery. These environmental changes can be attributed almost entirely to upland practices such as channelization, diversion and wetland drainage. As a result, year-round stream flows are no longer sustained.

4. Findings

The quality of the area's coastal waters is affected by its location at the outlet of the Great Lakes Basin. The Niagara River contributes about 85 percent of total inflow to Lake Ontario, and a substantial proportion of its dissolved pollutants. Other external impacts on the area's coastal waters originate elsewhere in the Lake Ontario Basin: at coastal metropolitan/industrial centers and tributary rivers. Because Lake Ontario's predominant circulation is counter-clockwise, pollutants entering the lake from sources west tend to be carried toward the St. Lawrence-Eastern Ontario area by the prevailing currents. This may be illustrated by the distribution of mirex in lake bottom sediments, since highest concentrations have been found along the south shore from the Niagara River mouth to Oswego County. These external influences on the area's water quality can produce conditions of great local concern (such as the current fishing restrictions), but they cannot be effectively addressed by local agencies or residents.

The Great Lakes system as a whole contains a vast amount of water relative to the amount added by

precipitation and tributary streams during any given period of time. As a result the system is very stable, with changes in levels and flows responding slowly to changes in supply. This is equally true of Lake Ontario. Its water level rises or falls slowly in response both to changes in precipitation within the Ontario Basin, and to changes that occurred previously in the upper lakes. Channel improvements in the St. Lawrence River, required for commercial navigation, have served to permit the regulation of river flow. The International St. Lawrence River Board of Control controls the river's flow (and thus affects Lake Ontario levels) for purposes of navigation and hydroelectric power generation. These two interests are effectively represented on the responsible regulatory agencies. In operation, the regulatory system moderates the occurrence of extreme lake levels (high or low) but does not preclude lake level movement through a range of several feet. The extremes of record occurred prior to construction of the Seaway, but extreme highs may exceed the nominal upper limit prescribed by the Plan of Control of the International Joint Commission.

. The quality of coastal waters in the area is influenced by the discharges of major tributary streams. Industrial and municipal wastes have at times significantly depleted dissolved oxygen in the Oswego River. This has produced fair to poor water conditions in the harbor which is classed as a "problem area" by the International Great Lakes Water Quality Board. Harbor sediment is polluted,

making it more difficult to satisfactorily dispose of dredged materials which must be removed to maintain navigation depths. Black River Bay is also classified as a "problem area" by the International Great Lakes Water Quality Board, with paper mill and municipal discharges the major sources of pollutants.

. Excessive growths of algae and weeds appear in many of the area's inlets and bays. These detract from activities such as boating, recreational fishing, and swimming, which are the dominant uses of these waters. Excessive plant growths are detrimental to the habitat of some fish species, and plant decay may reduce dissolved oxygen below tolerable levels. Such plant growths are made possible by an excess of available nutrients (notably phosphorus) in the water. Principal sources of these nutrients are wastes from shoreline or streamside settlements, municipal waste disposal systems and runoff from upland farms and woodlands. These are conditions that may be controlled by local effort. Problem areas include: Little Sodus Bay, Chaumont Bay (including Sawmill, Guffin and Three Mile Bays), and river areas such as Goose and Chippewa Bays and Lake of the Isles. In varying degrees, development of eutrophic conditions in such waters is also aided by their configuration which restricts circulation and the flushing action by lake or river currents.

. Wetlands have a beneficial effect on water quality because they act as a natural filter and settling basin to

help remove pollutants. Many wetlands have been lost and many others are losing their capability to perform ~~their~~ beneficial actions.

. The impacts of thermal pollution and discharge of radioactive materials into Lake Ontario are not fully known. This is a serious shortcoming in light of the potential for further development of electrical generating facilities in the service area.

. Municipalities are a major source of pollutants. Some municipalities are not served by treatment plants while some existing plants are inadequate since storm water is not separated from waste water resulting in overtaxed systems during periods of heavy rain.

. Nutrients, pathogenic bacteria and viruses enter the waters of the service area due to inadequate treatment of wastes. This inadequate treatment can occur because the soils do not have the capability to filter wastes entering from individual sewage disposal systems.

. Evidence of decreasing water quality are present in the St. Lawrence-Eastern Ontario Commission service area. Major examples are the current ban on possession of certain sports fish, existence of large weed beds, occurrence of oil spills, and the loss of spawning beds of some sports fish.

. There is insufficient data on the quality of the waters within the service area. A comprehensive program to obtain this data has not been established.

. In the St. Lawrence-Eastern Ontario area, the original stable fish community has been disturbed by the actions of man. Pollution, over-fishing and habitat destruction have resulted in an unstable fish community dominated by two forage fish (alewife and rainbow smelt) and lacking many of the original open-lake predators. Productive fisheries (especially for cold water species) can now be sustained only by management. Current management programs for the region's fishery have been hindered by a lack of comprehensive information on population dynamics, fish community relationships, and the location and status of critical habitat areas.

. Toxic wastes entering Lake Ontario and the St. Lawrence River have produced significant damage to the area's fisheries. In many instances, timely control by responsible public agencies has been prevented by inadequate information as the the presence, sources and environmental consequences of such materials. Effective control will require a multi-state and an international effort.

. A variety of habitat types are necessary for maintenance and development of the area's sport and commercial fisheries. All are susceptible to damage or destruction by natural processes and by man's activities. Natural processes can be controlled to some extent and man's activities can be regulated. During the past forty years, most of the area's minor tributaries of former fishery value have been destroyed primarily by incompatible upland land use. Much

of the area's productive wetlands have been destroyed during the past twenty years as a result of dredging, filling and adjacent incompatible development. Excessive growth of aquatic plants in nearshore and embayed waters adversely affects fish habitat and interferes with normal harvest operations. Sediment from upland and shoreline erosion damages spawning and nursery habitat of several species in nearshore waters.

D. Coastal Plant and Animal Communities

The coastal land-water environment is a dynamic and diverse system, and includes habitat for a wide variety of plant and animal species. It supports living communities, each harboring distinct groups of wildlife and plants which interact with each other and their environment in complex, sometimes unique, ecosystems.

Human influences have modified this environment in numerous ways: altering the extent and character of native communities, eliminating some species, altering the population levels of others and introducing adaptable plant and animal species. Significant "natural" areas of the coastal region are often inherently unstable. Identification of values that warrant some form of protection is a difficult process, frequently compounded by a lack of reliable or comprehensive information.

1. Habitat Types

The Commission has established five general classes or habitat types comprising important natural areas in the St.

Lawrence-Eastern Ontario area: the littoral zone, coastal ponds and embayments, wetlands, upland forests and mixed upland cover. Individual sites often include features characteristic of more than one habitat type.

a) Littoral Zone

The littoral zone is an area of shallow water in which sunlight can penetrate to the bottom. Depth of light penetration through water is influenced by such factors as water color, turbidity, sediment load and the presence of weeds or algae. For the purposes of this report, the littoral zone is assigned a uniform range of water depth of between 0 and 30 feet in nearshore areas of Lake Ontario, the St. Lawrence River and around outlying islands and shoals. Portions of such areas are among the most biologically productive regions of the lake, river and adjacent uplands. Littoral zones are rich in plant and animal life and are an essential habitat for the area's sports fish species (as described in Section C). Additionally, these areas produce food used by land animals and by birds occupying nearby shoreline and upland areas.

b) Coastal Ponds and Embayments

Coastal ponds, embayments, inlets and harbors serve as feeding and loafing areas for migratory waterfowl and shorebirds during their spring and fall passages, as well as for summer and winter resident species. Certain areas are heavily used and for that reason, the food sources there require protection.

c) Coastal Wetlands

Wetlands exhibit soils that are seasonally or persistently waterlogged or inundated, and that support specific aquatic and semi-aquatic flora species. Biomass in wetlands is generally higher than that obtained in more terrestrial and in many aquatic ecosystems. Wetlands serve as: holding basins for flood waters; recharge areas for ground water supplies; filters of sediment carried by tributary streams; breeding and nursery areas for waterfowl, shorebirds, fish, furbearers, and many reptile, amphibian and insect species; foraging and loafing areas for birds and terrestrial wildlife species; and centers of recreation activity for non-consumptive naturalist and consumptive hunting and fishing pursuits.

Although there are specific hydrologic, physiographic, and adaphic prerequisites, the flora species composition and the area of open water are key factors influencing composition of the fauna species community that will use a given wetland.

d) Upland Forests

Few upland forests in this coastal zone are harvested for sawlogs or pulp. The higher volume of timber harvested in the coastal zone appears to be in the southerly portions of the region. Foresters operating under the NYS Forest Practice Act note that coastal zone woodland owners generally emphasize such values as scenic quality, shade, windbreaks and wildlife habitat, rather than wood fiber

production. Coastal uplands (for example, the barrier dunes of the Mexico Bay area north to Stony Point) forest stands valuable for those reasons.

e) Mixed Upland Cover

Mixed upland cover types include a variety of vegetative characteristics that, in combination, comprise several important habitat areas along easternLake Ontario and the St. Lawrence River. Such areas include: agricultural and adjoining lands providing food and cover for wildlife; the dune complexes with their bare sand, plants, forests and associated wetlands and aquatic systems; shoal areas comprising emergent and subsurface land areas in the lake and river; and the bluffs along the lakeshore.

2. Critical Areas

Over 200 specific sites of notable value for coastal plant and animal communities have been identified in the St. Lawrence-Eastern Ontario area, with all five habitat types represented. Over half of such sites have been classified as "critical areas" for one or a combination of reasons. Evaluative factors used in identifying critical areas include: species abundance, biological productivity, vulnerability to destruction and restoration potential. As a result of this analysis, four types of critical areas are distinguished in this report.

a) Wildlife Concentration Areas

Wildlife concentration areas (WCA's) are sites that are seasonally occupied by relatively large numbers of a fauna

species. Examples include: waterfowl wintering areas in the open waters of Lake Ontario; areas occupied by wintering arctic birds of prey in the lake plain sections of northwestern Jefferson County; and deer wintering areas of Stony Point, in the Ashland Wildlife Management Area and in the vicinity of Selkirk Shores State Park. Habitat areas of this sort are essential in sustaining the populations of various nonresident species and of some species that, although resident, occupy other habitat areas (or disperse) during other seasons. The period of occupation is one of several weeks or months. Such areas can be distinguished from those found along bird migration corridors, in which spring and fall populations are more or less in continuous motion.

b) Exceptional Ecological Areas

Exceptional ecological areas (EEA's) identified in this report include a number of wetlands, bogs, forest lands and bird habitat areas. They are distinguished from other similar habitats by such factors as: unusually high species diversity, abundance, age, size and biological productivity; the vulnerability of the site to nonessential and incompatible development; the presence of unusual or interesting species in the natural community; and the actual or potential occupation of the site by native species recognized as rare, threatened, endangered or extirpated.

c) Unique Ecological Areas

Unique ecological areas (UEA's) are identifiable as exceptional ecological areas, but in addition are occupied by one or more flora/fauna species that occur nowhere else or very rarely in the area. To illustrate the diversity of these sites, examples include: the Pitch pine forest tract south of Plessis in the Town of Alexandria; mature deciduous forests (of the northern hardwoods and central hardwoods associations) found at scattered locations throughout the area; natural White spruce stands in north-western Jefferson County; an active Turkey vulture breeding site on Picton Island; the Ironside Island Great blue heron rookery; the Henderson high banks; a number of bogs; Derby Hill (of unequaled richness during bird migration); sites of Upland plover breeding habitat; some White pine groves; Oswego Harbor (major wintering area for wide variety of waterfowl, including Double-crested cormorants); and the North Sandy Pond natural complex (marsh, open water, islands, barrier dunes and upland forests).

d) Rare, Endangered, Threatened and Extirpated Native Species

Sites in this category (RETE's) provide potential or occupied habitat for native species identified as protected, endangered, rare, threatened or extirpated from the area. Information concerning such species was obtained from the U.S. Fish and Wildlife Service's "United States List of Endangered Fauna," the "List of Protected Native Plants in

New York State," the Aububon Society's avifauna "Blue List," and unpublished lists supplied by authoritative naturalists throughout the region. Included in this category are confirmed occupied or potential habitat for such species as: Peregrine falcon, Blackcrowned night heron, Upland plover, Pine warbler, Bog turtle, Indiana bat and other fauna, as well as several protected flora species.

