Introduction and Definitions

EARTH 444

BIOL 462

Applied Wetland Science

B.G. Warner

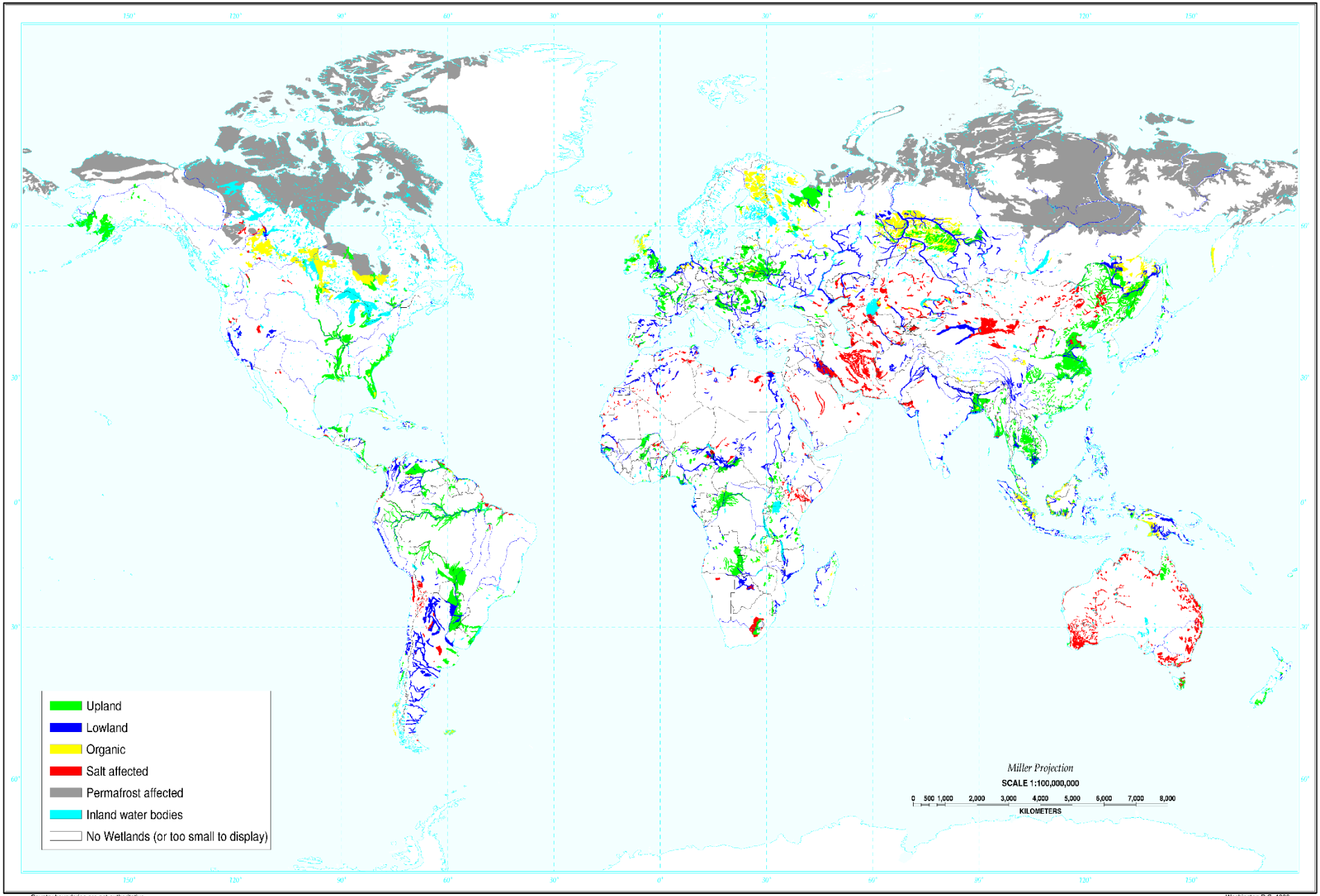
Hippopotamus amphibius

Homo sapiens

Castor canadensis

U.S. Dept. of Agriculture
Natural Resources Conservation Service
Soil Survey Division
World Soil Resources

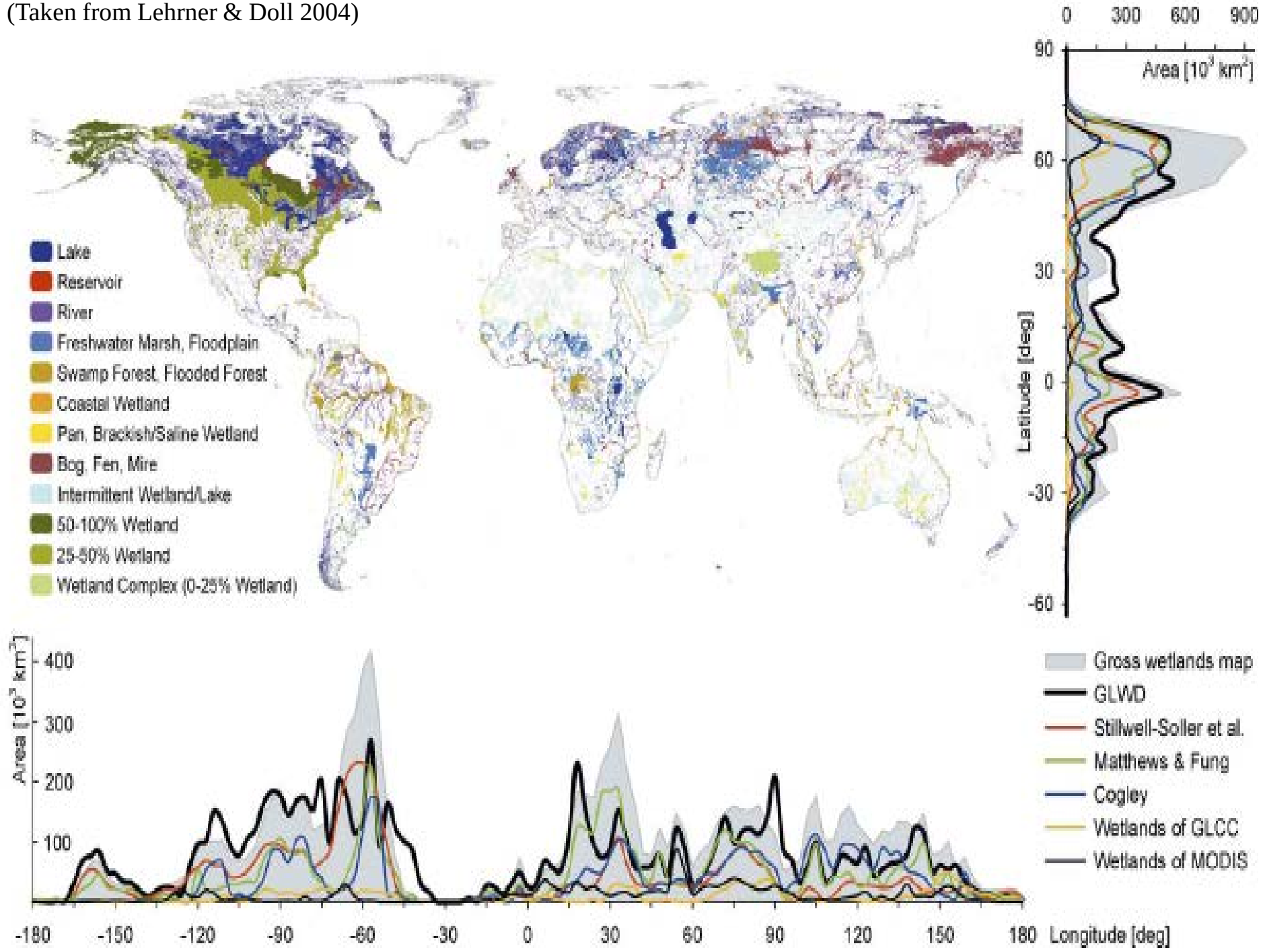
Distribution of Wetlands



Country boundaries are not authoritative.

Washington D.C. 1996

(Taken from Lehrner & Doll 2004)



OF WETLANDS

Produced by the Geographical Services Division, Surveys and Mapping Branch, Energy, Mines and Resources Canada. Printed 1986.

Copies of this map may be obtained from the Canada Map Office, Energy, Mines and Resources Canada, Ottawa, or your nearest map dealer. Quote MCR 4107.

Des exemplaires de cette carte sont disponibles en français. Précisez MCR 4107F.

Scale 1:7 500 000 or 1 centimetre represents 75 kilometres

75 0 75 150 225 300 375 450 kilometres

Lambert Conformal Conic Projection, Standard Parallels 49°N and 77°N.
Modified Polyconic Projection, North of Latitude 80°.

