Holland Marsh Wetland Complex

Wetland Evaluation Edition	3rd (1993-2002)

August 1984

updated to 3rd edition 1998, and updated significant species 2012

Comments

Attached Documents Include:

1) List of vegetation communities in the Holland Marsh Wetland Complex
2) Map of Interspersion for the Holland Marsh Wetland Complex
3) Research and Studies - Holland Marsh Wetland Complex
4) List of significant species in the Holland Marsh Wetland Complex
5) Map of the Holland Marsh Wetland Complex

Additional Information

Official Name:	Holland Marsh Wetland Complex				
Evaluation Edition:	3rd	Class:		Wetland ID:	
Wetland Significance:	Year/Month Last Evaluated			August, 1984	
Provincially Significant	Year/Month Last Updated			updated 1998 and 2012	

Special Planning Considerations:		**Scores**	
		Biological:	188
		Social:	199
		Hydrological:	23
		Special Features:	250
		Overall:	660

Submitted by:	Ontario Ministry of Natural Resources
Date:	Aug. 1984, updated 1998 & 2012

WETLAND DATA AND SCORING RECORD

i) **WETLAND NAME:** Holland Marsh Wetland Complex

ii) **MNR ADMINISTRATIVE REGION:** Southern **DISTRICT:** Aurora

AREA OFFICE (if different from District):

iii) **CONSERVATION AUTHORITY JURISDICTION:** Lake Simcoe Region

If not within a designated CA, check here: _____

iv) **COUNTY OR REGIONAL MUNICIPALITY:** Simcoe County & Regional Municipality of York

v) **TOWNSHIP:** Georgina, East Gwillimbury, Bradford West Gwillimbury & King

vi) **LOTS & CONCESSIONS:** Georgina - Concession I, II Lots 1-5
East Gwillimbury - Concession IE Lots 115-130
Concession IW Lots 119-125
King - Concession II Lots 19-28
Bradford West Gwillimbury - Concession VIII Lot 18
- Concession 1x Lots 19-21
- Concession X Lots 21-24
- Concession XI, XII Lots 22-24
- Concession XIII, XIV Lots 23-24

vii) **MAP AND AIR PHOTO REFERENCES**

a) Latitude: 44° 11' Longitude: 79° 31' 30' '

b) UTM grid reference: Zone: 17T Block: PU
Grid: E 1 8 0 N 9 3 0
618000E 4893000N

c) National Topographic Series:

map name(s) Newmarket, Alliston

map number(s) 31 D/3; 31D/4 edition _____

scale 1:50,000

d) Aerial photographs: Date photo taken: June 1978 Scale: 1:10,000

Flight & plate numbers:

e) Ontario Base Map numbers & scale 10 17 6150 48800, 6150 48850, 6150 48900, 6150 48950, 6200 48800, 6200 48850, 6200 48900 & 6200 48950

viii) WETLAND SIZE AND BOUNDARIES

a) Single contiguous wetland area: 3206 hectares

b) Wetland complex comprised of _____ individual wetlands:

Wetland Unit Number (for reference)		Size of each wetland unit				
		Isolated	Palustrine	Riverine	Lacustrine	
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
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Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit Totals:		0.00	0.00	0.00	0.00	

TOTAL WETLAND SIZE 0.00 ha

c) Brief documentation of reasons for including any areas less than 0.5 ha in size:

1.0 BIOLOGICAL COMPONENT

1.1 PRODUCTIVITY

1.1.1 GROWING DEGREE-DAYS/SOILS

GROWING DEGREE DAYS (check one)		
1)		<2800
2)		2800 -3200
3)	x	3200 -3600
4)		3600 -4000
5)		>4000

SOILS Estimated Fractional Area	
0.15	clay/loam
	silt/marl
	limestone
0.15	sand
0.70	humic/mesic
	fibric
	granite

SCORING:

Growing Degree-Days	Clay-Loam	Silt-Marl	Lime-stone	Sand	Humic-Mesic	Fibric	Granite
<2800	15	13	11	9	8	7	5
2800-3200	18	15	13	11	9	8	7
3200-3600	22	18	15	13	11	9	7
3600-4000	26	21	18	15	13	10	8
>4000	30	25	20	18	15	12	8

(maximum score 30; if wetland contains more than one soil type, evaluate based on fractional area)

Steps required for evaluation: (maximum score 30 points)

1. Select GDD line in evaluation table applicable to your wetland;
2. Determine fractional area of the wetland for each soil type;
3. Multiply fractional area of each soil type by score;
4. Sum individual soil type scores (round to nearest whole number).

In wetland complexes the evaluator should aim at determining the percentage of area occupied by the categories for the complex as a whole.

Score		
22	clay/loam	3.30
	silt/marl	
	limestone	
13	sand	1.95
11	humic/mesic	7.70
	fibric	
	granite	

Final Score Growing Degree-Days/Soils (maximum 30 points) 13

1.1.2 WETLAND TYPE (Fractional Area = area of wetland type/total wetland area)

	Fractional Area		Score
Bog		x 3	
Fen	0.11	x 6	0.66
Swamp	0.36	x 8	2.88
Marsh	0.53	x 15	7.95

Wetland type score (maximum 15 points) 11

1.1.3 SITE TYPE (Fractional Area = area of site type/total wetland area)

	Fractional Area		Score
Isolated		x 1 =	
Palustrine (permanent or intermittent flow)		x 2 =	
Riverine	0.43	x 4 =	1.72
Riverine (at rivermouth)		x 5 =	
Lacustrine (at rivermouth)	0.31	x 5 =	1.55
Lacustrine (on enclosed bay, with barrier beach)		x 3 =	
Lacustrine (exposed to lake)	0.26	x 2 =	0.52
		Sub Total:	3.79

Site Type Score (maximum 5 points) 4

1.2 BIODIVERSITY

1.2.1 NUMBER OF WETLAND TYPES

(Check only one)		Score
1)	one	9 points
2)	two	13
3) x	three	20
4)	four	30

Number of Wetland Types Score (maximum 30 points) 20

1.2.2 VEGETATION COMMUNITIES

Attach a separate sheet listing community (map) codes, vegetation forms and dominant species.
Use the form on the following page to record percent area by dominant vegetation form. This information will be used in other parts of the evaluation.

Communities should be grouped by number of forms. For example, 2 form communities might appear as follows:

2 forms

Code	Forms	Dominant Species
M6	re, ff	re, *Typha latifolia* ; ff, *Lemna minor, Wolffia*
S1	ts, gc	ts, *Salix discolor* ; gc, *Impatiens capensis, Thelypteris palustris*

Note that the dominant species for each form are separated by a semicolon. The dominant species within a form are separated by commas.