Rare, endangered, threatened flora and fauns species may be considered to be declining or in danger of disappearing from the area. Such species are often referred to as "red-listed" or "blue-listed." Red-listed species are treated as those "extirpated from or in immediate danger of extirpation from an area." Blue-listed species are those considered "declining or uncommon in an area, and which should be watched to ascertain their status and the status of restricted habitat." In St. Lawrence-Eastern Ontario coastal areas there are some 80 fauna species and many protected flora species that may be considered red- or blue-listed.

Seventy-six bird species native to the region have been identified as red- or blue-listed. Three reptiles (the Bog turtle, Massasauga snake and the Timber rattler) and one mammal (the Indiana bat) are species whose habitat is included in the RETE category, as are protected flora that are natural to the area. A great many of New York's protected flora are often found in the wetland and bog communities located throughout the area.

3. Resources for Management

Management responsibility for the coastal area's significant flora and fauna resources is dispersed among a large number of public agencies and private interests. This responsibility may arise from either land ownership or statutory authority, and is exercised with varying degrees of effectiveness.

Ownership of property may be the surest means for exercising control over its use (subject at least to normal limitations required for the public health, safety and general welfare). For that reason the owners (individuals and institutions) of the critical areas (WCA's, EEA's, UEA's, RETE's) identified in the St. Lawrence-Eastern Ontario coastal area have a fundamental responsibility for safeguarding these significant natural resource values.

How this responsibility is exercised is largely determined by the land owner's dominant objectives or interests: the way he uses or wants to use the property. The owner's land use objectives can be compared with the Commission's objective 15 on this subject:[1] "protect, or enhance...shoreline and upland habitat for both resident and migratory species, areas containing rare or endangered plant species or exceptional stands of representative coastal plant communities." The more closely these are in agreement, the more likely it is that the property will be

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[1]See the St. Lawrence-Eastern Ontario Commission's Technical Report #1, Coastal Resources--Goals and Objectives (1976).

managed in accordance with the Commission's objective. Otherwise, such resources may be endangered. In that case, other means such as a statutory authority may be employed to resolve or moderate the use/resource conflict, if protection of the critical area is a sufficiently high priority at that particular date.

A comparative scale shown in Table 20 illustrates the degree of agreement between the Commission's and land owner's objectives on this subject.

Evaluation of coastal properties in this way may identify the likelihood of conflict between present or potential developments or uses and the need to protect critical areas of wildlife habitat. This is in fact an aspect of the normal process of environmental impact assessment, such as for electric generation plant sitings under Article VIII of the Public Service Law. In that instance the utility's primary objectives may minimize protection of natural resource values. Therefore, these values are protected to the extent practicable by statutory authority. Similarly the Commission, under its project review responsibility, must identify the manner in which a proposed development project would affect significant natural resource values and, if possible, persuade the developer to proceed in a supportive rather than adverse manner.

4. Findings

. The St. Lawrence-Eastern Ontario area is most distinctive in its variety of flora and fauna communities. With

Table 20.

Extent of Agreement between SLEOC General Objective 15 and Individual Land Owners' Objectives and Practices	Selected Examples
Identical	Private: The Nature Conservancy (Ironsides Island, El Dorado Beach Preserve). Public: NYS DEC (Lakeview Wildlife Management Area)
Supportive	Private: E. J. Noble Foundation (Wellesley Island properties, managed with an intent to preserve an exceptional woodland). Public: NYS OPR (management policy formulated to protect scarce plant species on its parks' properties).
Indeterminate	Private: Phillips Petroleum Co. (Little Galloo, Calf and Stony Islands, on which maintenance of high wildlife values depends upon the nature and intensity of any future development). Public: PASNY (some River properties dedicated to wildlife conservation, but operational requirements influence Lake levels in manner that may be detrimental to coastal wetlands).
Adverse	Private: Whitehead Enterprises, Inc. (strip-mining of Deer Creek barrier dunes for foundry sand). Public: US DOT/SLSDC (Seaway navigation, which results in pollution episodes highly detrimental to River wildlife).

some few notable exceptions, it does not support unique flora or fauna at the species level. What is unique is the variety of communities existing within short distances of each other. The area is in many respects a melting pot of northern and southern species, a natural interface where species are often in or near the extremes of their natural range. Hence, they are vulnerable to acts that are disruptive of the natural balance within the ecosystem.

. The area's upland flora and fauna resources (as well as the physical resources supporting them) are thoroughly interdependent upon land, water and air resources.

. The most pertinent measure of resource value of the area's flora/fauna resource base is diversity.

. A majority of the area's biomass is present as a consequence of natural phenomena and as a byproduct of man's cultural activities. Only managed forests and plantations, game management areas and most agricultural lands can be considered productive of flora/fauna communities that represent man's constructive management of organic resources.

. Records of empirical/scientific inventory of the coastal area's native flora and fauna are scanty and usually always unpublished. Only two such inventories are currently in process: J. Geis's wetlands of Jefferson County shoreline and G. Smith's biological inventory of the Oswego County coastal zone. P. Connor of the NYS Museum and Science Service has made some scientific observations in the St. Lawrence County portion of the region, but that data is in his field

notebooks. Similar such personal records prepared by authoritative professional and amateur naturalists are generally available only through personal interview and in a few publications of diverse associations and societies.

. Observation is a logical first step in a process leading to rational management of a region's entire flora and fauna resource. Continuous observation (or inventory, or monitoring) is a logical procedure to follow in correcting management criteria as needed. The state, national and continental efforts regarding waterfowl, game birds and certain endangered birds, such as the Trumpeter swan, rely heavily upon observation. Most of this area's flora and fauna resources are not the subject of such observation.

. In New York, the wildlife species receiving most attention through research and habitat protection are game species. However, the state Department of Environmental Conservation is legislatively directed to administer or manage all the state's wildlife resources, not just game species.

. Regardless of which wildlife species are receiving management protection, it is principally the sportsman through license fees who supports this work. There is only a narrow base source of funds supporting wildlife research and habitat management.

. DEC is currently initiating a non-game wildlife species program to satisfy increasing public demand for such action, and to meet its obligation under the NYS Fish and Wildlife

Law to deal with all wildlife species in the state. Reportedly, the first priority of the non-game species program is to concentrate on endangered species. Many species currently occupying range in the state are experiencing population decline, often due to uncontrolled, and perhaps needless, habitat destruction. The population and habitat status of the Bog turtle (nationally endangered, and status unknown in this state), and the reptile and amphibian population in general is nearly universally unknown throughout New York State. However, it appears concentration is being placed on extirpated species (e.g. reintroduction of Bald eagle and Peregrine falcon; studies on the Eastern puma) for whose absence the ecosystem may already have adjusted itself satisfactorily.

. DEC under ECL Article II, Title 5 is authorized to assist landowners in establishing and maintaining sound wildlife management programs on private property. Although the interest of consumptive sporting pursuits has been emphasized, this program can be used to aid property owners in developing and maintaining appropriate wildlife habitat for nonconsumptive recreation and education purposes.

. Funds authorized under the Environmental Quality Bond Act of 1972 have not yet been used to acquire ecologically significant areas. Even so, the State Preserve has gained a number of properties by donation. It would be beneficial to add other critical areas for which active public use would be inappropriate to the State Preserve.

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. Legal hunting is reported at times to compromise the sanctity of areas of heavy concentrations of birds in migration. Examples are crow hunting along the ridge west of Derby Hill during periods of hawk migration and hunters firing from positions below mean low water line off El Dorado Beach Preserve. Migration corridors are generally used by heavy concentrations of mixed species during select time periods annually. Crow and other huntable species may fly in close proximity to rare or endangered species such as the Bald eagle, Peregrine falcon, Sharpshinned hawk, Coopers hawk, Redshouldered hawk and other. ~~Uneducated or~~ indiscriminant hunting can result in needless depredations on rare and endangered species in these flight corridors.

. Off-shore structures to control erosion, sedimentation and littoral transport of mineral matter have been built at various sites along the coastline. Such structures are currently being proposed at the mouth of the Salmon River, Deer Creek, and off the South Sandy Pond barrier beach. Little or nothing is known about the impact of such structures upon flora and fauna habitat in their immediate vicinity.

. Areas of small craft recreational boating frequently abut emergent vegetation areas providing waterfowl nesting habitat. Some species attach their nests to vegetation at or near water level. Wake wash, if too high or too frequent, may destroy nest, eggs and chicks. A combination

of navigational speed control during the nesting season and boater education may decrease nest, egg and chick mortality from wake wash. Examples of species affected by wake wash include Loons (~~not~~ now reported to be breeding in the area) and Red-billed grebe. Examples of areas needing wake wash control include the Pond, the Carl Island area of North Sandy Pond, and Renshaw Bay.

. The construction of tall and heavily glassed structures (such as SUNY Oswego and the Niagara Mohawk Power Corp. stack in the City of Oswego) along the Lake Ontario shoreline may cause high levels of mortality among birds rising off the lake and flying southerly ~~in~~ migration.

. There are significant gaps in information regarding location, and qualitative and quantitative descriptions of unique, rare and endangered plant species and communities located in the service area.

. Too little is known about the habitat requirements and population dynamics of nearly all the region's wildlife species. The location of occupied habitat for any given species is ~~only spottily~~ little known and understood. Animals have a range, some no further than a few yards ~~in~~ during a life time, other thousands of miles. In addition, there are many effects upon animal life ~~that~~ which are ~~irregularly~~ variable including siltation, air and water pollution, and sport and commercial harvesters.

The interplay of natural forces, natural communities, and man's activities is complex. The effect of that interplay upon animals in the area is generally ~~not sufficiently~~ understood.

A comprehensive and workable set of management practices for the area's wildlife is needed. To establish a comprehensive wildlife management plan, a great deal of baseline data concerning species and their habitat is required, including basic information on population levels, locations, and dynamics; preferred habitat types; the real and potential carrying capacity of habitat throughout the region; and relevent law enforcement needs.

. Shoal areas serve as nesting areas for various bird species (the common tern, for example) and feeding and resting areas for an even greater variety of bird species. Waterborne pollutants such as oil spills can temporarily degrade the shoal habitat by destroying food materials, physically obstructing daily travel routes, or physically contaminating or entraping bird species. Active nests on the water's edge (or on the leading edges of wetlands) may be destroyed, or young chicks entrapped. Wake wash can destroy active nests or young chicks. Nesting, feeding and resting habits of waterfowl and shorebirds are not now adequately identified geographically or seasonally.