Sources:

Ketcheson, D.E. and J.K. Jeglum. 1972. *Estimates of Black Spruce and Peatland Areas in Ontario.* Canadian Forestry Service. Information Report O-X-172. Sault Ste. Marie, Ontario.

Keys, D., D.E. Gemmell and R.E. Henderson. 1982. "New Brunswick Peat – Resources, Management and Development Potential". *Proceedings of a Symposium on Peat and Peatlands.* Shippagan, New Brunswick.

Kivinen, E. and P. Pakarinen. 1980. "Peatland Areas and the Proportion of Virgin Peatlands in Different Countries". *Proceedings of the 6th International Peat Congress,* Duluth, Minnesota. pp. 52 - 54.

Korpijaakko, E.O. 1975. "Preliminary Muskeg (Peatland) Inventory of the Province of New Brunswick". *Canadian Journal of Earth Sciences.* Volume 12, Number 1, pp. 24 - 27.

Mills, G.F. 1983. "Peatland Inventories in Manitoba". *Proceedings of a Peatland Inventory Methodology Workshop.* S.M. Morgan and F.C. Pollett (eds.) Ottawa, Ontario.

Monenco Ontario Limited. 1981. *Evaluation of the Potential of Peat in Ontario Energy and Non-Energy Uses.* Ontario Ministry of Natural Resources. Occasional Paper Number 7. Toronto, Ontario.

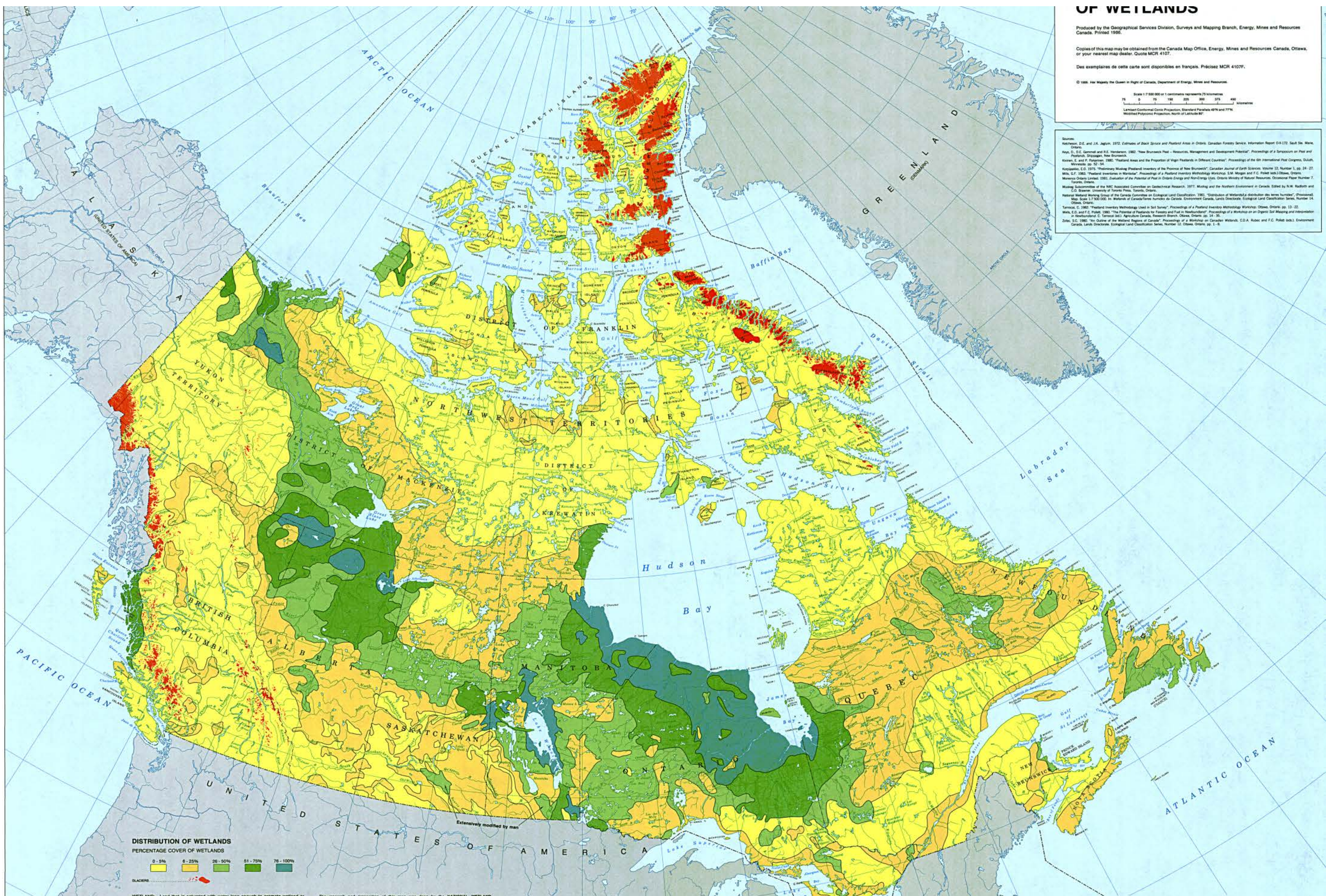
Muskeg Subcommittee of the NRC Associated Committee on Geotechnical Research. 1977. *Muskeg and the Northern Environment in Canada.* Edited by N.W. Radforth and C.O. Brawner. University of Toronto Press. Toronto, Ontario.

National Wetland Working Group of the Canada Committee on Ecological Land Classification. 1981. "Distribution of Wetlands/La distribution des terres humides", (Provisional). Map. Scale 1:7 500 000. In: *Wetlands of Canada/Terres humides du Canada.* Environment Canada, Lands Directorate. Ecological Land Classification Series, Number 14. Ottawa, Ontario.

Tarnocai, C. 1982. "Peatland Inventory Methodology Used in Soil Survey". *Proceedings of a Peatland Inventory Methodology Workshop.* Ottawa, Ontario. pp. 13 - 22.

Wells, E.D. and F.C. Pollett. 1980. "The Potential of Peatlands for Forestry and Fuel in Newfoundland". *Proceedings of a Workshop on an Organic Soil Mapping and Interpretation in Newfoundland.* C. Tarnocai (ed.). Agriculture Canada, Research Branch. Ottawa, Ontario. pp. 14 - 35.

Zoltai, S.C. 1980. "An Outline of the Wetland Regions of Canada". *Proceedings of a Workshop on Canadian Wetlands.* C.D.A. Rubec and F.C. Pollett (eds.). Environment Canada, Lands Directorate. Ecological Land Classification Series, Number 12. Ottawa, Ontario. pp. 1 - 8.



DISTRIBUTION OF WETLANDS

PERCENTAGE COVER OF WETLANDS

0 - 5% | 6 - 25% | 26 - 50% | 51 - 75% | 76 - 100%

GLACIERS

WETLAND: Land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation, and various kinds of biological activity which are adapted to a wet environment.

Wetlands include peatlands which are characterized by more than 40 cm of peat accumulation, on which Organic soils (excluding Folisols) develop. Wetlands also occur in areas that are influenced by excess water but which, for climatic, edaphic (factors related to soil), or biotic reasons, produce little or no peat. These wetlands are characterized by Gleysolic or the peaty phases of Gleysolic soils.

Shallow open water, generally less than 2 m deep, is also included in wetlands if associated with other kinds of wetlands. In certain areas of these wetlands, vegetation is lacking and soils are poorly developed as a result of frequent and drastic fluctuations of surface water levels or of wave action, water flow, turbidity, or high concentration of salts or other toxic substances in the water or in the soil.

Wetlands also include areas which are modified by water control structures or which are tilled and planted but which, if allowed to revert again, become saturated for long periods and will be associated with wet soils (Gleysols) and hydrophytic vegetation.

Regional differences in the development of wetlands are readily apparent in Canada. Some of these differences relate to the distribution and abundance of wetlands. Although

The research and preparation of this map was done by the **NATIONAL WETLAND WORKING GROUP of the CANADA COMMITTEE ON ECOLOGICAL LAND CLASSIFICATION.**

The major contributors to this map were the following members of the National Wetland Working Group:

G.D. Adams	-	Canadian Wildlife Service, Environment Canada, Saskatoon, Saskatchewan.
A.N. Boissonneau	-	Ontario Centre for Remote Sensing, Ministry of Natural Resources, Toronto, Ontario.
A.E. Eagle	-	Land Resource Research Institute, Agriculture Canada, Ottawa, Ontario.
H.E. Hirvonen	-	Office of the Regional Director-General, Environment Canada, Dartmouth, Nova Scotia.
G.F. Mills	-	Canada - Manitoba Soil Survey, Department of Agriculture, Winnipeg, Manitoba.
E.T. Oswald	-	Canadian Forestry Service, Agriculture Canada, Victoria, British Columbia.
J. Ouzilleau	-	Foramec, Conseillers en environnement, Québec, Quebec.
C.D.A. Rubec	-	Lands Directorate, Environment Canada, Hull, Quebec.
C. Tarnocai	-	Land Resource Research Institute, Agriculture Canada, Ottawa, Ontario.
E.D. Wells	-	Canadian Forestry Service, Agriculture Canada, St. John's, Newfoundland.
S.C. Zoltai	-	Canadian Forestry Service, Agriculture Canada, Edmonton, Alberta.