Scoring: see attached 5A-B

Total # of communities with 1-3 forms 43	Total # of communities with 4 -5 forms 12	Total # of communities with 6 or more forms
1 = 1.5 points	1 = 2 points	1 = 3 points
2 = 2.5	2 = 3.5	2 = 5
3 = 3.5	3 = 5	3 = 7
4 = 4.5	4 = 6.5	4 = 9
5 = 5	5 = 7.5	5 = 10.5
6 = 5.5	6 = 8.5	6 = 12
7 = 6	7 = 9.5	7 = 13.5
8 = 6.5	8 = 10.5	8 = 15
9 = 7	9 = 11.5	9 = 16.5
10 = 7.5	10 = 12.5	10 = 18
11 = 8	11 = 13	11 = 19
+.5 each additional community = 24.0	+.5 each additional community = 13.5	+ 1 each additional community =

e.g., a wetland with 3 one form communities, 4 two form communities, 12 four form communities and 8 six form communities would score: 6 + 13.5 + 15 = 34.5 = 35 points
24 + 13.5 = 37.5 = 37 points

Vegetation Communities Score (maximum 45 points) 37

1.2.2. Vegetation Communities - Holland Marsh Wetland Complex

# of forms	Map Code	Updated Map Code	Vegetation Forms	Dominant Species
1	reM1		re*	re: Typha sp.
1	neM10		gc*	gc: herbs
1	neM5		ne*	ne: grasses and sedges
1	tsS20		ts*	ts: Alnus incana
1	suW1		su*	su: Myriophyllum sp.
2	tsF12		ts*,m	ts: Salix sp.; m: mosses
2	neF5		gc,ne*	gc: herbs; ne: grasses and sedges
2	neF6		ne*,m	ne: grasses and sedges; m: mosses
2	neM3		ne,re*	ne: grasses and sedges; re: Typha sp.
2	neM4		gc*,ne	gc: Impatiens capensis, ne: grasses and sedges
2	reM6		gc,re*	gc: herbs; re: Typha sp.
2	reM8		re*,ff	re: Typha sp.; ff: Lemna sp.
2	reM9		dh,re*	dh: dead deciduous trees; re: Typha sp.
2	hS12		h*,ls	h: Populus tremuloides; ls: Cornus sericea
2	cS14		c*,ls,m	c: Larix laricina; ls: Rubus sp., Parthenocissus vitacea; m: mosses
2	tsS17		ts*,ne	ts: Alnus incana, Salix sp.; ne: grasses and sedges
2	tsS19		ts*,gc	ts: Alnus incana; gc: Impatiens capensis
2	reS26		ts,re*	ts: Alnus incana; re: Typha sp.
2	hS4		h*,ne	h: Populus tremuloides; ne: grasses and sedges
2	hS5		h*,gc	h: Fraxinus nigra; gc: herbs
2	suW2		f,su*	f: waterlily sp.; su: Myriophyllum sp.
2	suW3		re,su*	re: Scirpus acutus, Typha sp.; su: Vallisneria americana
3	lsF1		ls*,re,m	ls: Ledum groenlandicum, Potentilla fruiticosa; re: Typha sp.; m: mosses
3	tsF10		ts*,gc,m	ts: Betula pumila, Alnus incana, Salix sp.; gc: herbs; m: mosses
3	tsF11		ts*,ne,m	ts: Betula pumila, Salix sp.; ne: grasses and sedges; m: mosses
3	tsF13		ts*,ls,m	ts: Alnus incana, Salix sp.; ls: Myrica gale, Cornus sericea; m: mosses
3	neF14		gc,ne*,re	gc: herbs; ne: grasses and sedges; re: Typha sp.
3	cB2	cS14	c*,ls,m	c: Larix laricina; ls: Myrica gale; m: mosses
3	lsB1	lsF2	ls*gc,m	ls: Betula pumila, Chamaedaphne calyculata; gc: Vaccinum macrocarpon, Sarracenia purpurea; m: mosses
3	neF3		gc,ne*,m	gc: herbs; ne: grasses and sedges; m: mosses
3	neF4		ne*,re,gc,m	ne: grasses and sedges; re: Typha sp.; gc: Impatiens capensis, Thelypteris
3	neF7		ne*,re,m	ne: grasses and sedges; re: Typha sp.; m: mosses
3	neM2		gc,ne*,re	gc: herbs; ne: grasses and sedges; re: Typha sp.
3	hS1		h*,gc,ne	h: Fraxinus pennsylvanica; gc: herbs; ne: grasses and sedges
3	hS10		h*,ts,ne	h: Fraxinus nigra, Populus tremuloides; ts: Salix sp., Alnus incana; ne: grasses
3	tsS11		h,ts*,ls	h: Salix sp.; ts: Salix sp.; ls: Salix sp.
3	tsS16		ts*,ne,be	ts: Alnus incana, Salix sp.; ne: grasses and sedges; be: Calla palustris
3	tsS18		ts*,ne,re	ts: Salix sp., Alnus incana; ne: grasses and sedges; re: Typha sp.

3	cS2		h,c*,gc	h: Fraxinus nigra; c: Thuja occidentalis; gc: herbs
3	tsS21		ts*,ne,m	ts: Salix sp.; ne: grasses and sedges; m: mosses
3	tsS22		ts*,gc,ne	ts: Alnus incana; gc: Impatiens capensis; ne: grasses and sedges
3	S25		ts,ls,ne	ts: Salix sp.; ls: Spiraea alba.; ne: grasses and sedges
3	gcS28		dh,gc*	dh: dead deciduous trees; gc: Impatiens capensis, Sium suave, Cicuta maculata
3	hS6		h*,gc,ff	h: Salix sp.; gc: herbs; ff: Lemna sp.
3	hS8		h*,ts,gc	h: Acer rubrum; ts: Fraxinus nigra; gc: herbs
3	hS9		h*,ls,ne	h: Populus tremuloides, Fraxinus nigra; ls: Cornus sericea; ne: grasses and
4	lsF15	lsF8	ls*,gc,ne,m	ls: Myrica gale, Cornus sericea; gc: Impatiens capensis, herbs; ne: grasses and
4	cF2	cS29	c*,gc,ne,m	c: Larix laricina; gc: Potentilla sp., Sarracenia purpurea; ne: grass, Equisetum sp.; m: mosses
4	tsF9		ts*,ls,gc,m	ts: Betula pumila, Cornus sericea; ls: Betula pumila, Spiraea alba; gc: herbs, m: mosses
4	gcM7		gc*,ne,re,be	gc: herbs; ne: grasses and sedges; re: Typha sp.; be: Sagittaria latifolia, Alisma
4	hS13		h*,gc,ne,re	h: Salix sp.; gc: herbs; ne: grasses; re: Typha sp.
4	hS15		h*,dh,ls,ne	h:Populus tremuloides, Ulmus americana; dh: Populus tremuloides; ls: Cornus
4	cS23		c*,ts,gc,m	c: Larix larcina, Thuja occidentalis; ts: Alnus incana, Cornus sericea, gc: herbs, m: mosses
4	tsS27		ts*,gc,ne,m	ts: Salix sp.; gc: herbs; ne: grasses and sedges; m: mosses
4	hS3		h*,ts,gc,ne	h: Fraxinus nigra, Salix sp.; ts: Alnus incana; gc: herbs; ne: grasses and sedges
4	hS7		h*,ls,gc,ne	h: Fraxinus nigra, Populus tremuloides; ls: Fraxinus nigra, Cornus sericea; gc:
5	cF8	cS30	c*,ts,gc,ne,m	c: Larix laricina; ts: Betula pumila, Salix sp.; gc: herbs; ne: grasses and sedges,
5	tsS24		ts*,ls,ne,re,ff	ts: Salix sp, Cornus sericea; ls: Salix sp.; ne: grasses and sedges; re: Typha sp.;