. DEC's Cooperative Forest Management Program (ECL Article 3, Title II) provides for technical assistance to cooperating landowners in the management of woodlands. DEC foresters working in the coastal area note that landscape and aesthetic objectives generally take priority over wood fiber production in coastal area forests. Most coastal landowners are most apt to value their forest

cover for scenic quality, shade, windbreaks, and wildlife habitat.

Forest and individual tree management problems and opportunities vary between wood fiber production and landscaping objectives. Economic or biologic maturity are not necessarily a criteria in the removal or harvest of a tree in the coastal area. Some FPA foresters note increasing requests for assistance in the coastal area in prolonging the lives of valued landscape trees. The objective of coastal landowners is often either to "keep" the tree stands as they are (often preferring no cutting as a perceived prerequisite to this objective), or to establish tree cover on open land.

. Some coastal areas receive heavy use by bird species that breed in close proximity to each other or in colonies. Examples include the out islands of the Town of Hounsfield, Carl Island in North Sandy Pond (Town of Sandy Creek), and Ironsides Island in the town of Alexandria and Hammond. Most of these sites in the service area have yet to be systematically inventoried by professionals in ornithology and allied disciplines. Most of these sites are not protected from incompatible land use practices.

. The Endangered Plant Species Protection Program (ECL Article 9-1503) is designed to protect a significant segment of the state's flora resources. However, more comprehensive legislation is needed to provide full protection.

. Sand dunes are by their nature physiologically dynamic. Thus, they are unsuited to land uses requiring surface and

subsurface stability. Many seasonal residence owners on the dunes have suffered financial losses due to problems associated with the erosion or accretion of "shifting" sand dunes. Construction and traffic on the dunes tends to thwart natural vegetative succession that "stabilizes" the sand material.

The dunes are representative of coastal area habitat. The dunes are distinctly finite within the area and the freshwater shoreline of New York State. They are no longer a resource that can replenish or regenerate itself. Hence, the area's dunes may be considered an exceptional natural resource that is extremely vulnerable to accelerated depletion due to house construction, sand mining and improper use by foot and motorized traffic.

The dunes protect several coastal inland freshwater wetlands from potentially damaging Lake Ontario wave action. They serve as landfalls for stressed birds in migration over a stormy Lake Ontario, and are migration routes for birds that fly along rather than over the lake.

. Open waters of Lake Ontario, the St. Lawrence River and their embayments serve as feeding and resting areas for geese and ducks in migration, while overwintering, and during the summer. The importance of those areas identified as receiving heavy use needs to be stressed in efforts to minimize pollution that may endanger food sources and the safety of birds using the waters.

. Wetlands serve a variety of useful purposes as outlined in the NYS Freshwater Wetlands Act (ECL Article 24).

Major adverse impacts upon wetlands in the area are brought about through dredging and filling, and occupation of bordering uplands by incompatible land uses. Many species depending on wetland habitat, require suitable upland habitat as well, often in uplands adjoining the wetland. Therefore, interest in any wetland should include adjacent uplands in so far as those uplands impact wetland water quality or water levels, or contribute significantly to habitat requirements of wildlife species using the wetlands. Completion of the required inventory maps and implementation of the permanent permit program by DEC will be beneficial. Effectiveness of this program will depend on the extent to which those wetland uses that are permitted prove to be compatible with the integrity of critical area habitat requirements.

. Mackintyre Bluff and other coastal drumlins nearby are subject to slumping on their lakeward end due to combined action of groundwater seepage and the erosive action of Lake Ontario waters. To a limited extent, natural erosion has been stopped on some bluffs with erosion retardation devices. Structural retardation of erosion of some bluffs may be desirable to preserve the bluffs for the enjoyment of future generations and to protect existing structural developments and land uses. However, a reasonable portion of the existing bluff faces should be left open to natural erosive forces, both to provide the public with scenic, scientific and educational

views of the effects of natural erosive forces, and to maintain natural habitat for flora/fauna species that are known to be dependent upon the erosion of the bluffs. An example is the bank swallow, a species using relatively freshly sluffed bluff face material for construction of nesting sites.

. A number of bog communities have been identified, or tentatively identified pending further investigation, in the area. It is reasonable to expect that many flora species found in those bogs are included in the "List of Protected Native Plants in NYS," enforced by DEC.

To date, all bogs recorded in the area appear to be found next to or in the midst of wetland (by most accounts, most commonly typha wetland). Bogs are scarce in the area, and their significance as habitat for exceptional or rare-endangered-threatened flora and fauna species such as the bog turtle or Arethusa bulbosa (a pink orchid) has yet ~~to be~~ documented.

E. Coastal Amenities

1. Introduction

Within the Commission's service area of about 1,000,000 acres are approximately 340 miles of shoreline bordering Lake Ontario and the St. Lawrence River. More lands border streams and inland water bodies.

Due to its scenic beauty, abundance of natural resources, and presence of man-made attractions, much of the area has developed into a recreation area for people living in or

visiting the northeastern United States. The Thousand Islands, Henderson Harbor, Fort Ontario, Moses-Saunders Power Dam, the Lake Ontario shoreline and the St. Lawrence Seaway as well as bass, pike, salmon and abundant waterfowl attract people in pursuit of recreation and leisure activities.

Coastal amentities can be described in terms of their use or their value as recreational resources. This section summarizes the many aspects of the area's natural and man-made resources.

2. Recreation

a) Recreational Activities

The recreational activities that are pursued in coastal areas is diversified, although many are water oriented. This reflects the nature of coastal natural resources and recreational facilities, and the overriding importance of lake and river waters.

Recreational activities capitalizing on the resource base include boating, fishing, hunting, naturalist pursuits and sight-seeing. The significance of these activities is summarized below.

1) Camping

One of the major recreational activities in the service area is camping, either as the primary activity or in conjunction with another activity. Extensive public and private facilities have been developed to serve the users.

Within the St. Lawrence-Eastern Ontario service area there are 23 developed state parks, of which 21 provide

camping facilities. Table 21 lists the parks and the attendance figures for the 1970 through 1975 time period.[1] It should be noted that park attendance has not reached the levels of 1970 in the last five years. Totals in 1975 were 87 percent of the 1970 level.

Currently there are 102 private campgrounds in the service area.[2] These facilities provide capacity for over 6,600 people. Table 22 summarizes their distribution and capacity throughout the service area. A 25 percent increase in average weekend day demand is expected between 1970 and 1990, according to New York State Office of Parks and Recreation.

2) Boating

Boating is another major recreational activity. Table 23 summarizes the number of boats reported primarily used in each of the four counties.

To serve this large number of boats and boaters, there are 57 marinas in the service area, providing a variety of services including repair, sales and storage. These are described in the next sub-section titled "Recreation Areas and Facilities."

The New York State Office of Parks and Recreation reported that there will be a higher percentage of the recreation population engaged in boating in 1990 as compared

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[1]Waterson Park has been incorporated into Wellesley Island State Park. St. Lawrence State Park does not provide camping facilities.

[2]SLEOC survey in 1975-76.

Table 21. State Park Attendance[a]

Park Name	1970	1971	1972	1973	1974	1975
Cayuga County						
Fair Haven	289,000	240,000	227,000	242,000	226,000	336,897[b]
Oswego County						
Selkirk Shores	196,000	160,000	145,000	166,000	164,000	153,000[b]
Jefferson County						
Southwick Beach	80,000	69,000	61,000	78,000	70,000	67,000
Westcott Beach	191,000	163,000	150,000	175,000	142,000	133,000
Long Point	17,000	21,000	23,000	18,000	18,000	18,000
Burnham Point	18,000	23,000	217,000	19,000	16,000	13,000
Cedar Point	100,000	76,000	81,000	84,000	80,000	79,000
Canoe Picnic Point	17,000	10,000	7,000	7,000	8,000	6,000
Grass Point	37,000	40,000	24,000	22,000	34,000	29,000
Wellesley Island	219,000	219,000	208,000	243,000	242,000	247,000
Waterson Point[e]	3,000	4,000	3,000	3,000	3,000	5,000
DeWolf Point	6,000	5,000	7,000	5,000	6,000	6,000
Keewaydin	32,000	30,000	33,000	40,000	45,000	35,000
Mary Island	8,000	6,000	5,000	3,000	5,000	8,000[c]
Kring Point	54,000	48,000	48,000	52,000	54,000	49,000
St. Lawrence County						
Cedar Island	3,000	3,000	1,000	2,000	1,000	c
Jacques Cartier	75,000	71,000	41,000	50,000	49,000	44,000
St. Lawrence	11,000	14,000	12,000	15,000	16,000	16,000
Eel Weir	9,000	9,000	8,000	8,000	7,000	9,000
Galop Island[d]						
Coles Creek Campsite[d]						
Crail Island[d]						
Robert Moses	439,000	368,000	343,000	339,000	278,000	323,000
Totals	1,804,000	1,579,000	1,444,000	1,571,000	1,464,000	1,576,897
Attendance as % of 1970 attendance	100	88	80	87	81	87

[a]Attendance is for fiscal year - April 1 to March 31

[b]Actual attendance for April - December 1975 and projected attendance for January - March 1976. Other parks are actual attendance for April - Nov. 1975

[c]Mary and Cedar Island attendance was reported as combined attendace in 1975.

[d]Undeveloped

[e]Waterson Point has been incorporated into Wellesley Island State Park.

[illegible]

Table 22. Campground Facilities[a]

Sub Area	Private Campground Number	Private Campground Capacity	Public Campground Number	Public Campground Capacity	Total Number	Total Capacity
I	4	215	2	531	6	746
II	8	243	2	127	10	370
III	55	3,882	11	11,120	66	15,002
IV	12	725	2	8,500	14	9,225
V	13	1,071	2	5,900	15	6,971
VI	10	467	2	3,100	12	3,567
Totals	102	6,603	21	29,278	123	35,881

[a] Includes not only tenting spaces but also cottages.

Table 23. Motor Boat Registration

Area	1970 Number	1970 % of State	1970 Rank	1971 Number	1971 % of State	1971 Rank	1975 Number	1975 % of State	1975 Rank
Cayuga Co.	3,389	0.9	26	3,823	0.9	26	3,140	0.9	16
Jefferson Co.	7,713	1.9	10	7,679	1.9	11	6,305	1.9	5
Oswego Co.	5,032	1.3	18	5,170	1.3	18	4,714	1.4	12
St. Law. Co.	7,394	1.9	12	7,376	1.9	12	6,201	1.8	7
Totals	23,978	6.1	--	24,048	6.1	--	20,360	6.0	--

to 1970. Table 24 reflects the increased numbers projected.

3) Fishing

A major attraction of the service area is its abundance of fish. Primary sports fish are largemouth and smallmouth bass, northern and walleye pike, muskies and the salmonids (coho and chinook salmon and lake, brown and steelhead trout).

Table 24. Boating

County	1970 Recreation Population	1970 % of Population	1970 Average Weekend Day Demand	1990 Recreation Population	1990 % of Population	1990 Average Weekend Day Demand
Cayuga	16,055	20.7	1,927	19,353	20.7	2,322
Jefferson	18,583	21.0	2,230	20,934	24.2	2,512
Oswego	20,883	20.7	2,506	31,854	21.4	3,822
St. Law.	23,078	20.6	2,769	24,997	21.4	3,000

In addition, perch bullhead and panfish are popular (see Section III-C of this report).