Adapted for the National Atlas of Canada by C.M.C. Gosson, Geographical Research, Geographical Services Division, Surveys and Mapping Branch, Energy, Mines and Resources Canada.

ESTIMATES OF WETLAND AREAS BY PROVINCE

Area of Wetland Within Each Distribution Class
(Figures in thousands of hectares)

PROVINCE	0 - 5%	6 - 25%	26 - 50%	51 - 75%	76 - 100%	Total Wetland Area	Percentage of Wetland by Province	Percentage of Total Canadian Wetlands
Newfoundland	58	3 596	3 138	-	-	6 792	18	5
Prince Edward Island	4	-	-	-	-	4	<1	<1
Nova Scotia	22	155	-	-	-	177	3	<1
New Brunswick	128	294	122	-	-	544	8	<1
Quebec	628	4 579	3 506	2 849	589	12 151	9	10
Ontario	105	684	4 795	8 634	15 023	29 241	33	23
Manitoba	38	2 225	7 089	5 184	7 934	22 470	41	18
Saskatchewan	398	4 170	3 695	1 271	153	9 687	17	8
Alberta	107	1 080	3 249	6 873	2 395	13 704	21	11
British Columbia	352	662	146	1 656	304	3 120	3	2
Yukon Territory	198	185	764	363	-	1 510	3	1
Northwest Territories	2 241	7 520	9 548	6 521	1 964	27 794	9	22

nature of wetlands, in which different wetlands develop under different conditions. If the developing wetland is in equilibrium with its environment (as modified by the wetland itself), very few changes will occur. On the other hand, if the developing wetland alters its own environment, or if the environment changes due to external natural or artificial causes, changes will take place in the development of the wetland. It follows that surface conditions reflect the present status which is but a slice in time of what may be a steady state or a transitional period. An understanding of wetland dynamics is therefore essential in a rational study and classification of wetlands.

Regional studies in Europe and Asia have shown that broad geographic regions have characteristic wetlands. In Canada, similar regionalization of wetland development is observed, generally along a north-south temperature gradient and an east-west precipitation gradient.

WETLAND TYPES

BOG is a peatland, generally with the water table at or near the surface. The bog surface, which may be raised or level with those of the surrounding wetlands, is virtually unaffected by the nutrient-rich ground waters from the surrounding mineral soils and is thus generally acidic and low in nutrients. The dominant peat materials are weakly to moderately decomposed Sphagnum and forest peat, underlain at times by fen peat. The soils are mainly Fibrisols, Mesisols, and Organic Cryosols. The bogs may be treed or treeless, and they are usually covered with Sphagnum mosses, and ericaceous shrubs.

FEN is a peatland with a water table usually at or above the surface. The waters are mainly nutrient-rich, minerotrophic waters from mineral soils. The dominant peat materials are well to moderately decomposed fen peat of variable thickness. The soils are mainly Mesisols, Humisols, and Organic Cryosols. The vegetation consists dominantly of sedges, grasses, reeds, and brown mosses with some shrub cover and, at times, a sparse tree layer.

MARSH is a mineral wetland or a peatland that is periodically inundated by standing or slowly moving waters. Surface waters may fluctuate seasonally, with declining levels exposing drawdown zones of matted vegetation or mudflats. The waters are rich in nutrients. The substratum usually consists of mineral material, although occasionally it consists of peat deposits. The soils are dominantly Gleysols, with some Humisols and Mesisols. Marshes characteristically show zonal or mosaic surface patterns comprised of pools or channels interspersed with unconsolidated stands of emergent sedges, grasses, rushes, and reeds, bordering grassy meadows and peripheral bands of shrubs or trees. Where open water areas occur, a variety of submerged and floating aquatic plants flourish.

SWAMP is a peatland or mineral wetland with standing or gently flowing waters occuring in pools or channels. The water table is usually at or near the surface. There is pronounced water movement from the margin or other mineral sources, hence the waters are rich in nutrients. If peat is present, it is mainly well decomposed forest peat, underlain at times by fen peat. The associated soils are Mesisols, Humisols, and Gleysols. The vegetation is characterized by a dense tree or shrub cover of deciduous or coniferous species, herbs, and some mosses.

SHALLOW WATER is characteristic of intermittently or permanently flooded or seasonally stable water regimes, featuring large open expanses of standing or flowing water which are variously called ponds, pools, shallow lakes, oxbows, reaches, channels, or impoundments. Shallow water is distinguished from deep water by mid-summer water depths of less than 2 m, and from other wetlands by summer open water zones occupying 75% or more of the wetland surface area. Large open water areas, (greater than 8 hectares), should be classified separately as shallow water units, despite the area or extent of bordering vegetation zones. Periodic flooding may increase water depths, but during droughts, low flows, drainage or intertidal periods, drawdown flats may be exposed. Shallow waters are delineated from uplands and bordering wetland complexes by water-eroded shorelines, or by the landward margins of mudflats, floating mats, emergents, or shrubs. In the open water zone, living vegetation, if present, is confined to submerged and floating aquatic plant forms.

Produced by the Geographical Services Division, Surveys and Mapping Branch, Energy, Mines and Resources Canada. Printed 1986.

Copies of this map may be obtained from the Canada Map Office, Energy, Mines and Resources Canada, Ottawa, or your nearest map dealer. Quote MCR 4108.

Des exemplaires de cette carte sont disponibles en français. Précisez MCR 4108F.

Scale 1:7 500 000 or 1 centimetre represents 75 kilometres

Lambert Conformal Conic Projection. Standard Parallels 49°N and 77°N.
Modified Polyconic Projection. North of Latitude 80°.

Sources

Allington, K.P. 1959. *The Bogs of Central Labrador-Ungava: An Examination of Their Physical Characteristics.* McGill University, McGill Sub-Arctic Research Paper Number 7. Montréal, Québec.

Brokx, P., D.N. Bates and D. Simkin. 1970. *Vegetation Patterns of the Hudson Bay Lowlands.* Ontario Department of Lands and Forests. Map 3269. Toronto, Ontario.

Canada Soil Survey Committee. 1978. *The Canadian System of Soil Classification.* Research Branch, Agriculture Canada. Publication Number 1646. Ottawa, Ontario.

Jeglum, J.K., A.N. Boissonneau and V.F. Haavisto. 1974. *Towards a Wetland Classification for Ontario.* Canadian Forestry Service, Department of the Environment. Information Report O-X-215. Sault Ste. Marie, Ontario.

Ketcheson, D.E. and J.K. Jeglum. 1972. *Estimates of Black Spruce and Peatland Areas in Ontario.* Canadian Forestry Service, Department of the Environment. Information Report O-X-172. Ottawa, Ontario.

Korpijaakko, E.O. 1975. "Preliminary Muskeg (Peatland) Inventory of the Province of New Brunswick". *Canadian Journal of Earth Sciences,* 12:24-27. Ottawa, Ontario.

Leahey, A. 1961. "The Soils of Canada from a Pedological Viewpoint". In *Soils of Canada.* R.F. Legget (ed.). Royal Society of Canada. Publication Number 3, pp. 147-157. Toronto, Ontario.

National Wetland Working Group of the Canada Committee on Ecological Land Classification. 1981. "Wetland Regions/Régions des terres humides", (provisional). Map. Scale 1:7 500 000. In *Wetlands of Canada/Terres humides du Canada.* Environment Canada. Lands Directorate. Ecological Land Classification Series, Number 14. Ottawa, Ontario.

Potzger, J.E. and A. Courtemanche. 1955. "Permafrost and Some Characteristics of Bogs and Vegetation of Northern Quebec". *Revue canadienne de géographie.* Volume 9, pp. 109-114. Montréal, Québec.

Smith, R.E. 1975. "Organic Soil Resources in Manitoba and Their Possibilities for Crop Production". *Proceedings of the Symposium Peat: A Resource in Manitoba's Agriculture and Industry.* Department of Plant Sciences, University of Manitoba, Winnipeg, Manitoba.

Tarnocai, C. 1970. *Classification of Peat Landforms in Manitoba.* Agriculture Canada, Research Station, Pedology Unit, Winnipeg, Manitoba.

________ 1974. "Peat Landforms and Associated Vegetation in Manitoba". In: Proceedings of the Canada Soil Survey Committee. *Organic Soil Mapping Workshop.* J.H. Day (ed.). Winnipeg, Manitoba.