Legend

Vegetation Forms:

h - deciduous trees
c - coniferous trees
dc - dead coniferous trees
dh - dead deciduous trees
ts - tall shrubs
ls - low shrubs
ds - dead shrubs
gc - herbs (ground cover)
m - mosses
re - robust emergents
ne - narrow leaved emergents
be - broad leaved emergents
f - floating plants (rooted)
ff - free floating plants
su - submerged plants
u - unvegetated
* - dominant form

Map Codes:

M - Marsh
W - Open Water Marsh
F - Fen
S - Swamp

Wetland Name: Holland Marsh Wetland Complex

Wetland Size (ha): 3206

Vegetation Form	% area in which form is dominant
h	
c	
dh	
dc	
ts	
ls	
ds	
gc	
m	
ne	
be	
re	
ff	
f	
su	
u (unvegetated)	
Total = 100%	0.00

1.2.3 DIVERSITY OF SURROUNDING HABITAT

(Check all appropriate items)

x	row crop
x	pasture
	abandoned agricultural land
x	deciduous forest
x	coniferous forest
	mixed forest (at least 25% conifer and 75% deciduous or vice versa)
	abandoned pits and quarries
x	open lake or deep river
x	fence rows with cover, or shelterbelts
x	terrain appreciably undulating, hilly, or with ravines
x	creek floodplain

Diversity of Surrounding Habitat Score (1 for each, maximum 7 points) 7

1.2.4 PROXIMITY TO OTHER WETLANDS

(Check first appropriate category only)

			Scoring
1)	x	Hydrologically connected by surface water to other wetlands (different dominant wetland type) or to open lake or deep river within 1.5 km	8 points
2)		Hydrologically connected by surface water to other wetlands (same dominant wetland type) within 0.5 km	8
3)		Hydrologically connected by surface water to other wetlands (different dominant wetland type), or to open lake or deep river from 1.5 to 4 km away	5
4)		Hydrologically connected by surface water to other wetlands (same dominant wetland type) from 0.5 to 1.5 km away	5
5)		Within 0.75 km of other wetlands (different dominant wetland type) or open water body, but not hydrologically connected by surface water	5
6)		Within 1 km of other wetlands, but not hydrologically connected by surface water	2
7)		No wetland within 1 km	0

Proximity to other Wetlands Score (Choose one only, maximum 8 points) 8

1.2.5 INTERSPERSION

Number of intersections (Check one)			Score
1)	26 or less		3
2)	27 to 40		6
3)	41 to 60		9
4)	61 to 80		12
5)	81 to l00		15
6)	101 to 125		18
7)	126 to 150		21
8)	151 to 175		24
9)	176 to 200		27
10)	>200	371	30

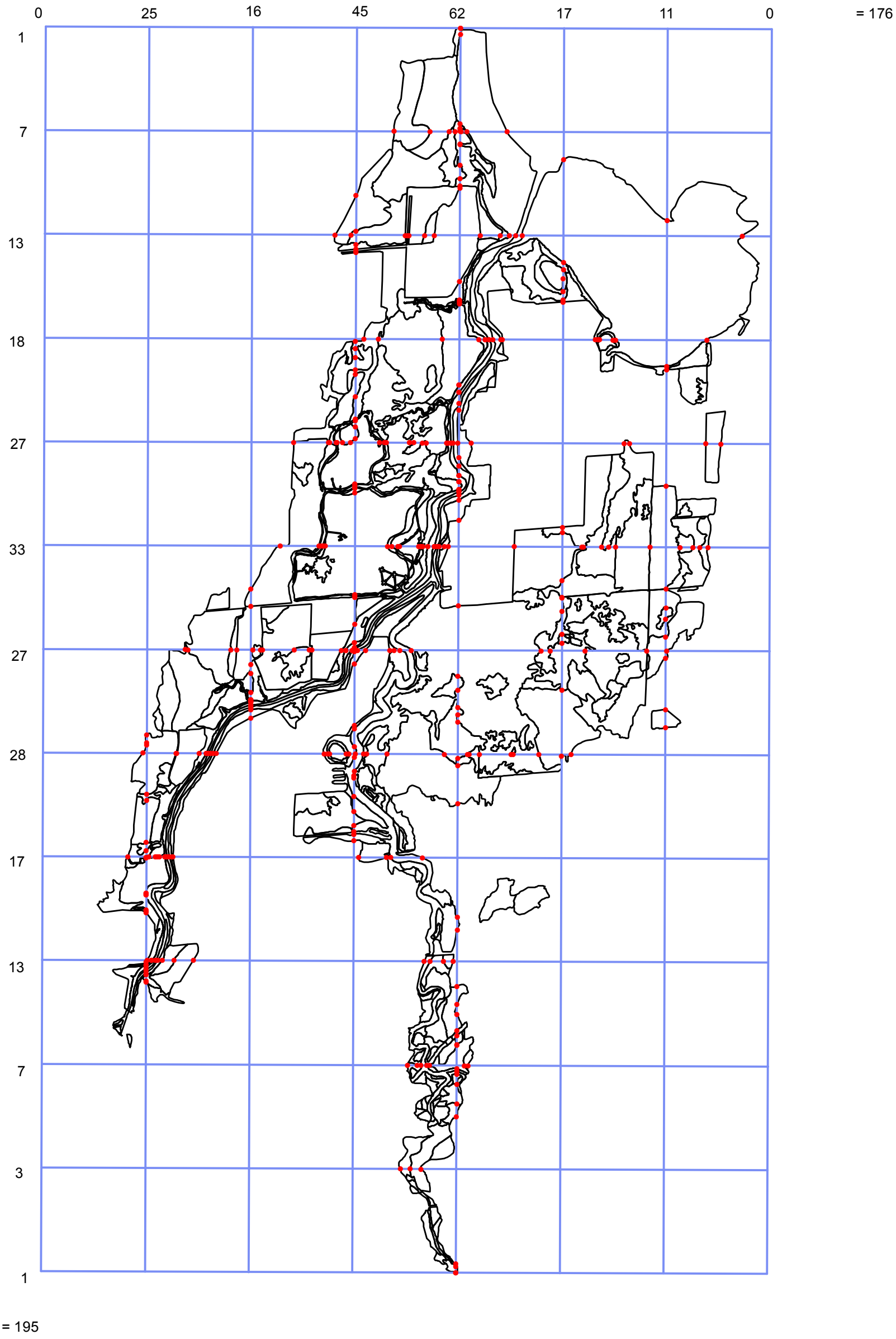
Interspersion Score (Choose one only, maximum 30 points) 30

1.2.6 OPEN WATER TYPES

Permanently flooded: (Check one)			Score
1)		type 1	8
2)	x	type 2	8
3)		type 3	14
4)		type 4	20
5)		type 5	30
6)		type 6	8
7)		type 7	14
8)		type 8	3
9)		no open water	0