Fishing license sales in the four-county area increased 9.6 percent between 1972-1973 and 1974-1975. The state average was 7.9 percent. Table 25 reflects the total license sales by area. Data on angler days expended for specific species of fish is not available except for the existing projections available for the salmonid fishery.[3]

Table 25. Fishing License Sales

Year	Number Sold: New York State	Four-Co. Area[a]	Cayuga	Jefferson	Oswego	St. Law.
1972-73	572,020	48,182	6,266	17,254	11,802	12,860
1973-74	581,372	48,418	6,293	16,970	12,083	13,072
1974-75	617,128	52,813	6,759	18,093	13,770	14,191

[a]Includes Oswego, Cayuga, St. Lawrence and Jefferson Counties

[3]These projections were made prior to the ban imposed on possession of coho, chinook and lake trout on September 14, 1976.

It is projected that there would be 945,000 angler days expended salmon fishing when the salmon program becomes fully developed.[4] Of these, 615,000 would be in areas from the western boundary of the Town of Sterling to the village of Cape Vincent. Peak day demand is expected to be about 16,000. It is estimated that 75 percent of the angler days will be spent fishing on Lake Ontario and the remaining 25 percent fishing in stocked streams.[5]

Estimates of the number of fishermen on the average weekend day made by the New York State Office of Parks and Recreation do not reflect the potential growth based on the increase in license sales and the introduction of salmonids into the lake. Table 26 reflect the OPR projects for 1990.

Table 26. Fishing Demand

	1970			1990		
County	Recreation Population	% of Population Fishing	Average Weekend Day Demand	Recreation Population	% of Population Fishing	Average Weekend Day Demand
Cayuga	16,301	21.1	815	19,381	20.7	969
Jefferson	19,024	21.5	951	18,410	21.3	920
Oswego	20,736	20.6	1,037	30,867	20.7	1,543
St. Law.	21,651	19.3	1,083	22,445	19.2	1,122

Source: Forecast of Outdoor Recreation in New York State 1970-90, People-Resources - Recreation, New York State Parks and Recreation, June 1973.

[4]Full development is based on the construction of the proposed hatchery.

[5]These estimates reflect the expected fishing pressure when and if the ban on possession is lifted and if the facilities, harbor of refuge, and hatchery are constructed as expected.

4) Waterfowl Hunting

Migratory bird hunting stamps were purchased by 9,805 people in the four-county area in 1971. This is an 80 percent increase over the sales recorded in 1962 for the four-county area. The state increase has been 114 percent in the same period.

The Department of Environmental Conservation operates two wildlife management areas in the service area where hunting is allowed by permit only. These are Wilson Hill and Perch River Wildlife Management Areas. In addition, Lakeview, Ashland and French Creek Wildlife Management Areas are open to hunting without a permit. Table 27 reflects the number of permits issued and birds taken from both of the permit areas.

Table 27. Migratory Bird Hunting on Wildlife Management Areas

Year	Perch River		Wilson Hill	
	No. of Hunters	Birds Taken	No. of Hunters	Birds Taken
1972	1815	2476	2124	1246
1973	2021	2419	2267	1238
1974	1278	1676	1121	400
1975	1693	2244	1511	698

In addition, hunting was permitted at 12 state parks during the fall of 1976 through cooperative efforts between the Office of Parks and Recreation and the Department of Environmental Conservation. Permits are required at all parks.

An estimate of man-days spent hunting migratory birds on private lands is not available. However, it is felt to be a large number within the service area since extensive areas of open water and marsh lands exist. In addition, the service area is in the flyway for migratory birds (see Section III-D).

5) Other Hunting

Sales of big game licenses (deer and bear) increased markedly between 1972-1973 and 1974-1975. Statewide, the increase was almost 25 percent. Within the service area the increase ranged from about 35 percent in Oswego County to over 20 percent in St. Lawrence County. Although nearly 40,000 licenses were issued in the four-county area, a very small proportion of the actual hunting occurs in the service area. Most is done in areas such as the Tug Hill, Adirondacks or Southern Tier.

Small game hunting is pursued by fewer people than either fishing or big game hunting. Its rate of growth was 6.5 percent statewide in the 1972-1973 to 1974-1975 period. In St. Lawrence County it grew at a 23.2 percent rate during the period (see Table 28). Again, it is not possible to determine the extent to which the activity is pursued within the service area. The primary species hunted are pheasants and rabbits. However, a small game license is required along with a migratory waterfowl hunting stamp to hunt ducks and other migratory birds.

Table 28. Small Game Licenses

Year	Number Sold					
	New York State	Four Co. Area[a]	Cayuga	Jefferson	Oswego	St. Law.
1972-73	253,558	12,553	3,080	2,757	3,374	3,336
1973-74	276,389	13,858	3,330	2,975	3,588	3,965
1974-75	270,155	13,801	3,324	2,993	3,374	4,110

[a]Include Counties of Cayuga, Jefferson, Oswego and St. Lawrence

Overall hunting pressure as projected by the Office of Parks and Recreation is reflected in Table 29. Projects indicate that the percent of population hunting will decline, leading to a stabilization of the demand for hunting lands.

Table 29. Hunting Demand

County	1970			1990		
	Recreation Population	% of Population Hunting	Average Weekend Day Demand	Recreation Population	% of Population Hunting	Average Weekend Day Demand
Cayuga	9,064	11.7	906	10,011	10.7	1,001
Jefferson	10,780	12.2	1,078	10,175	11.7	1,017
Oswego	12,590	12.5	1,259	17,028	11.4	1,703
St. Law.	14,800	13.2	1,480	14,794	12.7	1,479

Source: Forecast of Outdoor Recreation In New York State 1970-1990, People - Resources - Recreation, New York State Parks and Recreation, June, 1973.

6) Winter Recreation

Large numbers of snowmobiles are registered and used within the four-county area, although data is not available to determine if this usage is in the service area or in nearby regions such as the Adirondacks or Tug Hill. Tables 30 and 31 summarize information regarding registrations and use. Neither growth rate appears to be matching statewide growth based on the change in rank of "County of Use" of the four counties.

Table 30. Snowmobile Registration

	1971			1972			1975		
County	Number	% of State	Rank	Number	% of State	Rank	Number	% of State	Rank
Cayuga	1,751	1.33	26	2,007	1.29	34	2,037	1.36	31
Jefferson	5,652	4.29	5	5,455	3.52	7	4,636	3.10	7
Oswego	5,600	4.25	6	6,187	4.00	6	6,379	4.27	5
St. Law.	7,272	5.52	3	7,324	4.73	3	5,405	3.62	6
Total	20,275	15.39	--	20,973	13.54	—	18,457	12.35	--

Table 31. Snowmobile Use

	1971			1972			1975		
County	Number	% of State	Rank	Number	% of State	Rank	Number	% of State	Rank
Cayuga	1,775	1.35	27	2,033	1.32	35	2,015	1.35	32
Jefferson	5,535	4.20	6	5,375	3.48	7	4,539	3.04	8
Oswego	5,867	4.45	4	6,456	4.18	5	6,551	4.38	5
St. Law.	7,331	5.57	3	7,374	4.77	3	5,396	3.61	6
Total	20,508	15.6	—	19,408	13.75	—	18,501	12.38	—

Ice fishing constitutes about 98 percent of all winter recreation activity along the St. Lawrence River. Data available on skiing and snowshoeing in the service area indicates that it makes up less than 2 percent of the water recreation activity along the St. Lawrence River.[6] There are only a few areas in the St. Lawrence-Eastern Ontario area with ski facilities, most of which are cross-country trails. Major downhill ski areas are found in other parts of the state such as the Adirondacks, Catskills and Southern Tier.

7) Naturalist Pursuits

Significant opportunity exists for nature study and leisure recreation in coastal areas. The extensive acreage of wetlands, open water and upland habitat (see Section III-D) abound in flora and fauna providing a nearly endless opportunity for non-consumptive pursuit of nature. Several areas are formally developed for naturalist activities and are referenced below. In addition to such formal areas, there are many others whose primary orientations are not specifically for naturalist pursuits but which can be used by those pursuing nature. Examples of these are public parks, public access areas and public lands.

Use data for these facilities is very limited. At the Minna Anthony Common Nature Center, 41,018 people were reported to have passed through during 1975. Other data is not available.

b) Recreation Areas and Facilities

There is considerable public and private investment in

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[6]The St. Lawrence River: Winter Recreation Activity as Related to An Extended Navigation Season, USDI, BOR, July 1976.

recreation areas and facilities in the St. Lawrence-Eastern Ontario area. In addition, there are many points of interest providing a recreational experience that were developed for other purposes (for example, the St. Lawrence Seaway).

Recreation facilities addressed by the Commission include those with the potential to benefit and be used by persons visiting the area. The Commission did not assess strictly local facilities such as village parks, local playgrounds and tennis courts. These types of facilities traditionally serve local residents and are not particularly related to coastal resources of Lake Ontario and the St. Lawrence River. In addition to public-owned facilities, commercially operated facilities open to the public were included.

1) State Parks

Use of the area's 23 state parks has been mentioned under recreation activities above. Of the areas available to the recreationist, they offer the greatest diversity of facilities and activities. Nearly all contain campgrounds and swimming beaches, and many are oriented toward boating with launch or mooring facilities, or both. The most diversified of these, Wellesley Island State Park, offers virtually any activity the recreator could desire--camping and cabins, boat launching and mooring, picnicking for day users, fishing and hunting access, hiking and skiing trails, swimming beach and the Minna Anthony Nature Center. Other state

parks in the region also provide a variety of facilities and activities.

2) Boat Mooring and Launching Facilities

In addition to boating facilities at state parks, a number of public and privately operated mooring and launching facilities are available to the public along the shoreline and on inland lakes and streams. Many of the private operations are associated with marinas and liveries, thus offering a wide range of boating services.

3) Camping and Cabins

Besides the state parks, numerous private campgrounds with facilities for tents and trailers are operated in the service area.

4) Fishing and Hunting Areas

Fishing and hunting access areas are particularly important to the visiting sportsman who may not have access to private lands. Certain areas of fishing access along streams are necessary for particular types of angling, principally for salmon in the Salmon River. All of the state parks permit fishing, thus providing access to the Lake or River. A few of the state parks and most wildlife and forest management areas permit hunting.

5) Hiking and Naturalist Areas

Many areas of natural space can be found almost anywhere along the coast and inland in the service area, although relatively few have been developed for naturalist pursuits. These have been developed by a number of public

and private groups and include: Minna Anthony Nature Center at Wellesley Island State Park (NYS Office of Parks and Recreation), Derby Hill (Onondaga Audubon Society), Perch River Wildlife Management Area (Department of Environmental Conservation), Wilson Hill Wildlife Management Area (DEC), Lakeview Wildlife Management Area (DEC), Eldorado Shores Beach Preserve (Nature Conservancy), Ironsides Island (Nature Conservancy), Fair Haven State Park Trails (Office of Parks and Recreation), Selkirk Shores State Park Trails (Office of Parks and Recreation), Cato-Fair Haven Trail (Cayuga County) and the Rice Creek Biological Field Station (SUNY Oswego).