________ 1980. "Canadian Wetland Registry". *Proceedings of a Workshop on Canadian Wetlands.* C.D.A. Rubec and F.C. Pollett (eds.). Environment Canada, Lands Directorate. Ecological Land Classification Series, Number 12, pp. 9-38. Ottawa, Ontario.

Zarnovican, R. and J.-L. Bélair. 1979. *Les tourbières de la Baie James: La végétation et les sols.* Environment Canada, Lands Directorate. Ecological Land Classification Series, Number 9. Ottawa, Ontario.

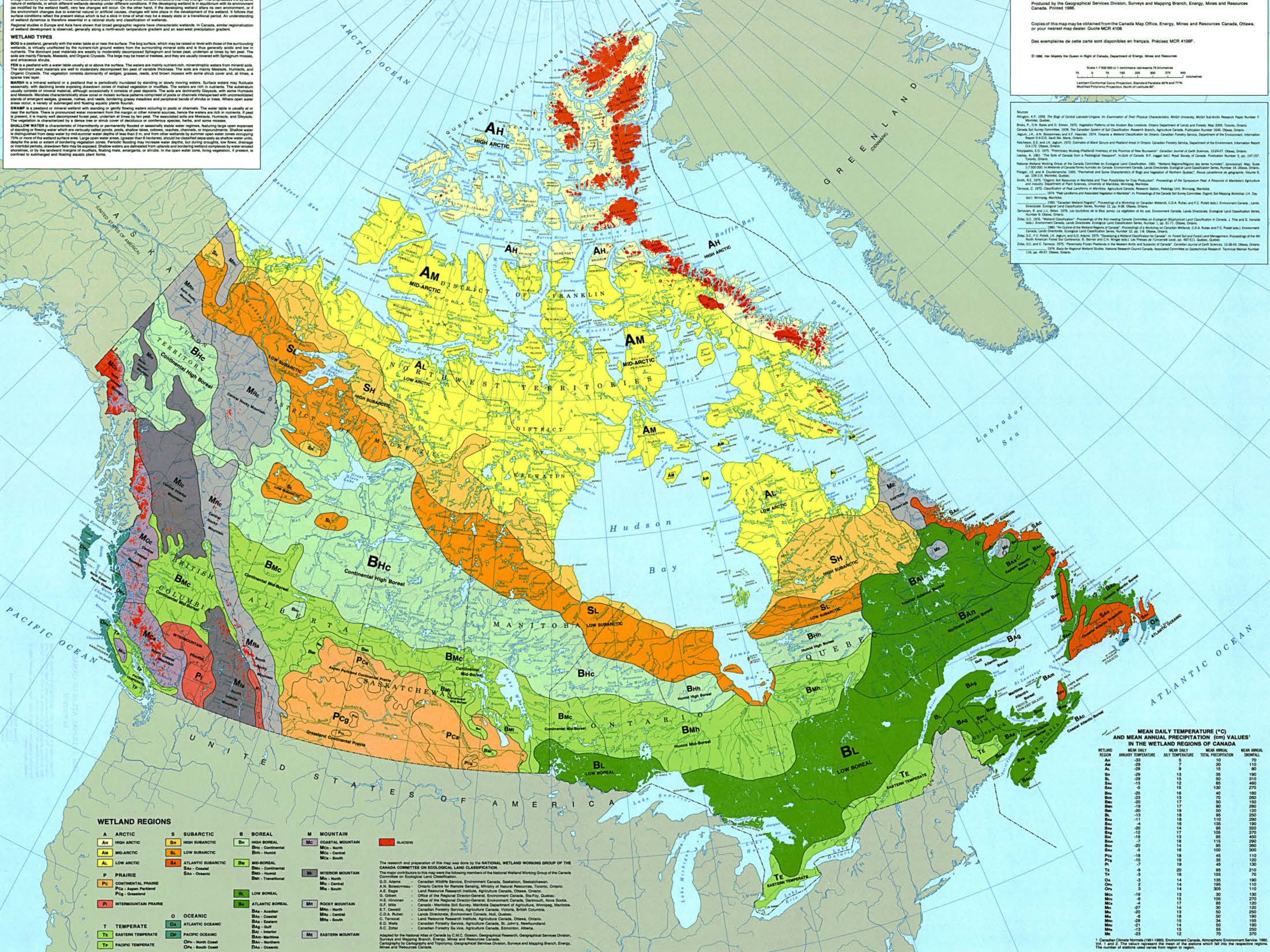
Zoltai, S.C. 1976. "Wetland Classification". *Proceedings of the first meeting Canada Committee on Ecological (Biophysical) Land Classification in Canada.* J. Thie and G. Ironside (eds.). Environment Canada, Lands Directorate. Ecological Land Classification Series, Number 1, pp. 61-71. Ottawa, Ontario.

________ 1980. "An Outline of the Wetland Regions of Canada". *Proceedings of a Workshop on Canadian Wetlands.* C.D.A. Rubec and F.C. Pollett (eds.). Environment Canada, Lands Directorate. Ecological Land Classification Series, Number 12, pp. 1-8. Ottawa, Ontario.

Zoltai, S.C., F.C. Pollett, J.K. Jeglum, and G.D. Adams. 1975. "Developing a Wetland Classification for Canada". In: *Forest Soil and Forest Land Management.* Proceedings of the 4th North American Forest Soil Conference. B. Bernier and C.H. Winget (eds.). Les Presses de l'Université Laval, pp. 497-511. Québec, Québec.

Zoltai, S.C. and C. Tarnocai. 1975. "Perennially Frozen Peatlands in the Western Arctic and Subarctic of Canada". *Canadian Journal of Earth Sciences,* 12:28-43. Ottawa, Ontario.

________ 1976. *Basis for Regional Wetland Studies.* National Research Council Canada, Associated Committee on Geotechnical Research. Technical Memoir Number 116, pp. 49-57. Ottawa, Ontario.



The research and preparation of this map was done by the **NATIONAL WETLAND WORKING GROUP OF THE CANADA COMMITTEE ON ECOLOGICAL LAND CLASSIFICATION.**

The major contributors to this map were the following members of the National Wetland Working Group of the Canada Committee on Ecological Land Classification.

G.D. Adams - Canadian Wildlife Service, Environment Canada, Saskatoon, Saskatchewan.
A.N. Boissonneau - Ontario Centre for Remote Sensing, Ministry of Natural Resources, Toronto, Ontario.
A.E. Eagle - Land Resource Research Institute, Agriculture Canada, Ottawa, Ontario.
G. Gilbert - Office of the Regional Director-General, Environment Canada, Ste-Foy, Quebec.
H.E. Hirvonen - Office of the Regional Director-General, Environment Canada, Dartmouth, Nova Scotia.
G.F. Mills - Canada - Manitoba Soil Survey, Manitoba Department of Agriculture, Winnipeg, Manitoba.
E.T. Oswald - Canadian Forestry Service, Agriculture Canada, Victoria, British Columbia.
C.D.A. Rubec - Lands Directorate, Environment Canada, Hull, Quebec.
C. Tarnocai - Land Resource Research Institute, Agriculture Canada, Ottawa, Ontario.
E.D. Wells - Canadian Forestry Service, Agriculture Canada, St. John's, Newfoundland.
S.C. Zoltai - Canadian Forestry Service, Agriculture Canada, Edmonton, Alberta.

Adapted for the National Atlas of Canada by C.M.C. Gosson, Geographical Research, Geographical Services Division, Surveys and Mapping Branch, Energy, Mines and Resources Canada.
Cartography by Cartography and Toponymy, Geographical Services Division, Surveys and Mapping Branch, Energy, Mines and Resources Canada.

MEAN DAILY TEMPERATURE (°C) AND MEAN ANNUAL PRECIPITATION (cm) VALUES[1] IN THE WETLAND REGIONS OF CANADA

WETLAND REGION	MEAN DAILY JANUARY TEMPERATURE	MEAN DAILY JULY TEMPERATURE	MEAN ANNUAL TOTAL PRECIPITATION	MEAN ANNUAL SNOWFALL
AH	-33	5	10	70
AM	-29	7	20	110
AL	-29	9	15	80
SH	-29	13	35	190
SL	-29	15	50	310
SAc	-15	12	85	460
SAo	-5	15	130	270
BHc	-25	16	40	160
BHh	-23	13	70	260
BMc	-20	17	50	150
BMh	-19	17	80	280
BMt	-20	19	50	120
BL	-13	18	95	250
BAa	-11	18	110	290
BAc	-4	16	135	190
BAe	-20	14	95	320
BAg	-12	17	105	370
BAi	-16	13	95	450
BAm	-7	18	115	290
BAn	-20	14	95	360
BAo	-5	16	100	300
PCa	-18	18	45	110
PCg	-15	19	35	120
PI	-7	19	45	130
TE	-9	20	95	210
TP	-3	16	155	70
OA	-3	14	135	190
OPn	2	14	195	110
OPs	3	14	305	110
MCn	-19	13	30	130
MCc	-8	15	105	270
MCs	-4	17	85	120
MIn	-27	14	30	120
MIc	-20	13	50	250
MIs	-8	18	50	190
MRn	-28	15	34	155
MRc	-21	14	50	180
MRs	-13	15	55	250
ME	-23	12	70	370

1 Canadian Climate Normals (1951-1980). Environment Canada, Atmospheric Environment Service. 1982. Vol. 1 and 2. The values represent the mean of the stations which fall into the respective regions. The number of stations used varies from region to region.