Open Water Type Score (Choose one only, maximum 30 points) 8

Holland Marsh Wetland Complex (2000)
INTERSPERSION GRID = 371



1:50,000

Kilometers
0 0.45 0.9 1.8 2.7 3.6

N
W
E
S

Legend

- Intersections (371)
- Grid
- Holland Marsh Wetland Complex

1.3 SIZE

3206 hectares 110 Subtotal for Biodiversity

Size Score (Biological Component) (maximum 50 points) 50

Evaluation Table Size Score (Biological component)

Wetland size (ha)	Total Score for Biodiversity Subcomponent									
	<37	37-48	49-60	61-72	73-84	85-96	97-108	109-120	121-132	>132
<21 ha	1	5	7	8	9	17	25	34	43	50
21-40	5	7	8	9	10	19	28	37	46	50
41-60	6	8	9	10	11	21	31	40	49	50
61-80	7	9	10	11	13	23	34	43	50	50
81-100	8	10	11	13	15	25	37	46	50	50
101-120	9	11	13	15	18	28	40	49	50	50
121-140	10	13	15	17	21	31	43	50	50	50
141-160	11	15	17	19	23	34	46	50	50	50
161-180	13	17	19	21	25	37	49	50	50	50
181-200	15	19	21	23	28	40	50	50	50	50
201-400	17	21	23	25	31	43	50	50	50	50
401-600	19	23	25	28	34	46	50	50	50	50
601-800	21	25	28	31	37	49	50	50	50	50
801-1000	23	28	31	34	40	50	50	50	50	50
1001-1200	25	31	34	37	43	50	50	50	50	50
1201-1400	28	34	37	40	46	50	50	50	50	50
1401-1600	31	37	40	43	49	50	50	50	50	50
1601-1800	34	40	43	46	50	50	50	50	50	50
1801-2000	37	43	47	49	50	50	50	50	50	50
>2000	40	46	50	50	50	50	50	50	50	50

2.0 SOCIAL COMPONENT

2.1 ECONOMICALLY VALUABLE PRODUCTS

2.1.1 WOOD PRODUCTS

Area of wetland forested (ha), i.e. dominant form is h or c. Note that this is not wetland size. (Check one only).

			Score
1)		<5 ha	0
2)		5 -25 ha	3
3)		26 -50 ha	6
4)		51- l00 ha	9
5)		101 -200 ha	12
6)	x	>200 ha	18

Source of information: Field Observations

Wood Products Score (Score one only, maximum 18 points) 18

2.1.2 WILD RICE

(Check one)			Score (Choose one)
Present (minimum size 0.5 ha)	1)	x	6 points
Absent	2)		0

Source of information: 2010 field observation Steve Varga

Wild Rice Score (maximum 6 points) 6

2.1.3 COMMERCIAL FISH (BAIT FISH AND/OR COARSE FISH)

(Check one)			Score (Choose one)
Present	1)	x	12 points
Habitat not suitable for fish	2)		0

Source of information: fish file records, MNR Aurora District

Commercial Fish Score (maximum 12 points) 12

2.1.4 BULLFROGS

(Check one)			Score (Choose one)
Present	1)	x	1 point
Absent	2)		0

Source of information: Field observations 1984

Bullfrog Score (maximum 1 point) 1

2.1.5 SNAPPING TURTLES

(Check one)			Score (Choose one)
Present	1)	x	1 point
Absent	2)		0

Source of information: Field observations MNR 1984

Snapping Turtle Score (maximum 1 point) 1

2.1.6 FURBEARERS

(Consult Appendix 9)

	Name of furbearer		Source of information
1)	Muskrat	3	John Bennett MNR (Maple District)
2)	Raccoon	3	"
3)	Beaver	3	"
4)	Mink	3	"
5)	Fox	3	"
6)	Skunk	0	"

Scoring: 3 points for each species, maximum 12

Furbearer Score (maximum 12 points) 12

2.2 RECREATIONAL ACTIVITIES

Type of Wetland-Associated Use						
Intensity of Use	Hunting		Nature Enjoyment/ Ecosystem Study		Fishing	
High	40 points	40	40 points		40 points	40
Moderate	20		20	20	20	
Low	8		8		8	
Not possible/NotKnown	0		0		0	
Totals		40		20		40

(score one level for each of the three wetland uses; scores are cumulative; maximum score 80 points)

Sources of information:

Hunting: Ken Faulkner - MNR (Maple District)

Nature: Angus Norman - MNR (Maple District)

Fishing: Ken Faulkner - MNR (Maple District)

Recreational Activities Score (maximum 80 points) 80

2.3 LANDSCAPE AESTHETICS

2.3.1 DISTINCTNESS

(Check one)			Score (Choose one)
Clearly distinct	1)	x	3 points
Indistinct	2)		0

Landscape Distinctness Score (maximum 3 points) 3

2.3.2 ABSENCE OF HUMAN DISTURBANCE

(Check one)			Score (Choose one)
Human disturbances absent or nearly so	1)		7 points
One or several localized disturbances	2)		4
Moderate disturbance; localized water pollution	3)	x	2
Wetland intact but impairment of ecosystem quality intense in some areas	4)		1
Extreme ecological degradation, or water pollution severe and widespread	5)		0

Source of information: Field Observations

Absence of Human Disturbance Score (maximum 7 points) 2

2.4 EDUCATION AND PUBLIC AWARENESS

2.4.1 EDUCATIONAL USES

(Check one)			Score (Choose one)
Frequent	1)		20 points
Infrequent	2)		12
No visits	3)	x	0

Source of information: unknown

Educational Uses Score (maximum 20 points) 0

2.4.2 FACILITIES AND PROGRAMS

(check one)			Score (Choose one)
Staffed interpretation centre	1)		8 points
No interpretation centre or staff but a system of self-guiding trails or brochures available	2)		4
Facilities such as maintained paths (e.g., woodchips) boardwalks, boat launches or observation towers but no brochures or other interpretation	3)	x	2
No facilities or programs	4)		0

Source of information: observation tower and trails
Holland Marsh Provincial Wildlife Management Area

Facilities and Programs Score (maximum 8 points) 2

2.4.3 RESEARCH AND STUDIES

(check appropriate spaces)		Score
Long term research has been done		12 points
Research papers published in refereed scientific journal or as a thesis	x	10
One or more (non-refereed) reports have been written on some aspect of the wetland ' s flora fauna hydrology etc.		5
No research or reports		0

Attach list of known reports by above categories: See attached 13A-C

Research and Studies Score (Score is cumulative, maximum 12 points) 10

2.5 PROXIMITY TO AREAS OF HUMAN SETTLEMENT

Circle the highest applicable score

Distance of wetland from settlement	1) population> 10,000		2) population 2,500 -10,000		3) population <2,500 or cottage community	
1) Within or adjoining settlement	40 points		26		16	
2) 0.5 to 10 km from settlement	26	26	16		10	
3) 10 to 60 km from settlement	12		8		4	
4) >60 km from settlement	5		2		0	
		26				

Name of settlement: Newmarket

Proximity to Human Settlement Score (maximum 40 points) 26

2.6 OWNERSHIP (FA= fraction Area)

					Score
FA of wetland in public or private ownership held under contract or in trust for wetland protection		x	10	=	
FA of wetland area in public ownership,not as above	0.44	x	8	=	3.52
FA of wetland area in private ownership,not as above	0.56	x	4	=	2.24

Source of information: land registry

Ownership Score (maximum 10 points) 6

1) Baird, A. 1924. Original Reclamation.