6) Miscellaneous Points of Interest

In addition to the naturalist areas, several other points of interest dot the lake and river shoreline. Examples of these include the St. Lawrence Seaway and associated locks and dams, the Department of Environmental Conservation fisheries station at Cape Vincent, sailing races in Henderson Harbor, Fort Ontario in Oswego, and the education and interpretive center at Niagara Mohawk's Nine Mile Point Nuclear Power Plant.[7]

7) Shoreline Residences

Not mentioned so far is a major recreation component--the hundreds of shoreline cottages, camps and homes on or near Lake Ontario, the St. Lawrence River and the

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[7]More information is available in St. Lawrence-Eastern Ontario Commission's technical report on recreation to be published.

Thousand Islands. These provide short-term and seasonal residences for thousands of visiting recreationists as well as for those who maintain year-round residences near the water.

c) Summary

The Commission's analysis of recreation in the St. Lawrence-Eastern Ontario area indicates a wide range of recreation activities is pursued within a diverse system of resources and facilities. Resource users are of three types--permanent residents, seasonal residents and transients.[8] Their perceptions of the area as a recreation land vary, and there are differences within the six subareas of the region.

Hundreds of permanent and seasonal homes dot the shoreline areas from Little Sodus Bay in Subarea I to the Moses-Saunders Power Dam in Subarea VI on the St. Lawrence. Most of the permanent homes, however, do not border on a water body. In fact, most owners of these homes have located for more traditional reasons such as proximity to work. On the other hand, virtually all seasonal residences (97 percent) are situated on property which borders water, and seasonal residents are much more strongly interested in water-oriented amenities. It is worth noting that there is a very slow rate of change in ownership in the region of these residence. Two-thirds of the properties have been held by their owners for over 10 years.

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[8]Recreation, SLEOC, 1976; a survey was ued.

Transient users--those recreationists who visit the area only temporarily--come for a variety of reasons, mostly related to forms of water recreation such as swimming and boating. Almost half of all boating activities are pursued for the purpose of fishing, although nearly all boaters (93 percent) fish sometimes.

In general, most recreationists in the area appear to feel that facilities available are adequate. Different resource users in different subareas do find certain deficiencies, however. These needs include more parks and beaches (especially in Subarea II), and cleaner water and more weed control. A problem is that more than half of seasonal property owners believe that local governments are not concerned with their problems.

Although "weekend camping" is popular, most campers in the service area stay for an average of four days. Half of all users of public and private campgrounds are from places outside the service area but within the state. A fourth of all campers come from other states and Canada. Campers are keenly aware of environmental problems which may affect their recreation experiences. Although little is known yet about the impacts of the oil spill on the St. Lawrence River in 1976,[9] other environmental problems (water pollution, weeds and high water) have influenced recent visitors

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[9]SLEOC is undertaking a study to determine the economic and environmental impact of the June 23, 1976 oil spill.

(25 percent of campers) to alter future plans to visit the area. It is evident that a clean, scenic environment is an important attraction to visiting recreators.

Overall fishing activity in the service area is increasing at an average annual rate of 3 percent. The importance of bass, pike, muskie and the salmonids has already been mentioned. Ice fishing is another aspect of recreation and constitutes 98 percent of all winter recreation activities on the river.

Several clusters of recreation facilities and activities can be identified within the six subareas. However, the area encompassing the Thousand Islands has by far the single greatest concentration of facilities, both public and private. The scenic beauty of the 1,800 islands and the river, with 5 state parks and 14 boating facilities, make this area uniquely oriented to the recreationist and sightseer.

Several other areas of scenic significance are found along coastal areas. There is an abundance of historic and architecturally attractive structures or sites in the service area. Fort Ontario in Oswego and the War of 1812 Museum in Sackets Harbor are now state parks and center attention on the historic activity that occurred in the area.

Examples of large stone houses abound throughout the Cape Vincent area. Many were built in the early 1800's when the French were the dominant influence in the area. Many have been maintained and are accessible for viewing.

Scattered throughout the Thousand Islands are examples of architectural styles including huge stone castles, large wooded

Victorian style resorts and simpler early 19th century cottages. These all add to the scenic mystic of the Thousand Islands area.

3. Historic Resources

The service area of the Commission is rich in historic resources which could be negatively impacted by unplanned or mismanaged development. These include structures and sites significant in the early settlement and defense of the border area between Canada and the United States, homes of prominent settlers and people who figured in the development of the nation, significant examples of local architecture, and numerous Indian sites.

Through contact with local historians, NYS Office of Parks and Recreation and the Commission's own efforts, 288 historic sites have been identified and inventoried. Preliminary evaluation is now taking place. Assistance from the Office of Parks and Recreation, cooperation from local historians and additional Commission effort are required to complete a detailed analysis of all this inventory material. A program can then be developed to protect, preserve and rehabilitate the area's historic resources.

4. Findings

. Currently incompatible uses are occurring on the lands bordering major streams, the St. Lawrence River and Lake Ontario due to the lack of adequate management.

. Ownership of residences is long-term with the primary land change occurring through subdivision of non-residential lands.

. There are recreation facility inadequacies in varying degrees throughout the service area. Certain of these have been traditionally provided by the public sector.

. The following trends or deficiencies are limiting the potential for economic expansion of the recreation industry:

(1) decreases in water quality

(2) limited facilities

(3) inadequate facilities

(4) decrease in quality of the environment due primarily to lack of or inadequate resource management.

. Seasonal property owners perceive that local government is not adequately concerned with the problems.

. Weed growth has been identified as one of the major factors influencing water use.

. Over 85 percent of the users of public parks reside in New York State while about 40 percent of users of private parks reside outside of New York State.

. Major factors that negatively influence recreation in the area are weed growth, water pollution and high water.

. The potential for impact by winter navigation exists along the St. Lawrence River.

. Fishing access is inadequate in the salmonid fishing area.

. Potential for extension of the recreation season lies in development of a winter recreation industry.

. Current activities are reducing the areas available for waterfowl habitat.

. Current activities are reducing the habitat available that is required to support the area's fishery at its current level.

. A low level of success is being experienced through current effort to preserve historic resources.

. Many historic resources are currently being lessened in value through incompatible uses, neglect or lack of appreciation of the resources, significance.

. In certain areas such as Sackets Harbor, Cape Vincent and the city of Oswego, concentration of historic resources occur. Efforts are currently being undertaken in the city of Oswego and Sackets Harbor to protect such resources.

Inventory of Natural and Man-Made Coastal Resources

Section 305 of the Act requirements of the regulations, 15 CFR 923.11, requires that the management program "must show evidence that the state has developed and applied a procedure for defining permissible land and water uses within the coastal zone which have a direct and significant impact upon the coastal waters--this will include an inventory of natural and man-made coastal resources.

The following land use and natural resource information has been mapped at 1"=2,000' for the areas within the SLEO coastal zone boundary.

Natural Resource Considerations Mapping

Soils with Poor Potential for Development--drainage slope, erosion, depth to bedrock, water table

Natural Habitat Areas--wetlands (coastal), forests coastal ponds/embayments, mixed upland cover

Hazard Areas--water, 100-year flood and storm/wave surge, erosion

Fish Habitat Areas--spawning, nesting, feeding and forage

Water Quality--critical areas, effluent limited, water quality limited

Development Capabilities Mapping

Recreation--state parks, natural areas (forest and wildlife management), boat launch/mooring, trails, picnic/day use, swimming, fishing access, hunting, skiing, camping, cabins, points of interest, historic

Community Development Facilities--port properties/Seaway channel, industrial park properties/railroads (Conrail), power properties/power lines

Public Lands--PASNY, Ogdensburg Bridge and Port Authority, USCG, US DOT, NYS OPR, NYS DEC

Land Use--residential shoreline, recreation areas, industry, wetlands, forests, active agriculture, inactive agriculture, and rural residential

Prime/Active Farmland

The above listed maps are being used to develop a single composite which will indicate the land development capability for the SLEOC area.

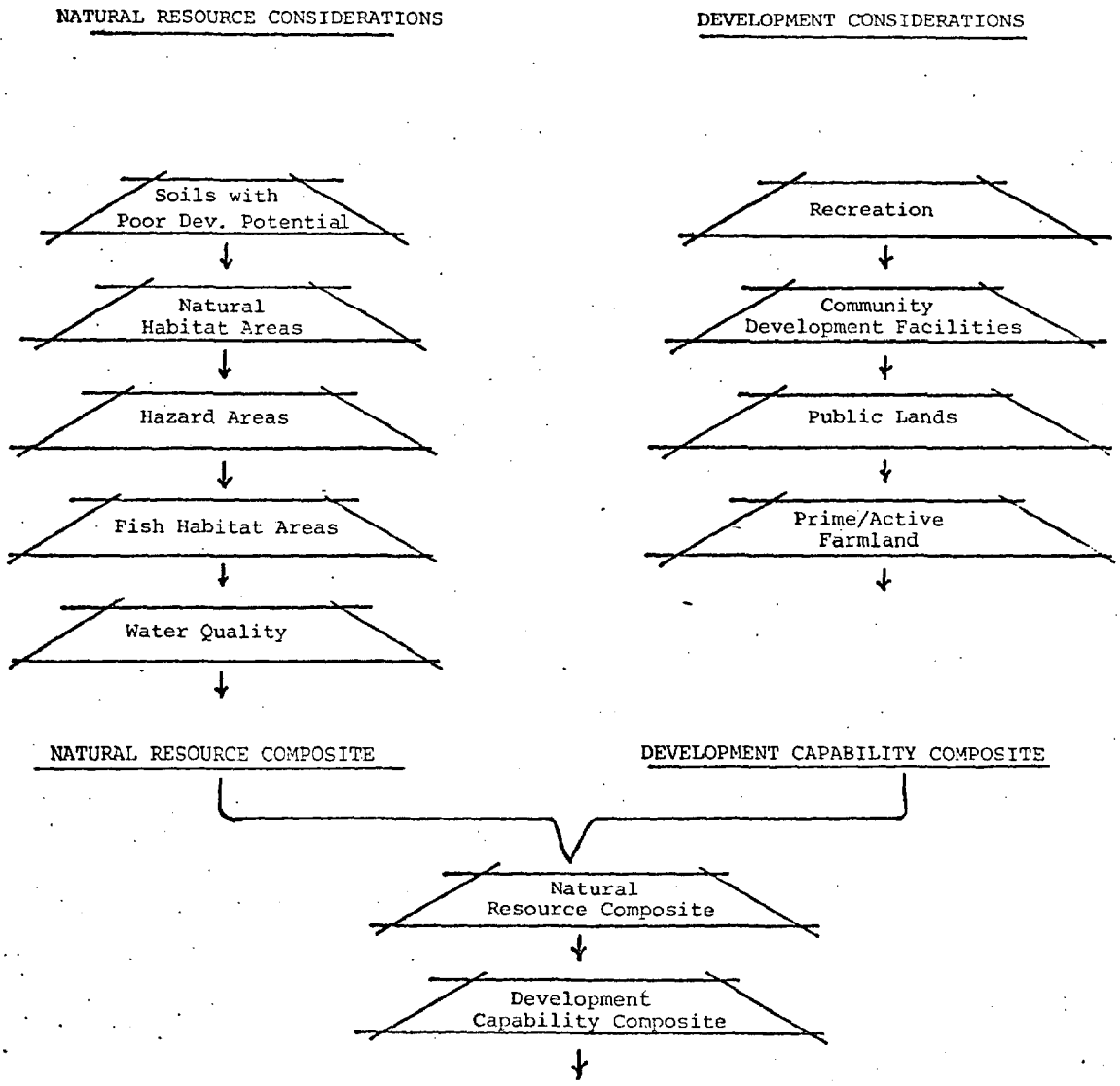
Using the information gathered from both natural resource inventory and land use mapping, it is possible to determine areas within the SLEOC area where development is best suited and where it is least suited. Those areas most suitable for development will show themselves prominently. Each natural resource map indicates certain places in the community where natural features would present various degrees of limitations to development; however, this does not mean that development cannot occur in these areas. With adequate engineering safeguards, many areas can indeed be developed. Where there are natural resource considerations, any limitation will be due either to biologic, aesthetic, or engineering and construction considerations, or a combination of these.