What is a wetland? Definitions & Terms

- Common usage terms (i.e. local terms, dictionary definitions)

  "*An area of land that is usually saturated with water, often a marsh or swamp.*" Oxford English Dictionary
- Scientific
- Regulatory (non-scientific)

  (i.e. Ontario Wetland Evaluation System, RAMSAR Convention)

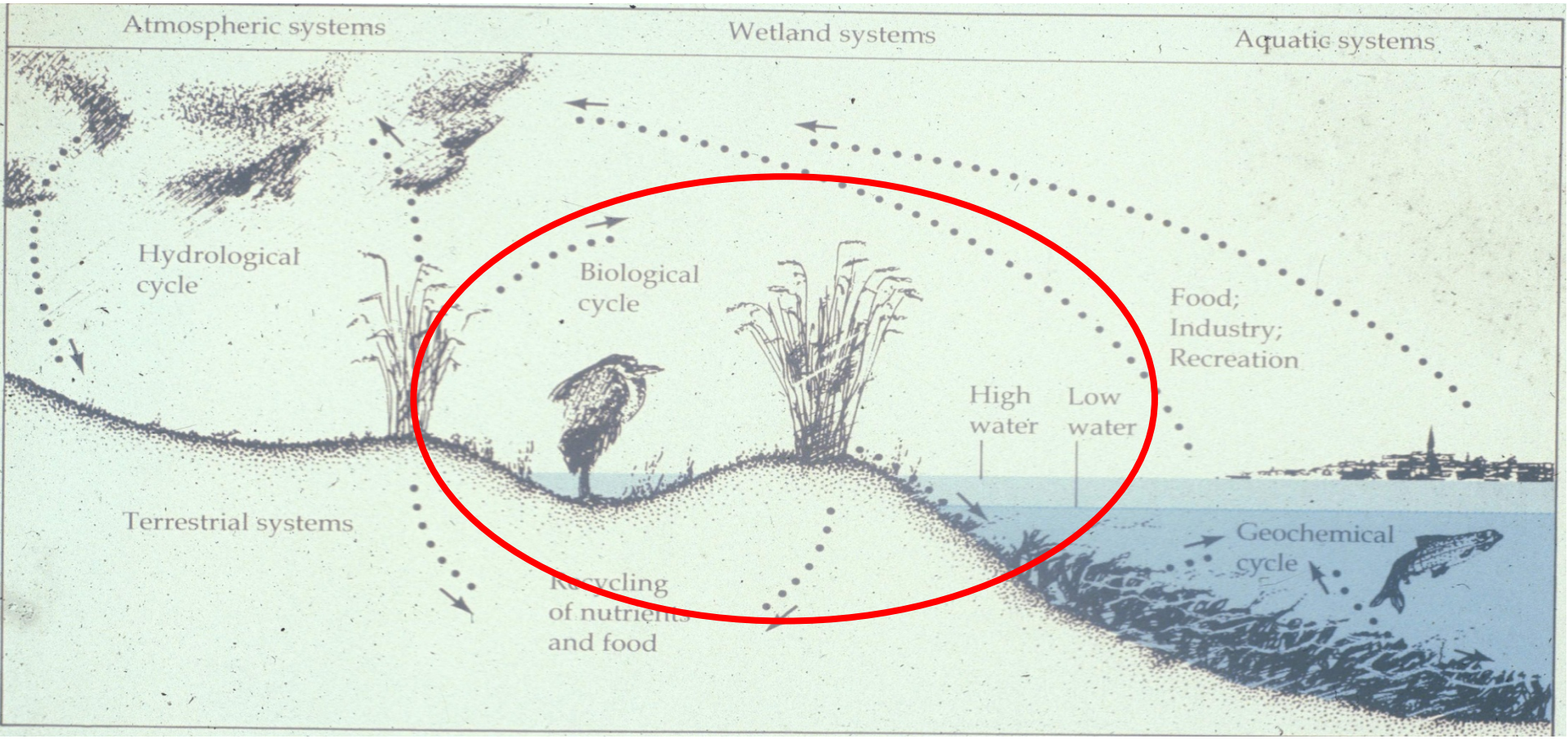
The scientific definition

- Land areas where the land surface is saturated for most of the year
- Saturated long enough to produce characteristic wetland soils that are poor in oxygen (i.e. hydric soils)
- Support specialized biotic communities adapted to saturated soils (hydrophytic vegetation)

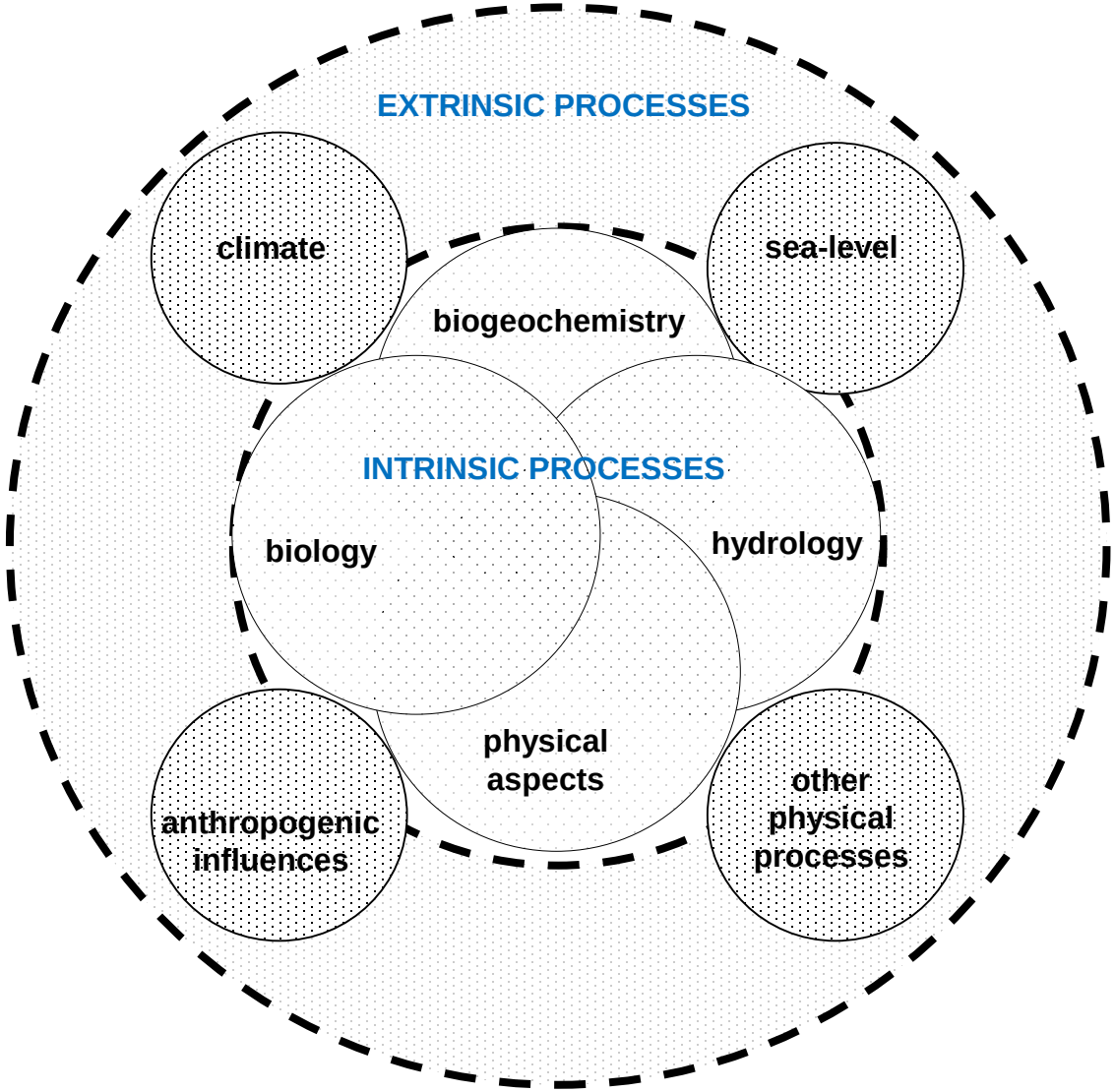
International Definition

- peatland or mineral wetland
- natural or artificial
- permanent or temporary
- water static or flowing
- fresh, brackish or salt water
- marine water at low tide not more than 6 meters (Ramsar 1971)