2) Bardawill, V.G., 1967. Lower Pump at North Station.

3) Brownell and Scott, 1949. Planning and Development.

4) Canadian Hydrographic Service, 1973. Hydrognaphic Chart. Head of Cook Bay Holland Rivers. Department of the Environment. Ottawa, Ontario.

5) Canadian Hydrographic Service, 1973. Hydrographic Chart. Lake Simcoe. Department of the Environment. Ottawa, Ontario.

6) Filman I. and Gregg, 1968. Drainage Engineering Study.

7) McCubbin, G.A. and W.G. McGeorge, 1941. Major Work on Central River.

8) McGeorge, W.G., 1949. West Pumping Station.

9) McGeorge, W.G., 1954. Repairs after Hurricane Hazel.

10) Ontario Ministry of Natural Resources, 1976. Holland River, Stream Survey Report. Maple District. Maple, Ontario.

11) Ontario Ministry of Natural Resources, 1977a. Herpetological Report on Holland Marsh. Maple District. Maple, Ontario.

12) Ontario Ministry of Natural Resources, 1977b. Holland Marsh Bird List. Maple District. Maple, Ontario.

13) Ontario Ministry of Natural Resources, 1977c. Holland Marsh Mammal List. Maple District. Maple, Ontario.

14) Ontario Ministry of Natural Resources, 1977d. Plant List for Holland Marsh Wildlife Management Area. Maple District. Maple, Ontario.

15) Ontario Ministry of Natural Resources, 1977e. Preliminary Management Plan for the Holland Marsh Provincial Wildlife Management Area. Maple District. Maple, Ontario.

16) Ontario Ministry of Natural Resources, 1977f. Waterfowl Survey of Holland Marsh. Maple District. Maple, Ontario.

17) Ontario Ministry of Natural Resources, 1983. Natural Vegetation Report. Maple District. Maple, Ontario.

18) Ontario Ministry of Natural Resources, 1983. Wildlife Report. Maple District. Maple, Ontario.

19) Ontario Ministry of Natural Resoucres, n.d. Bird Inventory of Holland Marsh. Maple District. Maple, Ontario.

20) Ontario Ministry of Natural Resources, n.d. Draft Master Plan, Holland Marsh Provincial Wildlife Management Area. Maple District. Maple, Ontario.

21) Ontario Ministry of Natural Resources, n.d. Habitat Management Plan for the Marsh Portion of the Holland Marsh Provincial Wildlife Management Area. Maple District. Maple, Ontario.

22) Ontario Ministry of Natural Resoures, n.d. Hydrology Report on Holland Marsh. Maple District. Maple, Ontario.

23) Ontario Ministry of Natural Resources, n.d. Keswick Marsh Report. Maple District. Maple, Ontario.

24) Ontario Ministry of Natural Resources, n.d. Mammal Study of Holland Marsh. Maple District, Maple, Ontario.

Continued.

25) Ontario Ministry of Natural Resources, n.d. Soils Report on Holland Marsh. Maple District. Maple, Ontario.

26) Ontario Ministry of Natural Resources, n.d. Species Inventory of Holland Marsh. Maple, District. Maple, Ontario.

27) Ontario Ministry of Natural Resources, n.d. Wetland Types in Holland Marsh. Maple District, Maple, Ontario.

28) Ontario Ministry of Transporation and Communications, 1984. Highway 89 Extension. Highway 11 to York Regional Road 12. Environmental Assessment Report. Toronto, Ontario.

29) South Lake Simcoe Conservation Authority, 1982. Environmentally Significant Areas Study. Newmarket, Ontario.

30) South Lake Simcoe Conservation Authority, 1984. Sub Watershed Discretization. Holland River Watershed Map. Newmarket, Ontario.

Additional Research Papers- Holland Marsh Wetland Complex

List of Refereed Research Papers

Reznicek, A. A. 1980. John Goldie's 1819 Collecting Site near Lake Simcoe, Ontario. Canadian Field Naturalist 94(4): 439-442

List of Non-refereed Research Papers:

Kathy Lindsay. 1996. Annotated Plant List of the Holland Rivermouth Fen. Ontario Ministry of Natural Resources. On file in the MNR Aurora District Office.

2.7 SIZE

3206 hectares 156 Subtotal for Social (2.1, 2.2 and 2.5)

Evaluation Table for Size Score (Social Component)

Wetland Size (ha)	Total for Size Dependent Score									
	<31	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-150	>150
<2 ha	1	2	4	8	10	12	14	14	14	15
2 - 4ha	1	2	4	8	12	13	14	14	15	16
5 - 8ha	2	2	5	9	13	14	15	15	16	16
9 - 12ha	3	3	6	10	14	15	15	16	17	17
13-17	3	4	7	10	14	15	16	16	17	17
18-28	4	5	8	11	15	16	16	17	17	18
29-37	5	7	10	13	16	17	18	18	19	19
38-49	5	7	10	13	16	17	18	18	19	20
50-62	5	8	11	14	17	17	18	19	20	20
63-81	5	8	11	15	17	18	19	20	20	20
82-105	6	9	11	15	18	18	19	20	20	20
106-137	6	9	12	16	18	19	20	20	20	20
138-178	6	9	13	16	18	19	20	20	20	20
179-233	6	9	13	16	18	20	20	20	20	20
234-302	7	9	13	16	18	20	20	20	20	20
303-393	7	9	14	17	18	20	20	20	20	20
394-511	7	10	14	17	18	20	20	20	20	20
512-665	7	10	14	17	18	20	20	20	20	20
666-863	7	10	14	17	19	20	20	20	20	20
864-1123	8	12	15	17	19	20	20	20	20	20
1124-1460	8	12	15	17	19	20	20	20	20	20
1461-1898	8	13	15	18	19	20	20	20	20	20
1899-2467	8	14	16	18	20	20	20	20	20	20
>2467	8	14	16	18	20	20	20	20	20	20

Total Size Score (Social Component) 20

2.8 ABORIGINAL AND CULTURAL HERITAGE VALUES

Either or both Aboriginal or Cultural Values may be scored. However, the maximum score permitted for 2.8 is 30 points. Attach documentation.

2.8.1 ABORIGINAL VALUES

Full documentation of sources must be attached to the data record.

1)	Significant		=	30 points
2)	Not Significant		=	0
3)	Unknown	x	=	0
	Total:	0		

2.8.2 CULTURAL HERITAGE

1)	Significant		=	30 points
2)	Not Significant		=	0
3)	Unknown	x	=	0
	Total:	0		

Aboriginal Values/Cultural Heritage Score (maximum 30 points) 0

3.0 HYDROLOGICAL COMPONENT

3.1 FLOOD ATTENUATION

If the wetland is a complex including isolated wetlands, apportion the l00 points according to area. For example if 10 ha of a l00 ha complex is isolated, the isolated portion receives the maximum proportional score of 10. The remainder of the wetland is then evaluated out of 90.