A compilation of these maps, which collects all of that data together on one map called a composite, enables one to identify those areas that are best suited and conversely those that are least suited for development. An example of this is the "infrastructure" of man-made features that both support and generate growth. These include transportation networks, sewer and water facilities, power facilities, etc. Once these map elements are combined to produce a development capability composite, and then overlayed on the natural resource composite,

those areas that are best suited and are the best locations for future development will clearly reveal themselves.

(Color slides of these maps are attached to this report.)

COMPOSITE PROCESS



III. CAPABILITY AND SUITABILITY OF COASTAL RESOURCES

The ability of resources to sustain a variety of coastal land and water uses is determined by two measures: suitability and capability. The suitability of a given resource type is based upon the natural inherent characteristics which enable the resource to support certain activities without undue degradation to the resource, and without threat to man-made developments. Suitability implies that the resource is best suited to activities which do not involve the application of more than the most elementary mitigating management or development practices, either to protect the resource or to protect the human activity therein undertaken. Water hazard areas (100-year flood hazard areas), for example, are naturally suited as open space flood plains, and can be used for agriculture (crops and pasture) or recreation not involving the emplacement of permanent structures. The suitability of water hazard areas is therefore in open space. (See Table III-1).

The capability of resources includes a broader range of uses than does suitability. A resource may be capable of supporting a variety of uses, given the application of standard management practices to protect either the resource or the development use or to make possible in some way the intended activity. For example, the St. Lawrence River as a resource type is naturally or easily suited for recreation such as boating and fishing. However, it is capable of supporting electric power generation if hydroelectric dam facilities are installed. Its capability, then, is much greater than its suitability.

Table III-1, which follows, summarizes the suitability and capability of 17 identified resource types in the St. Lawrence-Eastern Lake Ontario area. In many cases, it is possible for an area to have the character-

istics of more than one resource type (e.g., a littoral area might also be found within a coastal embayment). After each resource type listed in the table are criteria used to identify and delineate the resource.

General criteria are suggested to describe suitability and capability of the resources. These should be used as guidelines; each area and resource should be evaluated separately for a better definition of suitability and capability. In any case, the descriptions under suitability and capability in the table do not necessarily imply that there will be no environmental impacts resulting from the emplacement or occurance of the stated uses for each resource type.

TABLE III-1: SUITABILITY AND CAPABILITY OF COASTAL RESOURCES

RESOURCE TYPE	CRITERIA	SUITABILITY	CAPABILITY - CONDITIONS FOR
1. Open Lake	1. Open waters not otherwise classified	1. Open water 2. Shipping 3. Recreation: boating, fishing 4. Water supply: process water	1. Water supply: municipal - with minor treatment 2. Waste discharge point - with adequate treatment of waste 3. Fishery - deep water lake fishery through: a) stocking b) environmental quality control
2. Open River	1. Open water not otherwise classified	1. Open water 2. Recreation: boating, fishing 3. Water supply - industrial process water	1. Water supply: municipal - with treatment 2. Fishery - develop through: a) stocking b) environmental quality control 3. Waste discharge point - with adequate treatment of waste 4. Hydroeclectric power generation - through installation of dams and facilities 5. Shipping - develop through: a) lock and canal system b) dredging and channel maintenance c) navigation aids d) extended season with ice-breaking
3. Littoral Areas	1. Water depth less than 30 feet	1. Benthic productivity and habitat area 2. Feeding, spawning, nursery area for fish and other aquatic organisms	1. Sport fishery - with environmental quality control
4. Coastal Embayments	1. Semi-enclosed coastal water areas	1. Open water 2. Recreation: boating 3. Recreation: fishing 4. Feeding and resting area for migratory and native waterfowl	1. Fishery - with environmental quality control 2. Harbors of refuge - develop through a) boat handling facilities b) dredging c) environmental quality control

RESOURCE TYPE	CRITERIA	SUITABILITY	CAPABILITY - CONDITONS FOR
5. Streams	1. Coastal tributaries	1. Drainageway 2. Recreation: fishign	1. Fishery - develop through: a) stocking b) environmental quality control c) hatchery 2. Waste discharge point - with adequate treatment of waste 3. Hydroelectric power generation - with dams and facilities 4. Domestic water supply
6. Areas Habitat	1. Evidence of fish presence 2. Prior authority - designation as: a) Class 1 Salmonid b) Class 2 Salmonid c) Class T quality designation	1. Spawning, nursery, feeding areas for fish 2. Recreation: fishing 3. Research	1. Fishery - enchancement through: a) stocking b) environmental quality control
7. Wildlife Habitat Areas	1. Evidence of wildlife abundance 2. Prior authority - designation as State Wildlife Management Area 3. Prior authority - designation as habitat areas for particular species by recognized authority (state agency, etc.)	1. Wildlife concentration and habitat areas 2. State Wildlife Management Areas 3. Natural open space 4. Research	1. Non-intensive recreation - range of certain activities can be develope hiking, hunting, nature study, etc. through: a) environmental quality control b) resonable resource utilization management
8. Wetlands	1. Prior authority - as wetland area by recognized authority (DEC, e.g.) for vegetation	1. Wildlife concentration and habitat area 2. Natural shoreline open space 3. State Wildlife Management Area 4. Research	1. Non-intensive recreation - range of certain activities can be developed through: a) environmental quality contorl b) reasonable resource utilization management

RESOURCE TYPE	CRITERIA	SUITABILITY	CAPABILITY - CONDITIONS FOR
9. Forest Lands	1. Conifer, deciduous, and mixed forests 2. State Forest Management Areas 3. County Forest Management Areas	1. Land treatment and stabilization 2. Wildlife habitat 3. Logging & timber production 4. State Forest Management Areas 5. County Forest Management Areas 6. State Game Management Areas	
10. Beaches	1. Relatively flat plain, immediately adjacent to Lake and River, of unconsolidated material (sand, cobbles, etc.	1. Natural shoreline open 2. Storm wave and surge hazard area 3. Recreation: swimming area 4. Wildlife concentration area	1. Recreation: parks - developed through: a) environmental quality control b) facility development in adjacent areas
11. Dunes	1. Low lying hills of unconsolidated material (sand, gravel, etc.) adjacent to Lake	1. Natural shoreline open space 2. Erosion hazard area 3. Wildlife concentration area 4. Unique or exceptional natural areas	1. Recreation: Non-intensive - developed through: a) environmental quality contro b) reasonable resource utilization
12. Unique or Exceptional Natural Areas	1. Undeveloped natural open space 2. Presence of unusual plant and animal associations 3. Undisturbed, unusual geologic features (drumlins, waterfalls, etc.) 4. Bogs 5. Relatively very large wetland areas 6. Areas of exceptional high quality scenic values 7. Bluffs	1. Natural shoreline open space 2. Wildlife concentration areas 3. Unique or exceptional natural areas	1. Recreation: Low-intensity - can be developed through careful resource management 2. Recreation: educational - can be developed through careful resource management, diot of interpretive center

RESOURCE TYPE	CRITERIA	SUITABILITY	CAPABILITY - CONDITIONS FOR
	8. Prior authority - designation as such by recognized authority 9. Prior authority - presence of plant or animal species recognized as rare, endangered, or threatened by recognized authority (i.e., "red-listed" or "blue-listed")		
13. Water Hazard Areas	1. 100-year flood hazard areas, flood plains 2. 100-year wave and storm surge hazard areas 3. Prior authority - designation as such by recognized authority (e.g. HUD, DEC)	1. Natural shoreline open space 2. Flood plains 3. Low intensity recreation areas (no permanent development) 4. Agriculture	
14. Erosion Hazard Areas	1. Prior authority - classification by SCS as subject to erosion 2. Prior authority - designation by HUD erosion hazard area 3. Bluffs adjacent to Lake Ontario subject to storm and wave action	1. Natural shoreline open space 2. Unique or exceptional natural 3. Wildlife concentration areas 4. Designated erosion hazard areas	
15. Soils with Development Limitations	1. Prior authority - designated soil types by SCS	(reference SLEOC report on Soils)	(reference SLEOC report on Soils)
16. Prime Agriculture Soils	1. Prior authority - designated soil types SCS	1. Agriculture 2. Natural open space	
17. Recreation Areas	1. Prior authority - State Parks 2. Prior use - use or development for recreational activity	1. Recreation (types vary)	

IV. PERMISSIBLE USES

For purposes of the Commission's Coastal Zone Management Program, virtually any use is permissible within the coastal zone, although not every use will be permissible in every part of the coastal zone. Permissible uses will be indicated following analysis of coastal resources, and will be geographically specific. Uses which meet certain criteria will be deemed permissible.

Criteria

Permissible uses include those which can be reasonably and safely supported by the resource, which are compatible with surrounding resource utilization, and which will have tolerable impacts upon the environment. The following constitute use permissibility:

1) The carrying capacity of the resource will sustain the intended use in combination with other existing and potential uses:
   Suitability - The resource displays an inherent character to support or to complement specific use(s), as indicated in Table II-1.
   Capability - The resource displays an ability to support a specific use(s) given certain conditions, which the Commission will indicate.
2) The intended use will not adversely affect surrounding resource utilization nor diminish the quality thereof as described in the matrix tables and Table I-3. Uses affected by impacts described as secondary or tertiary in effect which are within the standards indicative of significance are permissible.
3) Impacts of the intended use on coastal resources will be within standards indicative of significance. The application of management techniques and procedures which mitigate resource impact of the intended use to within standards indicative of significance are permissible.

4) The intended use is in basic conformity with the goals and objectives, as established by the Commission in accordance with state and federal regulations.

5) The intended use is not in conflict with those of regional benefit or the National interest.

Priority of Uses

A variety of uses can be expected to meet criteria for permissibility in a given resource area. However, some uses may be better suited to certain locations depending upon resource characteristics, use intensity, need, or other factors. As part of its analysis, the Commission will assess permissible uses in terms of setting priorities for the entire coastal zone, specific resource area types, and geographic areas of particular concern. The Commission will consider the following factors relevant to designation of priorities for coastal uses:

1) The natural inherent character of a resource to support certain uses (principle) of best use)

2) The degree to which the use satisfies local, regional, state, and national needs and interests

3) Conformance with St. Lawrence-Eastern Ontario goals and objectives for coastal development

4) Prior authority or prior use

5) The degree to which the intended use meets criteria for designation of Georaphic Areas of Particular Concern.