Wetland in Land-Water Continuum



The Wetland System

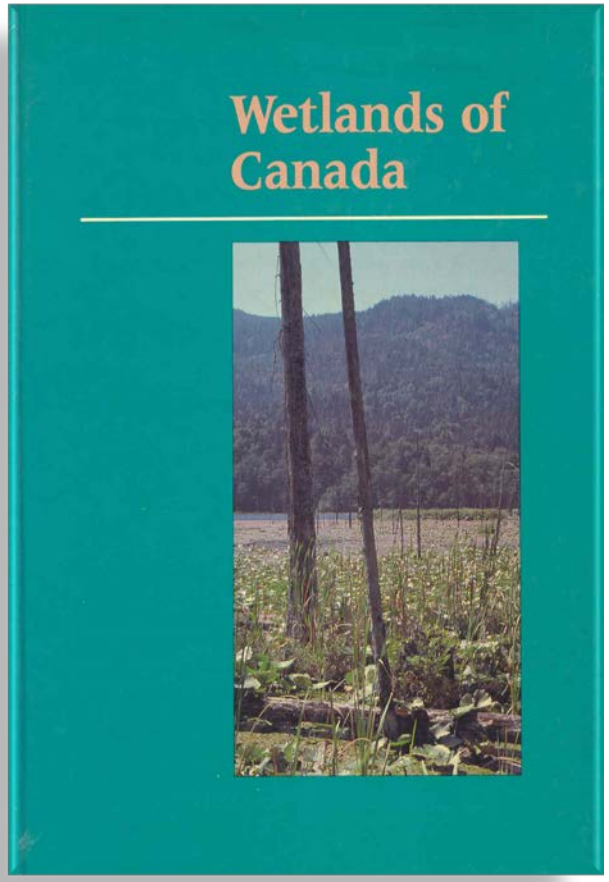


Classification of Wetlands

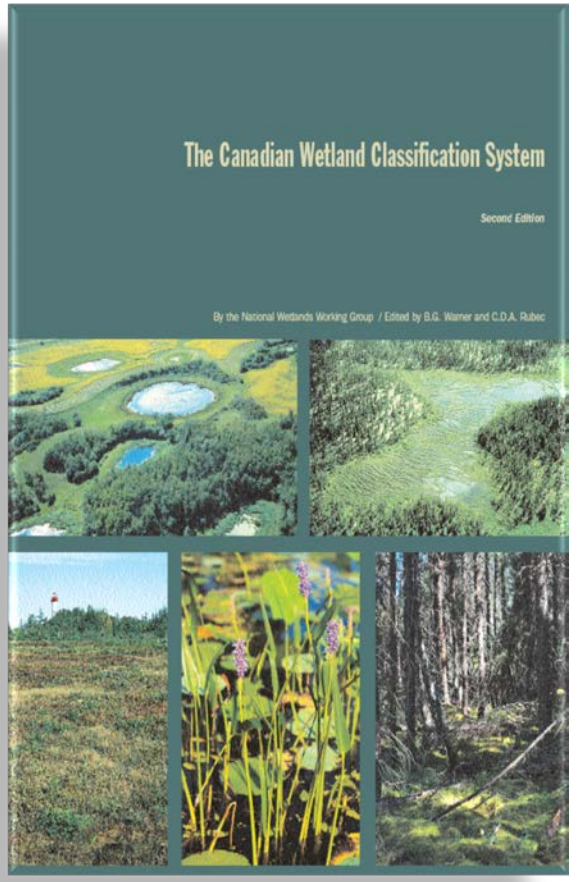
Purposes of Classifications

- is a standard terminology (“taxonomy”)
- provides framework for defining and recognizing wetlands
- provides common terms and standards for wetland inventories, mapping, wetland zones
- is a system available for scientific, legislative, management and conservation purposes

The Canadian Wetland Classification System



1st edition, 1988



2nd edition, 1997

Mineral Wetlands

- Areas with excess water but do not accumulate organic material
- Associated with shallow water less than 2 m deep
- Mineral soil areas modified by water control structures

Organic Wetlands (Peatlands)

- More than 40 cm of organic accumulation; whether active or not
- {*mire: has peat-forming vegetation; where peat is currently being formed*}


mineral wetland


organic wetland - peatland

Canadian Wetland Classification - Hierarchy

- **Wetland Class -** general wetland characteristics
- **Wetland Form -** surface patterns, soil and water type
- **Wetland Type -** vegetation physiognomy

Canadian Wetland Classification System

- **Bog**: 16 forms and 4 subforms
- **Fen**: 12 forms and 7 subforms
- **Swamp**: 8 forms and 22 subforms
- **Marsh**: 8 forms and 18 subforms
- **Shallow Water**: 5 forms and 24 subforms

TOTAL: 124 forms and subforms

Swamp Class

- **Landform**: peatlands and mineral wetlands
- **Hydrol**: water table at or below the surface
- **Chemistry**: minerotrophic
- **Soil**: highly decomposed woody peat
- **Veg'n**: coniferous and deciduous trees and tall shrub (thicket) vegetation cover

Bog Class

- **Landform**: peatlands
- surface raised or level with surrounding terrain
- **Hydrol**: water table at or slightly below surface
- **Chemistry**: ombrotrophic
- **Soils**: moderately decomposed *Sphagnum* peat with woody remains of shrubs
- **Veg'n**: tree, shrub or treeless vegetation cover

Fen Class

- **Landform**: peatlands
- **Hydrol**: water table at or a few centimeters above or below surface
- surface is level with water table with moving water
- **Chemistry**: minerotrophic
- **Soil**: decomposed sedge or brown moss peat
- **Veg'n**: graminoid and shrub vegetation cover

Marsh Class

- **Landform**: mineral wetlands
- **Hydrol:** shallow surface water which fluctuate
- **Chemistry**: minerotrophic and eutrophic
- **Soil**: thin accumulation of organic material
- **Veg'n**: rushes, reeds, grasses and sedge vegetation cover with emergent and floating aquatic herbaceous species

Shallow Water Class

- **Landform**: transitional between peatlands/ mineral wetlands and aquatic systems
- **Hydrol**.: standing or flowing water
- less than 2 m water
- **Chemistry**: minerotrophic or oligotrophic (eutrophic)
- **Soil**: limnetic and organic material
- **Veg'n**: floating leaved and submergent aquatic vegetation

Wetlands difficult to classify

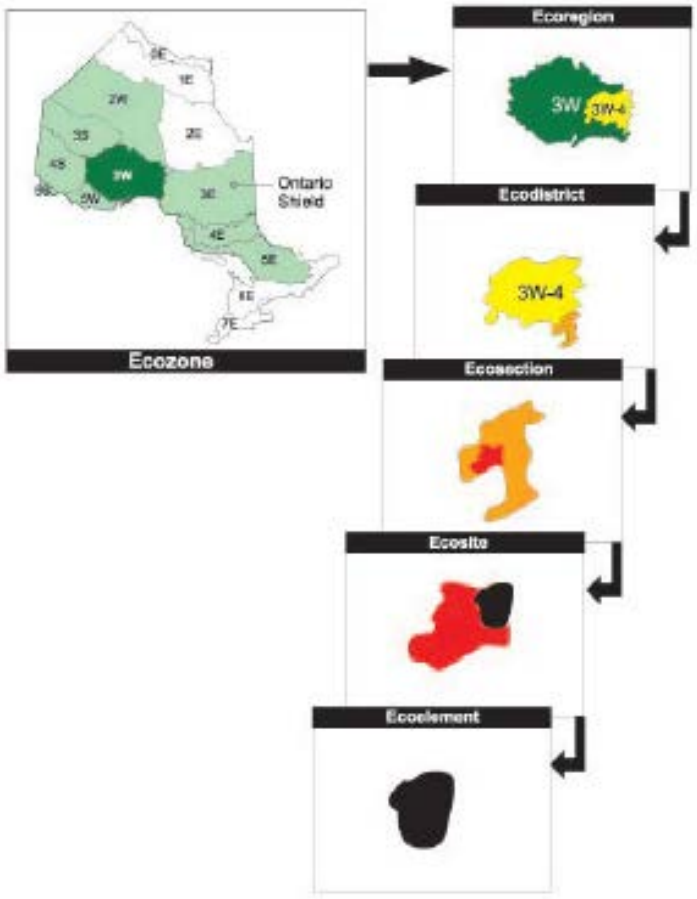
- Physical setting
- Hydrology
- Geochemistry
- Biota

Ecological Land Classification

- Began in 1990s, but latest revisions in 2000
- Applicable to many OMNR programs and policies, such as Species at Risk, Old Growth Policy, Forest Resource Inventory, Provincial Policy Statement
- hierarchial system: very broad → fine scale
- defines ecological units on the basis of:
  - bedrock
  - climate (temperature, precipitation)
  - physical setting (soils, slope, aspect)
  - vegetation