Step 1: Determination of Maximum Score

x	Wetland is located on one of the defined 5 large lakes or 5 major rivers (Go to Step 4)
	Wetland is entirely isolated (i.e. not part of a complex) (Go to Step 4)
	All other wetland types (Go through Steps 2,3 and 4B)

Step 2: Determination of Upstream Detention Factor (DF)

(a)	Wetland area (ha)		
(b)	Total area (ha) of upstream detention areas (include the wetland itself)		
(c)	Ratio of (a):(b)		
(d)	Upstream Detention Factor: (c) x 2 = (maximum allowable factor = 1)		

Step 3: Determination of Wetland Attenuation Factor (AF)

(a)	Wetland area (ha)		
(b)	Size of catchment basin (ha) upstream of wetland (include wetland itself in catchment area)		
(c)	Ratio of (a):(b)		
(d)	Wetland Attenuation Factor: (c) x 10 = (maximum allowable factor = 1)		

Step 4: Calculation of final score

(a)	Wetlands on large lakes or major rivers		0
(b)	Wetland entirely isolated		100
(b)	All other wetlands --calculate as follows:		
(c	* Complex Formula - Isolated portion		
	Initial Score		
	Upstream detention factor (DF) (Step 2)		
	Wetland attenuation factor (AF) (Step 3)		
	Final score: [(DF + AF)/2] x Initial score =		
(c	Final score:=		

*Unless wetland is a complex with isolated portions (see above).

Flood Attenuation Score (maximum l00 points) 0

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: **Determination of maximum initial score**

x	Wetland on one of the 5 defined large lakes or 5 major rivers (Go to Step 5a)
	All other wetlands (Go through Steps 2, 3, 4, and 5b)

Step 2: **Determination of Watershed Improvement Factor (WIF)**
Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

(FA= area of site type/total area of wetland)	Fractional Area				
FA of isolated wetland		x	0.5	=	
FA of riverine wetland		x	1	=	
FA of palustrine wetland with no inflow		x	0.7	=	
FA of palustrine wetland with inflows		x	1	=	
FA of lacustrine on lake shoreline		x	0.2	=	
FA of lacustrine at lake inflow or outflow		x	1	=	
			Sub Total:		
			Sum (WIF cannot exceed 1.0)		

Step 3: **Determination of Catchment Land Use Factor (LUF)**
(Choose the first category that fits upstream landuse in the catchment.)

1)	Over 50% agricultural and/or urban	1.0
2)	Between 30 and 50% agricultural and/or urban	0.8
3)	Over 50% forested or other natural vegetation	0.6

LUF (maximum 1.0)

Step 4: **Determination of pollutant uptake factor (PUT)**
Calculation of PUT is based on the fractional area (FA) of each vegetation type that makes up the total area of the wetland. Base assessment on the dominant vegetation form for each community except where dead trees or shrubs dominate. In that case base assessment on the dominant live vegetation. (FA = area of vegetation type/total area of wetland).

	Fractional Area				
FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m)		x	0.75	=	
FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,f,ff)		x	1	=	
FA of wetland with little or no vegetation (u)		x	0.5	=	
			Sum (PUT cannot exceed 1.0)		

Step 5: **Calculation of final score**

(a)	Wetland on large lakes or major rivers	0
(b)	All other wetlands - calculate as follows	
	Initial score	60
	Watershed Improvement Factor (WIF)	
	Land Use Factor (LUF)	
	Pollutant Uptake Factor (PUT)	
	Final score: 60 x WIF x LUF x PUT =	

Short Term Water Quality Improvement Score (maximum 60 points) 0

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

x	Wetland on large lakes or 5 major rivers	0 points
	All other wetlands (proceed to Step 2)	

Step 2: Choose only one of the following settings that best describes the wetland being evaluated.

1)		Wetland located in a river mouth	10 points
2)		Wetland is a bog, fen or swamp with more than 50% of the wetland being covered with organic soil	10
3)		Wetland is a bog, fen or swamp with less than 50% of the wetland being covered with organic soil	3
4)		Wetland is a marsh with more than 50% of the wetland covered with organic soil	3
5)		None of the above	0

Long Term Nutrient Trap Score (maximum 10 points) 0

3.2.3 GROUNDWATER DISCHARGE

(Circle the characteristics that best describe the wetland being evaluated and then sum the scores. If the sum exceeds 30 points assign the maximum score of 30.)

Wetland Characteristics	Potential for Discharge					
	None to Little		Some		High	
Wetland type	1) Bog = 0		2) Swamp/Marsh = 2		3) Fen = 5	5
Topography	1) Flat/rolling = 0	0	2) Hilly = 2		3) Steep = 5	
Wetland Area: Upslope Catchment Area	Large (>50%) = 0		Moderate (5-50%) = 2	2	Small (<5%) = 5	
Lagg Development	1) None found = 0	0	2) Minor = 2		3) Extensive = 5	
Seeps	1) None = 0		2) = or < 3 seeps = 2		3) > 3 seeps = 5	5
Surface marl deposits	1) None = 0	0	2) = or < 3 sites = 2		3) > 3 sites = 5	
Iron precipitates	1) None = 0	0	2) = or < 3 sites = 2		3) > 3 sites = 5	
Located within 1 km of a major aquifer	N/A = 0	0	N/A = 0		Yes = 10	
Totals		0		2		10

(Scores are cumulative maximum score 30 points.)

Groundwater Discharge Score (maximum 30 points) 12

3.3 CARBON SINK

Choose only one of the following

1)	Bog, fen or swamp with more than 50% coverage by organic soil		5 points
2)	Bog, fen or swamp with between 10 to 49% coverage by organic soil		2
3)	Marsh with more than 50% coverage by organic soil	x	3
4)	Wetlands not in one of the above categories		0

Carbon Sink Score (maximum 5 points) 3

3.4 SHORELINE EROSION CONTROL

Step 1:

		Score
	Wetland entirely isolated or palustrine	0
x	Any part of the Wetland riverine or lacustrine (proceed to Step 2)	

Step 2:

Choose the one characteristic that best describes the shoreline vegetation (see text for a definition of shoreline)

			Score
1)		Trees and shrubs	15
2)	x	Emergent vegetation	8
3)		Submergent vegetation	6
4)		Other shoreline vegetation	3
5)		No vegetation	0

Shoreline Erosion Control Score (maximum 15 points) 8

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

		Score	
(a)	Wetland > 50% lacustrine (by area) or located on one of the five major rivers	0	0
(b)	Wetland not as above. Calculate final score as follows: (FA= area of site type/total area of wetland)		

	Fractional Area			
FA of isolated or palustrine wetland		x 50	=	
FA of riverine wetland		x 20	=	
FA of lacustrine wetland (wetland <50% lacustrine)		x 0	=	

Ground Water Recharge Wetland Site Type Component Score (maximum 50 points) 0

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

(Circle only one choice that best describes the hydrologic soil class of the area surrounding the wetland being evaluated.)

Dominant Wetland Type	1) Sand, loam, gravel, till		2) Clay or bedrock	
1) Lacustrine or on a major river	0	0	0	
2) Isolated	10		5	
3) Palustrine	7		4	
4) Riverine (not a major river)	5		2	
Totals		0		

Ground Water Recharge Wetland Soil Recharge Potential Score (maximum 10 points) 0

4.0 SPECIAL FEATURES COMPONENT

4.1 RARITY

4.1.1 WETLANDS

Site District 6-6

Presence of wetland type (check one or more)

	Bog
x	Fen
x	Swamp
x	Marsh

Score for rarity within the landscape and rarity of the wetland type. Score for rarity of wetland type is cumulative (maximum 80 points) based on presence or absence.