V. USES OF REGIONAL BENEFIT

Requirements

As noted in the Introduction, above, the Coastal Zone Management Act requires (in Sec. 306(e)(2)) that the state's management program include means for "...assuring that local land and water use regulations...do not unreasonably restrict or exclude uses of regional benefit." As defined in 15 CFR 923.17, "...a use of regional benefit will be one which provides services or other benefits to citizens of more than one unit of local, general-purpose government....In any event, ...these uses should include..." facilities needed to meet "requirements which are other than local in nature and in the siting of which there may be a clear national interest." The latter (which are specified in 15 CFR 923.15) include the following broad categories of uses:

> Energy production/transmission; Interstate recreation; Interstate transportation; Production of food and fiber; Preservation of life and property; National defense; Historic, cultural, esthetic and conservation values; Mineral extraction.

Restriction or exclusion of facilities needed for such uses (and others of more than local benefit) by local regulation, although allowable, cannot be arbitrary or capricious. Appropriate local limitations may be established, based upon analyses of the suitability of an area for a particular use, or of the capability of local resources to sustain the use.

Thus, the state's management program must satisfy three requirements:

- it must identify, or provide criteria and procedures for identifying, uses of regional benefit;
- it must prescribe standards and procedures for determining whether a local regulation of a regional benefit use is reasonable; and
- it must include means for preventing or overriding unreasonable local exclusion or restrictions.

Criteria for Uses of Regional Benefit

The fundamental criterion for such uses can be drawn clearly from the regulations quoted above: that the goods, services, or intangible benefits resulting from the use or activity are to be consumed, used, or enjoyed primarily by other than local community residents. Although there may in fact be local benefits, the facility or area in question must be primarily intended to serve a greater-than-local "market."

This will be true even though adverse effects or impacts may largely affect, or are seen as affecting, the particular locality in which the use is located. That is, of course, the situation in which local interests may seek to apply restrictive or exclusionary regulations.

Whether or not there is a "national interest" in the siting of a particular use or facility of regional benefit will depend on the circumstances: the nature or relative size of the area or facility, the size of the "market" that

is to be served, its specific contribution to satisfaction of a national requirement, or a determination to that effect by a responsible federal agency.

A. Energy production/transmission--Locational and site advantages have made the SLEO area attractive for development of facilities serving statewide electric generation requirements. One-third of all major thermal electric stations on Lake Ontario are in this area, and substantial additions are under construction and in planning. Existing and projected transmission corridors link these sites with the statewide grid, and interconnect PASNY with Hydro Quebec to permit large-scale seasonal exchanges of current. Additionally, the St. Lawrence Seaway transits over 2 million tons of petroleum fuels annually, largely bound for Canadian or upper Great Lakes U.S. ports. Minor gas supplies have been developed in the coastal area, and there is some potential for further exploration and development of this source. Large-scale wind-powered electric generators have been proposed, both offshore and upland, but locally specific studies have not been undertaken to assess system designs, their technical and economic feasibility, or environmental impacts. For these reasons, uses of regional benefit shall include items meeting the following criteria.

Major electric generation plants and transmission lines, defined as uses of regional benefit, shall be those existing and proposed facilities identified annually in the Long Range Plan of the New York Power Pool (pursuant to Art. VIII, Sec. 149-b, NYS Public Service Law). Proposed facilities for which at least

a preliminary site identification has been made are specifically listed (in the 1977 Plan) in Exhibit 15A "Schedule of Generating Capacity Additions" and Exhibit 16 "Proposed Transmission Facilities." Comparable listings in subsequent editions of the Plan shall constitute the criterion for proposed regional benefit uses of this category.

Major gas transmission facilities, defined as uses of regional benefit, shall be those defined in Article VII, NYS Public Services Law, as being subject to application for certification under that Article. Any gas well, except a well exclusively serving a single on-site consumer, shall be a use of regional benefit.

Uses of regional benefit shall include all oil wells and oil refining/processing plants, and all transmission lines, storage tanks, truck terminals, docks, and moorings utilized in the wholesale distribution of petroleum fuel products.

B. Recreation--Outdoor recreation, primarily seasonal in character, is a substantial user of the area's shorelands and an important element in the economy of many communities in the SLEO area. The area's location and the character of its outdoor recreation resources have made it of international as well as interstate significance. Users are predominantly non-local in origin. For those reasons the following constitute uses of regional benefit:

a) Public facilities --

State and county parks

State historic sites

Public water-access facilities: boat launches, moorings, marinas, and fishing access points, fishing rights easements and access ways.

Scenic overlooks, rest areas, and scenic easements.

Wildlife Management Areas and Sanctuaries

b) Private-Commercial --

campgrounds, rental accommodations

recreation beaches, day-use recreation areas and facilities

boat launches and marinas

support facilities: retail sales and services predominantly utilized by transients and seasonal residents (specifically, establishments that close during the off-season).

C. Transportation -- Major transportation facilities are by definition uses of regional benefit. The location and character of the SLEO area are such that it includes but a few significant facilities devoted to this purpose. Forseeable changes include enlargement or improvement of existing facilities, rather than construction of new ones. The following constitute uses of regional benefit:

--The Seaway, including its control works, channels, navigation aids, locks, and anchorages. Operational changes, e.g., to accommodate larger vessels, or to extend the navigation season, would be uses of regional benefit.

--Ports and port facilities, including docks, basins, and channels; warehouses and other goods storage facilities; industrial development dependent upon or related to shipping; dredging

and spoil disposal, necessary for port maintenance or improvement, are uses of regional benefit.

--Highways providing primary access to or through the coastal area: Interstate 81, highways 3, 12, and 37, international bridges.

--Railroads: lines serving Oswego and Ogdensburg are of regional benefit because of industrial service and as complementary linkages with port facilities.

D. Production of Food and Fiber--

(The remainder of this section will be transmitted at a later date.)

Local Controls and Uses of Regional Benefit

Requirements

Section 306(e)(2) of the CZMA requires a management program to provide "for a method of assuring that local land and water uses regulations within the coastal zone do not unreasonably restrict or exclude land and water uses of regional benefit. As defined in 15CFR 923.17.." that the state has developed and applied a method for determining uses of regional benefit and that it has established a method for assuring that local land and water use controls in the coastal zone do not unreasonably or arbitrarily restrict or exclude those uses of regional benefit."

It is important to point out that Section 306(e)(2) does not state that uses of regional benefit cannot be excluded or restricted by a local unit of government - only that they not be unreasonably excluded or restricted. Uses with a direct and significant impact on coastal waters which exceed the carrying capacity of the resources or which are demonstrably unsuitable with respect to adjacent uses obviously can be excluded or restricted within the framwork of the management program.

The management program will include a provision for performance standards whereby the impacts of various uses upon coastal resources are assessed and acceptable levels established; any use whose impacts do not exceed the established level will be deemed acceptable and thus included implicitly within the list of managed land and water uses. These performance standards will emanate from an analysis of the acceptability of impacts upon coastal resources and not from statewide or national standards alone. Thus, in certain instances, performance standards developed for coastal zone management may well be more restrictive than similar requirements which apply for air and water pollution control on a statewide basis.

In order to assure that there are necessary provisions to either appeal and/or change unreasonable or arbitrary exclusion of regional benefit by local government the State of New York does have adequate provision to override local zoning ordinances. Article IX, section 2 of the New York State Constitution provides for - Powers and duties of legislature; home rule powers of local government; stature of local governments. As provided in Section 2 (a), "The legislature shall provide for the creation and organization of local government in such manner as shall serve to them the rights, powers, privilegs and immunities granted to them by this consitution."

The "police power" resides in the legislature - cities, towns, and villages are creatures of the state. Article 2 (b) (1); further states "A power granted in such statute may be repealed, dimminished, impaired or suspended only by enactment of a statute by the legislature with the approval of the govenor at its regular session in one calendar year and the re-enactment and approval of such statute in the following calendar year."

There are several recent examples of the state's ability to supercede local controls. The two most relevant cases include the NYS Urban Development Corporation (UDC) Thomas Floyd vs. N.Y.S.--U.D.C., and the Adirondack Park Agency with regard to the Wambat court decisions.

In 1968, the state legislature created the New York State UDC, a statewide benefit corporation having powers to undertake certain types of community development.

"The two corporations (U.D.C. and Urban Development Research Corporation) were given the power to 'override' local zoning ordinances and regulations in order to overcome restrictive local standards that have often impeded urgently needed development or

have rendered it prohibitively expensive. This grant of power reaffirmed the traditional immunity that instrumentalities of the State have enjoyed when carrying out State purposes." (N.Y. Legis. Annual, 1972, p. 448).

In the case of Thomas Floyd vs. New York State Urban Development Corporation, it was decided in the Court of Appeals, State of New York, on July 3, 1973 that, "New York State Urban Development Corporation, in planning to develop a 12 acres parcel of real property, may plan and execute projects in disregard of local zoning laws."

The Adirondack Park Agency created by an act of the State legislature in 1973, has as its basic function and concern the regulation of the use and development of private lands within the Adirondack Park.

A further purpose of the Act in Article 801 is to focus the responsibility for developing long-range park policy in a form reflecting statewide concern.

In a decision written by Chief Justic Charles Breitel, Court of Appeals (the state's highest court) upheld the constitutionality of the Adirondack Park Agency, ruling that the state has the power to override "local or parochial interest" on matters of statewide concern.

Wambat Realty, which owns 2,000 acres in Black Brook, was denied APA approval to develop a project called "Valmont Village." The project would have been permitted under the town zoning law.

Wambat and the Town of Black Brook, Clinton County, had argued that the creation of the park did not serve any interest of the state or the maintenance of life and health, and therefore did not meet the test of statewide concern. The court held

"that the proper purpose and effect of the APA law was to prevent localities within the Adirondack Park from freely exercising their zoning and planning powers."

This finding recognizes the major state interest in the conservation, use and development of the park's resources and the preservation of its open space character, and at the same time, provides a continuing role for local government.

A bill that will soon be introduced to the state legislature, Article 6-B, Coastal Zone Management, "An act to amend the executive law, in relation to the preparation of a coastal zone management program," directly addresses the issue of regional benefit of uses that are other than local in nature.

e. "It (the local land use program) contains adequate authority and provision for its implementation, including authority for its administration and enforcement. Such authority shall require that notification be given to the secretary of any application for approval of a land or water use which is, under the program, subject to approval after the exercise of administrative discretion on a case-by-case basis, including, but not limited to, subdivision plats, special permits, site plans, and variances."

The bill sets forth a procedure for state review and approval/disapproval of local land use programs. The bill will in addition provide the state with authority to withdraw approval of ordinances that are not administered "properly."

Further consideration is being given to the idea of the state being a "party" in any decretionary decision, if the decision is contrary to statewide interests and policy, then it would be appealed through the courts rather than through administrative procedures.

Of further interest is that although the St. Lawrence-Eastern Ontario Commission has no regulatory control, it does exercise an advisory role over development within its jurisdiction (adjacent towns) through Article 37 of the Executive Law.

847-e (2)--encourage and assist compliance with the comprehensive development plan to be prepared by the Commission under this article by offering and giving advice, guidance and assistance to public and private agencies...

847-e (4)--promote and aid the coordination of the activities and programs of federal, state, municipal and private agencies concerned with the preservation, planning, and development of the scenic, aesthetic, historic, ecological, economic, recreational and natural resources of the area...