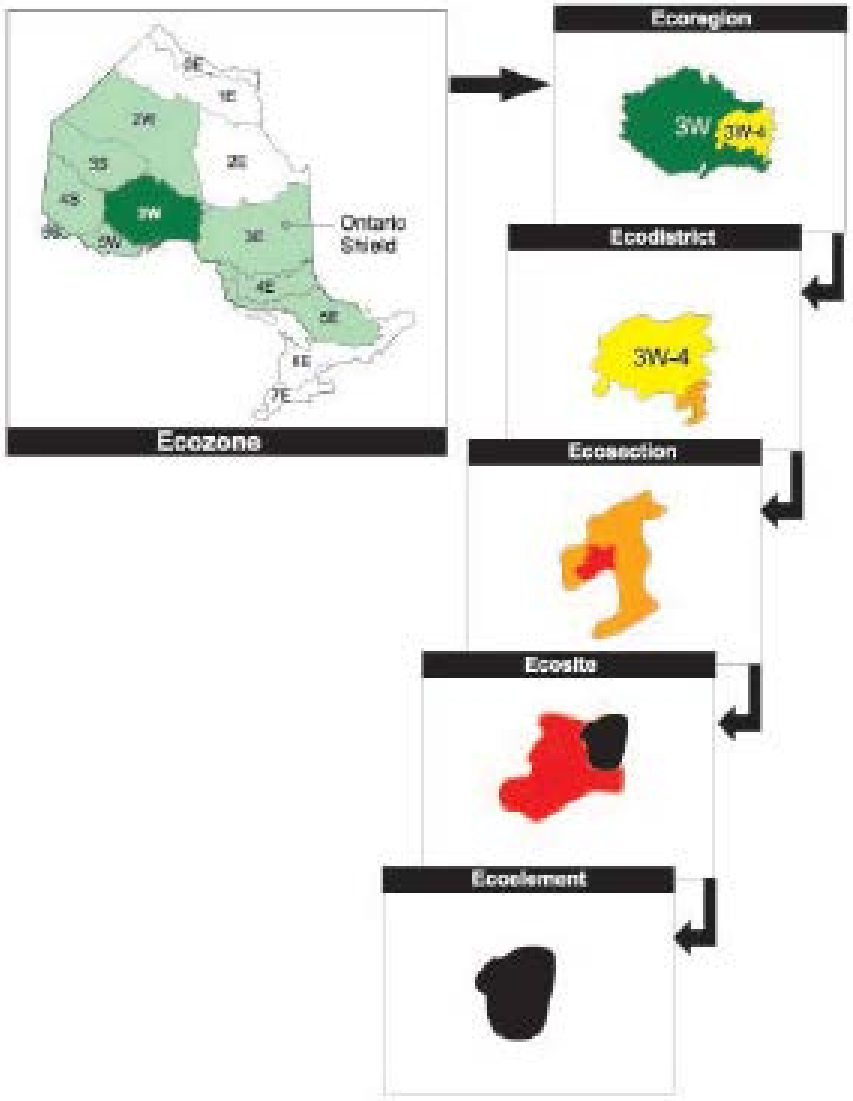
Ecological Land Classification

- Ecozone – 3 in Ontario
  - Hudson Bay Lowlands – 3 Ecoregions
  - Ontario Shield – 9 Ecoregions
  - Mixed Plains – 2 Ecoregions
- Ecoregion – 14 in Ontario
- Ecodistrict
- Ecosite
- Ecoelement



Ecological Land Classification

- Ecozone – 3 in Ontario
  - Hudson Bay Lowlands – 3 Ecoregions
  - Ontario Shield – 9 Ecoregions
  - Mixed Plains – 2 Ecoregions
- Ecoregion – 14 in Ontario
- Ecodistrict



This map is illustrative only. Do not rely on it as a precise indication of routes, location of features, nor as a guide to navigation.

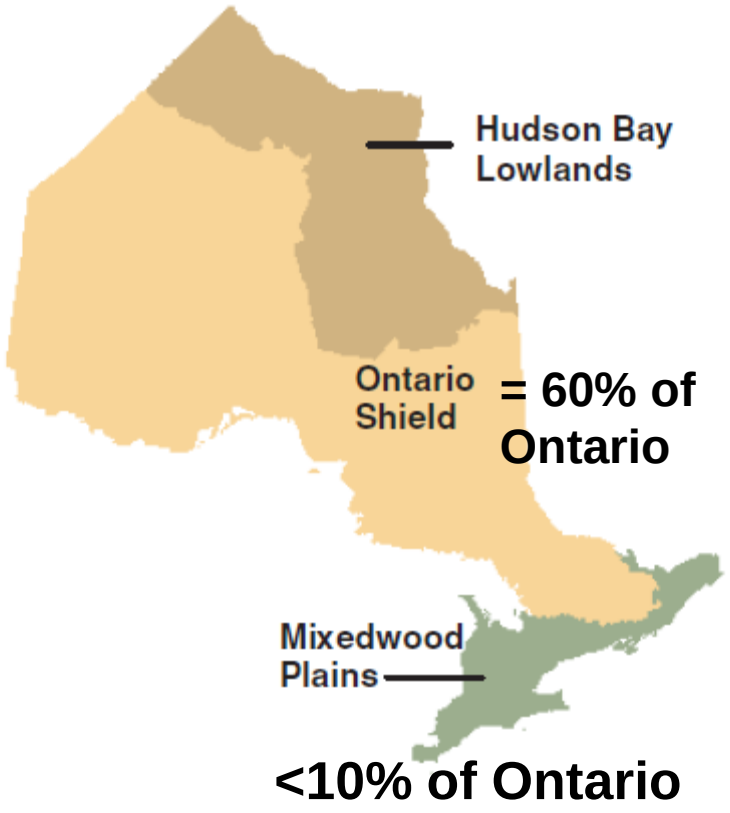
Produced by the Planning and Research Section, Ontario Parks.

Data Source: ELC - William J. Crins, for ELC Working Group, NRVS

Projection: Lambert Conformal Conic, North American Datum 1983

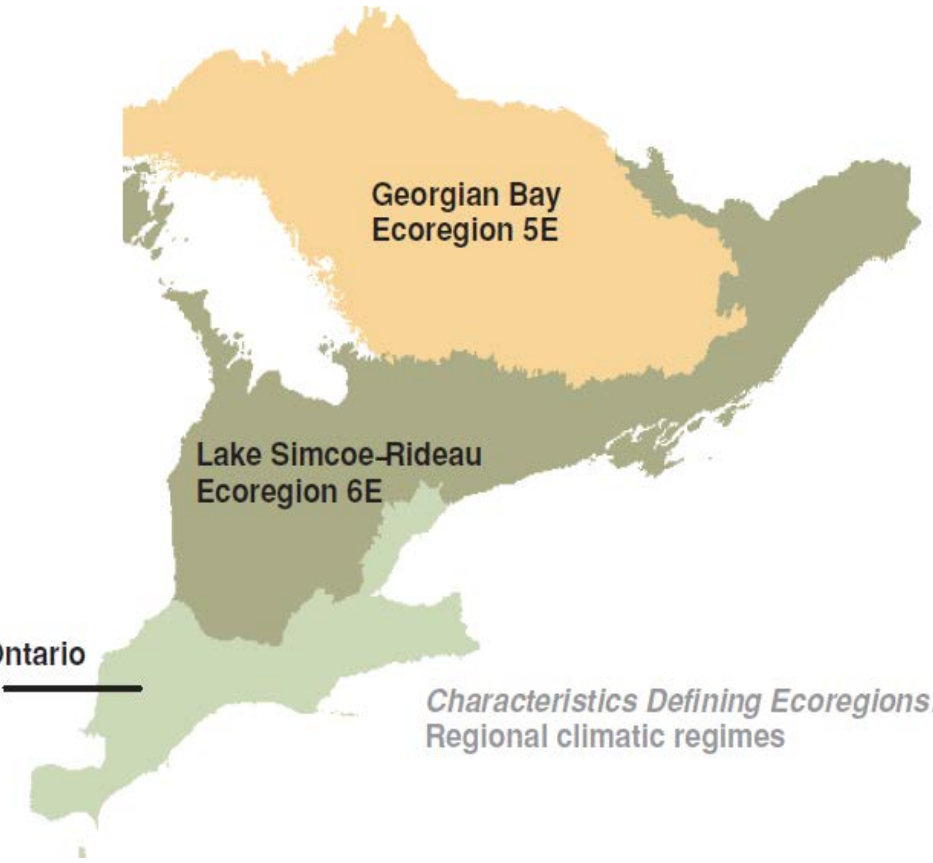
Ecozones

- Based on bedrock, broad climate
- Used for national and coarse-scale provincial reporting such as climate, watersheds, and demographics