Site District	Score for Rarity within the Landscape	Score for Rarity of Wetland Type			
		Marsh	Swamp	Fen	Bog
6-1	60	40	0	80	80
6-2	60	40	0	80	80
6-3	40	10	0	40	80
6-4	60	40	0	80	80
6-5	20	40	0	80	80
6-6	40	20	0	80	80
6-7	60	10	0	80	80
6-8	20	20	0	80	80
6-9	0	20	0	80	80
6-10	20	0	20	80	80
6-11	0	30	0	80	80
6-12	0	30	0	60	80
6-13	60	10	0	80	80
6-14	40	20	0	40	80
6-15	40	0	0	80	80
7-1	60	0	60	80	80
7-2	60	0	0	80	80
7-3	60	0	0	80	80
7-4	80	0	0	80	80
7-5	80	30	0	80	80

Rarity within the Landscape Score (maximum 80 points)	40
Rarity of Wetland Type Score (maximum 80 points)	80

4.1.2 SPECIES

4.1.2.1 BREEDING HABITAT FOR AN ENDANGERED OR THREATENED SPECIES

	Name of species		Source of information
1)	see attached 27A		
2)			
3)			
4)			
5)			
	Total:	1000	

Attach documentation.

Scoring:

For each species 250 points

(score is cumulative, no maximum score)

Breeding Habitat for Endangered or Threatened Species Score (no maximum) 1000

4.1.2.2 TRADITIONAL MIGRATION OR FEEDING HABITAT FOR AN ENDANGERED OR THREATENED SPECIES

	Name of species		Source of information
1)			
2)			
3)			
4)			
5)			
	Total:		

Attach documentation.

Scoring:

For one species 150 points
For each additional species 75

(Score is cumulative, no maximum score.)

Traditional Habitat for Endangered Species Score (no maximum) 0

4.1.2.3 PROVINCIALLY SIGNIFICANT ANIMAL SPECIES

	Name of species	Source of information
1)	See attached 27A	
2)		
3)		
4)		
5)		
6)		
7)		
8)		
9)		
10)		
11)		
12)		
13)		
14)		
15)		

Attach documentation

Scoring:

Number of provincially significant animal species in the wetland:

1	species =	50 points	14 species =	154
2	species =	80	15 species =	156
3	species =	95	16 species =	158
4	species =	105	17 species =	160
5	species =	115	18 species =	162
6	species =	125	19 species =	164
7	species =	130	20 species =	166
8	species =	135	21 species =	168
9	species =	140	22 species =	170
10	species =	143	23 species =	172
11	species =	146	24 species =	174
12	species =	149	25 species =	176
13	species =	152		

Add one point for every species past 25 (for example, 26 species = 177 points, 27 species = 178 points etc.)

(no maximum score)

Provincially Significant Animal Species Score (no maximum) 105

4.1.2.4 PROVINCIALLY SIGNIFICANT PLANT SPECIES

(Scientific names must be recorded)

	Common Name	Scientific Name	Source of information
1)	See attached 27A		
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			
12)			
13)			
14)			
15)			

Attach documentation.

Scoring:

Number of provincially significant plant species in the wetland:

1 species	=	50 points	14 species	=	154
2 species	=	80	15 species	=	156
3 species	=	95	16 species	=	158
4 species	=	105	17 species	=	160
5 species	=	115	18 species	=	162
6 species	=	125	19 species	=	164
7 species	=	130	20 species	=	166
8 species	=	135	21 species	=	168
9 species	=	140	22 species	=	170
10 species	=	143	23 species	=	172
11 species	=	146	24 species	=	174
12 species	=	149	25 species	=	176
13 species	=	152			

Add one point for every species past 25 (for example, 26 species = 177 points, 27 species = 178 points etc.)

Provincially Significant Plant Species Score (no maximum) 50

4.1.2.5 REGIONALLY SIGNIFICANT SPECIES (SITE REGION)

Scientific names must be recorded for plant species. **Lists of significant species must be approved by MNR.**

SIGNIFICANT IN SITE REGION:

.

	Common Name	Scientific Name	Source of information
1)	See attached 27A-B		
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			
12)			
13)			
14)			
15)			

Attach documentation.

Scoring:

Number of species significant in Site Region

1 species	=	20	6 species	=	55
2 species	=	30	7 species	=	58
3 species	=	40	8 species	=	61
4 species	=	45	9 species	=	64
5 species	=	50	10 species	=	67

Add one point for every species past 10 (no maximum score).

Regionally Significant Species Score (Site Region)(no maximum) 64

4.1.2.6 LOCALLY SIGNIFICANT SPECIES (SITE DISTRICT)

Scientific names must be recorded for plant species. **Lists of significant species must be approved by MNR.**

	Common Name	Scientific Name	Source of information
1	See attached 27B-D		
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

Attach documentation.

Scoring:

Number of species significant in Site District

1 species	=	10	6 species	=	41
2 species	=	17	7 species	=	43
3 species	=	24	8 species	=	45
4 species	=	31	9 species	=	47
5 species	=	38	10 species	=	49

For each significant species over 10 in the wetland, add 1 point. Total of 95 species = 134

Locally Significant Species Score (Site District) (no maximum) 134

Holland Marsh Wetland Complex - Significant Species

4.1.2.1 Breeding Habitat for an Endangered or Threatened Species
Source: N- Natural Heritage Information Centre (NHIC) OMNR Peterborough records; A- OMNR Aurora District records; C- Atlas squares covering the Holland Marsh Wetland Complex in Cadman, M.D. et al. 2007, Atlas of the Breeding Birds of Ontario 2001-2005, Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources and Ontario Nature, Toronto
Status: based on Regulation 230/08 under the *Endangered Species Act*
1. *Emydoidea blaningii* (Blanding's Turtle) A (Threatened species, observed in 1977, suitable habitat is still present)
2. *Ixobrychus exilis* (Least Bittern) N, A, C (Threatened species, confirmed breeder in 1938, possible breeder in 1983 and 1984; probable breeder in 1990, 1991, 1995 and 1997; 2001-2005 noted as probable breeder in 1 atlas square)
3. *Platanthera lecuophaea* (Prairie White Fringed Orchid) N, A (Endangered species, observed and collected by Steve Varga and Sheila McKay Kuja on Aug. 14, 1981, observed by Jocelyn Webber in 1982 and observed by Steve Varga and Emma Followes in 2005; not found in a 2009 OMNR site visit)
4. *Rallus elegans* (King Rail) (Endangered species, probable breeder in 1983, 1992, 1993 and 1997; 2001-2005 noted as possible breeder in 1 atlas square)