847-e (9)--encourage and assist municipalities to prepare and adopt comprehensive planning programs to include appropriate ordinances and construction codes and standards.

Project Review. The purposes of this section are to encourage public and private agencies and persons to undertake projects which reflect careful balance of interest. This section provide procedures for project review.

The Commission has also promulgated further rules and regulations which establish standards and procedures consistent with Article 847-g, including a finding by the Commission on "the effect of the project upon scenic, historic, recreational, ecological, conservational and natural resources of the St. Lawrence-Eastern Ontario area and the commercial, industrial, agricultural, residencial or other authorities for property acquisition. The possibility exists, however remote, at some later date that

Article 37 could be amended, where necessary, to accommodate uses of regional benefit through further regulatory provisions.

APPENDIX

APPENDIX

TABLE A-I-1: PROCESSES THROUGH WHICH DEVELOPMENT ACTIVITIES AFFECT RESOURCES

INITIAL IMPACTS		CONSEQUENT IMPACTS	
101 Increase runoff flows	101.1	Stimulate or increase erosion	- see 120
	101.2	Increased frequency + size of floods	- imperil coastal flood plain dev't
102 Decrease runoff flows	102.1	Decrease assimilative capacity	- see 113
	102.2	Decrease DO supply	- see 113.3
	102.3	Concentrate sediment inshore	- destruction of near-shore fish and amphibian habitat
	102.4	Increased sedimentation upstream	
103 Increase lake levels	103.1	Higher storm surge and wave action runup, water levels	- increased coastal erosion - undermining of shoreline slopes - distrub coastal wetlands - Imperil coastal dev't (cottages, docks,etc.)
104 Decrease lake levels	104.1	Decreased river and lake near-shore bottom depth	- increase potential for ships and boats grounding - decrease utility of shore-line structures (docks left high and dry) - decrease or shift littoral zone
105 Block or reduce current	105.1	Inhibit mixing with lake waters	- stagnation and filling of impounded drainage - increased eutrophication rate
	105.2	Reduced flusing of pollutants	- reduce assimilative capacity
	105.3	Reduced oxygenation capacity	- see 113
	105.4	Increased water temperatures	- stimulate phytoplankton blooms - decreased saturation limit of DO - mortality and habitat destruction - see 113
106 Scour substrate	106.1	Scour away substrate and benthic biota	- habitat destruction
	106.2	Increased turbidity	- see 113

107	Draw biota into uptake	107.1	biota mortality	
108	Introduce boat/ship wakes	108.1	Increased turbidity	-see 111
		108.2	Rocking of moored or docked craft	- damage
		108.3	Increased shoreline wave action	- shoreline erosion
		108.4	Physical disruption of biota	
109	Decrease recharge	109.1	Lowered groundwater level	- mortality of associated wetland vegetation - reduced water supply - destruction of wildlife habitat
110	Increase salinity	110.1	Reduce saturation limit of DO	- lower biotic ability to assimilate BOD (see 113.3)
		110.2	Salinity barrier to anadromous migration	- decrease anadromous populations
111	Increase turbidity	111.1	Reduced light for photosynthesis, primary producers	- reduce bitotic production - reduce size and number of species
		111.2	Impair feeding of sight-feeding species	- impair sport fishing - favor species tolerant to high turbidity - decreased feeding habitat for fish eaters
		111.3	Change color and clarity of water	- aesthetic displeasure
		111.4	Increased amounts of suspended materials	- reduced disirability for water-contact
		111.5	Increased sedimentation	- see 121
112	Increase water temperature	112.1	Reduced DO	- see 113.3
		112.2	Reduced biotic resistance to toxicity and salinity changes	- reduce biotic productivity - decrease size and number of species
		112.3	Proliferation of warmer water biota	- proliferation of species into weed or pest level - degeneration of habitat
		112.4	Decreased species diversity	- instability of populations and communities
		112.5	Barrier to heat sensitive anadromous fish	- reduce anadromous populations
113	Introduce sewage	113.1	Unappealing water color and noxious odor	- aesthetic displeasure
		113.2	Nutrient-stimulated phytoplankton blooms	- aesthetic displeasure - production ot toxins fatal to biota

			- decreased light generation
			- reduced DO (see 113.3)
		113.3 Increased oxygen demand; decreased DO	- mortality and habitat destruction of high oxygen demand biota; reduced productivity
			- proliferation of low oxygen demand biota to weed or pest level
			- anaerobic conditions; noxious ordors
		113.4 Introduction of human disease vectors	- contamination of water-contact areas
			- contamination of domestic water supplies
		113.5 Introduction of floating material	- befouling of shoreline and water contact areas
		113.6 Proliferation of sewage-tolerant species	- proliferation to weed or pest level
		113.7 Increased turbidity	- see 111
		113.8 Precipitation of sludge blanket	- mortality and habitat destruction of benthic biota
		113.9 Introduction of poisons and inhibiting agents	- mortality and habitat destruction of biota
		113.10 (Boats) Bacteria into nearshore waters	- contamination of water contact areas
114	Introduce nutrients	114.1 Nitrification of groundwater	- groundwater contamination
		114.2 Stimulation of phyto-plankton blooms	- see 113.2
		114.3 Introduction of human disease vectors	- see 113.4
		114.4 Seepage of polluted groundwater into coastal drainage	
115	Introduce persistent	115.1 Biotic conentration in food chain	- human contamination
			- mortality or reproduction failure of affected species species
116	Introduce ephemeral toxins	116.1 Concentration in biota	- mortality and degeneration of habitat
117	Introduce radioactive effluent	117.1 Biotic concentrations of radionuclids	- biota harmful to human contact and ingestion
		117.2 Radioactive areas, radiation	- induce cancer, etc. in exposed populations
118	Introduce floating debris	118.1 Aesthetic displeasure	
		118.2 Hazards for water contact activities	- property damage
			- injuries

119 Create oil slicks	119.1 Introduction of highly toxic fuel oils	- widespread mortality of biota and long term destruction of habitats
	119.2 Block oxygenation of water	- reduce biotic productivity - see 113.3
	119.3 Ingestion and concentration of oil by biota	- biota harmful to human contact and ingestion - reduced biotic production - death of biota
	119.4 Floating oil scum	- contaminate swimming areas - befoul boats, shoreline, beaches, habitat areas - noxious odor - aesthetic displeasure
	119.5 Adhesion to suspended material, precipitation to bottom	- concentration of toxic hydrocarbons on bottom; benthic habitat destruction
	119.6 Oil coating of birds and mammals	- mortality of affected birds and mammals - endanger survival of rare species
	119.7 Fouling of fishing gear	- impair sport fishing
	119.8 Application of chemicals and dispersants	- mortality of biota
120 Increase sheet and gully erosion into coastal drainage	120.1 Change bottom sediment composition	- alter benthic community - substrate unsuitable for recolinization
	120.2 Silt covered biota and spawning grounds	- mortality of biota and spawning populations
	120.3 Increased turbidity	- see 133
	120.4 Accelerate evolution to wetlands; eutrophication	- mortality and habitat destruction of submerged communities
121 Increase sedimentation	121.1 Sediment deposition faster than biotic adjustment	- smother benthic biota - habitat destruction
	121.2 Change composition of bottom substrate	- substrate unsuitable for recolonization
	121.3 Shoaling	- hazardous shallows
122 Remove substrate	122.1 Mortality of biota in substrate	- see 121.2
	122.2 Change composition of substrate	- see 111
123 Introduce sludge and contaminated sediments	123.1 Increased oxygen demand - decreased DO	- see 113.3
	123.2 Release of toxins	- see 115 and 116
124 Increase bottom depth	124.1 Decreased light penetration to bottom for photosynthesis	- reduced primary production - destruction of submerged lands vegetation

		124.2 Pits formed below bottom level	- collection and decomposition of organic debris
125	Increase shoreline slope	125.1 High wave runup and overtopping	- inland flooding
		125.2 Increased erosion	- see 120
		125.3 Stimulation of landslides and undermining	- increased erosion - damage to shoreline development
		125.4 Visible areas of earth and vegetation disturbance	- aesthetic displeasure - see 131 and 132
126	Intercept longshore drift	126.1 Downdrift beach and shore erosion	- removal of beaches - undermining of shoreline developments - scouring away of benthic habitats
		126.2 Ballooning of updrift beach and shoreline	- smother benthic habitat - shoaling and infilling - remove shoreline dev't. from immediate access to water
		126.3 Reflection of on shore waves	- increase backwash across shore and erosion
127	Block sand erosion and transport	127.1 Decreased sand depostion to beaches	- erosion of beaches
128	Fill natural areas	128.1 Disposal of dredging spoils	- deposition on bottom faster than benthic adjustment; smother biota; habitat destruction - change composition of substrate - noxious ordors - filling of wetlands or submerged lands - increased turbidity; see 111
		128.2 Change slope of shoreline	- support failure and collapse of fill
		128.3 Destroy nursery grounds	- reduce populations of affected species
		128.4 Destroy waterfowl nesting and feeding areas	- reduce populations
129	Introduce landfill seepage and leaching	129.1 See 113	
		129.2 See 115	
		129.3 See 116	
130	Litter	130.1 Attraction of insects, gulls, rodents (beach	- physical annyoyance, disease vectors, aesthectic displeasure
		130.2 Hazardous materials (glass, etc.) (beach)	- potential injuries to beach users
		130.3 Increase public disregard for area (beach)	
		130.4 Noxious odors aesthetic displeasure	

		130.5	Introductions of poisons toxic substances (off-shore)	- biotic mortality and habitat destruction
		130.6	Accumulated organic sludge on bottom	- see 113
		130.7	Introduction of floating debris (off-shore)	- see 118 - accumulation on shoreline - navigational hazards - physical hazard in water contact areas
		130.8	Debris accumulation on bottom	- fouling of fishing gear - aesthetic displeasure - potential hazards in water contact areas
131	Remove shoreline material	131.1	Remove storm wave dissipation material	- increase exposure to storm damage, inland flooding
		131.2	Sheet and gully erosion into coastal waters	- see 120
		131.3	Remove sand supply to beaches	- see 127
		131.4	Remove vegetation	- see 132
132	Disturb vegetation	132.2	Mortality or stunting of vegetation	- dune blowouts, wind erosion - expose shoreline dev't to stomm damage
		132.3	Scarring of natural vegetation pattern	- aesthetic displeasure
		132.4	Increased sheet and gully erosion into coastal drainage	- see 120
133	Bock anadromous fish	133.1	Reduce anadromous populations	- inhibit sport fishery
134	Inhibit coastal access	134.1	Increased competition for available access	- overuse, deterioration, destruction - congestion and crowding
		134.2	Physcial barriers to alongshore beach and water	- navigation hazards - boating congestion
		134.3	Insufficient parking areas	
135	Navigation hazards in water			
136	Impair scenic quality	136.1	Aesthetic displeasure	
		136.2	Increased desirability of unspoiled scenic areas	- overuse and competition for other areas
		136.3	Blocked or impaired coastal views	
137	Impair historic character			
138	Impair air quality	138.1	Introduce toxic pollutants	- increased morbidity

138.2	Atmosheric discoloration, clouding	- aesthetic displeasure
138.3	Noxious odors	- aesthetic displeasure

APPENDIX B - DEFINITIONS

(The remainder will be transmitted at a later date.)