Ecoregions

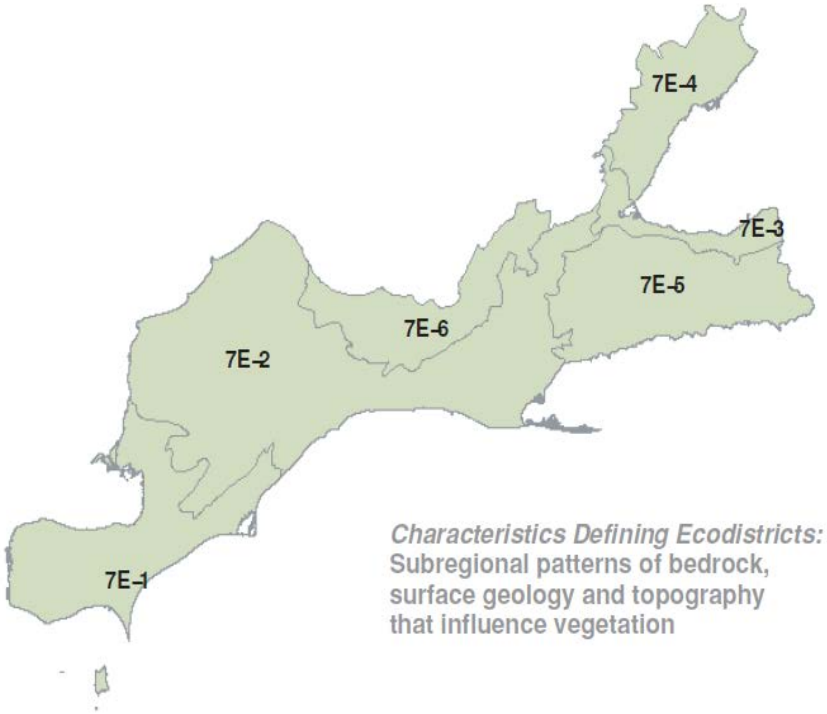
- Based on climate variables (i.e. temp., precip., humidity), soil formation, vegetation, other ecosystem variables
- Used for determining level of significance of wetland classes, natural heritage features such as old growth forest, State of the Forest, natural disturbance



Ecodistricts

- Based on distinctive physiography (i.e. bedrock, landforms), local climate (i.e. lake-effects),
- Used for assessing biodiversity, defining seed zones, mapping ecosystem types and setting targets for identification of natural heritage systems

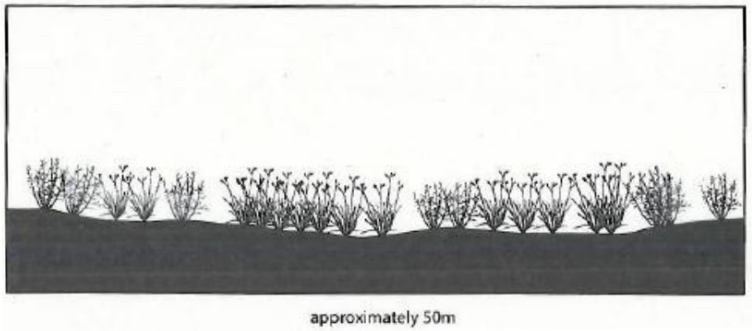
Lake Erie-Lake Ontario Ecoregion



Ecosites

- Since 2006
- Need standardization and consistency; very strict and detailed
- Ecosites are landscape areas consisting of typical, recurring associations of vegetation types (v-type) and substrate types (s-type) combinations (v-type X s-type = ecoelement)
- Ecological Land Classification Field Manuals for ecosite descriptions
- Need specialized training by MNR to be qualified to do this

Profile/Slope Sequence



approximately 50m

Ecosite Description

Graminoid or low shrub communities. Tree poor. Shrubs when present typically ericaceous. Herb moderately poor. Ground surface mostly sedge and deciduous litter, and Sphagnum mosses. Substrate organic or mineral. Mostly deep and very moist to wet (MR = 6, 7, 8, or 9) or saturated.

Substrate Description

Substrate Series	VS1 VS2 S1 S2 M8 M9 M10 M11 MD12 MD13 MD14 MD15 D12 D13 D14 D15 O2 O4 O5 O6													
Mode of Deposition	RO	CO	MO	GF	FL	LA	GL	EO	OR	GW	WA	CX	AN	
Family	Sandy		Coarse Loamy		Silty		Fine Loamy		Clayey		Peat		Folic	
Humus Form	Mull		Moder		Fibrimor		Humimor		Peatymor		Anmoor			
Moisture Regime	Θ	0	1	2	3	4	5	6	7	8	9	x	h	s
Moisture	d		f			m		v		w		x	h	s
Depth	R		VS		S		M		MD		D			
Chemistry	k				n			z						

Vegetation Description

Shrub or graminoid dominated system. Tree cover ≤ 10%, and tall shrub cover ≤ 25%. Rich fen indicators present. Tree species if present include stunted black spruce and tamarack. Shrubs species commonly found include leatherleaf, sweet gale, speckled alder, and dwarf birch. Herbaceous species include few-seeded sedge, bog aster, and slender sedge. Bryophyte species include small red peat moss, midway peat moss, and Schreber's moss.

- G140S - open peatlands with > 10% cover of shrubs. Forb cover is variable, graminoids are abundant. Stunted black spruce and tamarack often present.
- G140N - open peatlands with ≤ 10% shrubs. Typically dominated by graminoids, forb cover is variable.

Trees	*Picea mariana, Larix laricina*
Shrubs	*Chamaedaphne calyculata, Myrica gale, Alnus incana* ssp. *rugosa, Betula pumila* var. *pumila, Vaccinium oxycoccos, Andromeda polifolia, Kalmia polifolia, Rhamnus alnifolia*
Vascular Herbaceous	*Carex oligosperma, C. lasiocarpa* ssp. *americana, Menyanthes trifoliata, Equisetum fluviatile, Eriophorum angustifolium* ssp. *angustifolium, Trichophorum alpinum, Solidago uliginosa, Rhynchospora alba, Carex magellanica* ssp. *irrigua, Solidago uliginosa, Utricularia intermedia, Pogonia ophioglossoides*
Non-vascular	*Sphagnum capillifolium, S. magellanicum, Pleurozium schreberi, Aulacomnium palustre, Sphagnum angustifolium*

G140S/N Open Moderately Rich Fen

Ecology

Substrate has moderate nutrient availability. Limitation to plant growth due to excess moisture Subjected to periodic flooding or ground water movement enriching the site with mineral and organic material. Rooting zone in contact with minerotrophic groundwater. Diversity of vascular plants is moderate and predominantly hydrophytic. Vegetation is characterized by *Sphagnum* mosses, graminoids, and woody vegetation adapted to nutrient-rich site conditions Fire does not have a large impact due to the wetness of the site. Stable unless moisture level change, for example flooding through beaver activity may convert the moderately rich fen into a meadow marsh or shallow marsh, or a decrease in the water table may convert the fen into a conifer swamp or shrub thicket.

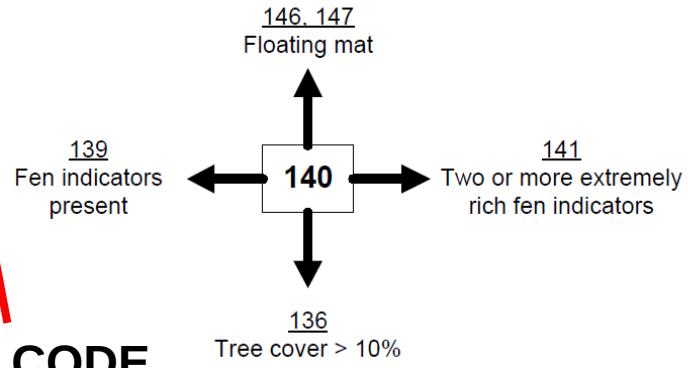
Ecoregional Variability

Widespread across Great Lakes-St.Lawrence range developing where permanently saturated substrate conditions occur. Confined to ground-water fed depressions, gradual seepage slopes, or protected riparian areas associated with lakes, rivers, and ponds. Generally level to undulating organic, morainal, glaciolacustrine, and glaciofluvial deposits. Typically non-calcareous, where calcareous increased plant diversity and vigour may occur.

Edaphic Variability

Hydric. Nutrient and moisture availability uniform. Mineral, peaty phase, or deep organic substrates likely. Generally on lower slopes, in depressions, or adjacent to flowing water or lake margins, likely in a complex with bog, other fen, or marsh ecosites. Microtopography variable ranging from uniformly level to mound and hollows. Changes in peat elevation within the site result in better drained conditions supporting localized communities of low shrubs and scattered black spruce and tamarack, and wetter hollows dominated by graminoids.

Related Ecosites



CODE
Geographic range
Ecosite number
Veg'n Cover