4.1.2.3. Provincially Significant Animal Species
Source: N- NHIC records; A- OMNR Aurora District records; C- Atlas squares covering the Holland Marsh Wetland Complex in Cadman et al. 2007
Status: species ranked as S1, S2, S3, SH or tracked by the NHIC
1. *Chelydra serpentina* (Common Snapping Turtle) A (Species of special concern, observed in 1984, suitable habitat is still present)
2. *Chlidonias niger* (Black Tern) N, A, C (Species of special concern, possible breeder in 1983, confirmed breeder in 1988, 1989 and 1990; 2001-2005 noted as confirmed breeder in 2 atlas squares)
3. *Haliaeetus leucocephalus* (Bald Eagle) A, C (Species of special concern, confirmed breeder in 2010; 2001-2005 noted as possible breeder in 1 atlas square)
4. *Wilsonia candensis* (Canada Warbler) A, C (Species of special concern, probable breeder in 1983; 2001-2005 noted as probable breeder in 1 atlas square)

4.1.2.4 Provincially Significant Plant Species
Source: A. A. Reznicek observation on the Simcoe County side of the Holland Marsh Wetland Complex noted by the Conservation Group Botany Department University of Toronto in a letter dated April 28, 1983 in MTO 1984 Highway 89 Extension Environmental Assessment Report one stage submission Ontario Ministry of Transportation and Communications, Planning and Design Section, Central Region
Status: species ranked as S1, S2, S3, SH or tracked by the Natural Heritage Information Centre (NHIC) OMNR
1. *Eleocharis rostellata* (Beaked Spike-rush)

4.1.2.5 Regionally Significant Species
Source: B- observations by the Conservation Group Botany Department University of Toronto in a letter dated April 28, 1983 in MTO 1984, V- Steve Varga, John L. Riley & Kathy Lindsay June 30, 1981 collections housed in the Royal Ontario Museum Herbarium (TRT) in Lindsay, K. 1996 Annotated List of Plants of the Holland Rivermouth Fen, OMNR; S- Steve Varga and Sheila McKay Kuja Aug. 14, 1981collections housed in the Royal Ontario Museum Herbarium (TRT) in Lindsay 1996; R- John L. Riley observations from 1983 with collections noted by an "*" housed in the Royal Ontario Museum Herbarium (TRT) in Lindsay 1996; W- Jocelyn Webber 1982 observations and collections noted with an "*" housed at the University of Toronto Erindale College Herbarium (TRTE) in MTO 1984; G- Joyce Gould and Steve Varga observations from August 18, 1986 in Gould, J. 1987 Holland Landing Wetland, OMNR, Parks and Recreation Areas Section, Central Region, Richmond Hill; A- A. A. Reznicek observations from 1976 in Reznicek, A.A. 1980 John Goldie's 1819 Collecting Site near Lake Simcoe, Ontario, Canadian Field Naturalist 94(4):439-442

Status: Regionally rare in the former OMNR Central Region based on Riley, J.L. 1989 Distribution and Status of the Vascular Plants of Central Region, OMNR, Parks and Recreation Areas Section, Central Region, Richmond Hill

1. *Calamagrostis stricta* ssp. *stricta* (Northern Reed Grass) B, R, V
2. *Carex chordorrhiza* (Creeping Sedge) B, W*, R, V, G, A
3. *Carex livida* (Livid Sedge) B, W, R, V, G, A
4. *Carex sartwellii* (Sartwell's Sedge) B, W*
5. *Cyperus engelmanni* (Engelmann's Cyperus) W*
6. *Epilobium strictum* (Soft Willow-herb) R*
7. *Eriophorum gracile* (Slender Cottongrass) B, W*, V, A
8. *Rhus vernix* (Poison Sumac) B, W
9. *Scheuchzeria palustris* (Marsh Scheuchzeria) B, W, R, V

4.1.2.6 Locally Significant Species

Source: B- observations by the Conservation Group Botany Department University of Toronto in a letter dated April 28, 1983 in MTO 1984, V- Steve Varga, John L. Riley & Kathy Lindsay June 30, 1981 collections housed in the Royal Ontario Museum Herbarium (TRT) in Lindsay 1996; S- Steve Varga and Sheila McKay Kuja August 14, 1981collections housed in the Royal Ontario Museum Herbarium (TRT) in Lindsay 1996; R- John L. Riley observations from 1983 with collections noted by an "*" housed in the Royal Ontario Museum Herbarium (TRT) in Lindsay 1996; W- Jocelyn Webber 1982 observations and collections noted with an "*" housed at the University of Toronto Erindale College Herbarium (TRTE) in MTO 1984; M- Steve Varga (OMNR Aurora District) observations from 2010 in Cook's Bay; T- TRT herbarium specimens from the 1950s; O- OMNR Maple District observations from 1977 to 1984; G- Joyce Gould and Steve Varga observations from August 18, 1986 in Gould 1987; A- A. A. Reznicek observations from 1976 in Reznicek, A.A. 1980

Status: Locally rare in the Regional Municipality of York being known from 10 of less locations or restricted to rare habitats based on Varga, S. et al. 2004 Distribution and Status of the Vascular Plants of the Greater Toronto Area, Ontario Ministry of Natural Resources, Aurora District

1. *Acorus americanus* (Sweetflag) W*
2. *Agalinus paupercula* (Small-flowered Agalinus) B, W*, S
3. *Agrostis scabra* (Rough Hair Grass) W*
4. *Andromeda glaucophylla* (Bog-rosemary) B, W*, R, V, G
5. *Apios americana* (Groundnut) W*, R
6. *Aronia melanocarpa* (Black Chokeberry) B, W*, R, V, S
7. *Aster borealis* (Rush Aster) B, W*, G, S, A
8. *Aster umbellatus* (Flat-topped Aster) W
9. *Betula pumila* (Swamp Birch) B, W*, V, G, O
10. *Brasenia scheberi* (Water-shield) O
11. *Calamagrostis stricta* ssp. *inexpansa* (Narrow Reed Grass) B, W*, R*, G
12. *Calopogon tuberosus* (Grass Pink) B, W, R, V
13. *Cardamine pratensis* (Cuckoo-flower) W*
14. *Carex brunnescens* (Brownish Sedge) W
15. *Carex buxbaumii* (Buxbaum's Sedge) B R, V
16. *Carex lasiocarpa* (Slender Sedge) B, W* R, V
17. *Carex limosa* (Mud Sedge) B, W* R, V
18. *Carex prairea* (Prairie Sedge) W*, R
19. *Chamaedaphne calyculata* (Leatherleaf) W*, R, V, G
20. *Cinna arundinacea* (Wood Reed Grass) B, W
21. *Cirsium muticum* (Swamp Thistle) W
22. *Cladium mariscoides* (Twig-rush) B, W*, R, V, S
23. *Corallorhiza trifida* (Early Coral-root) W
24. *Cornus amomum* (Silky Dogwood) W
25. *Cypripedium calceolus* var. *parviflorum* (Small Yellow Lady's Slipper) W*
26. *Cypripedium calceolus* var. *pubescens* (Large Yellow Lady's Slipper) W*

27. *Cypripedium reginae* (Showy Lady's Slipper) W
28. *Decodon verticillatus* (Water-willow) W*
29. *Drosera intermedia* (Spatulate-leaved Sundew) B, W*
30. *Drosera rotundifolia* (Round-leaved Sundew) B, W* R, V, S, G
31. *Dulichium arundinaceum* (Three-way Sedge) B, W, S
32. *Eleocharis acicularis* (Needle Spike-rush) W*
33. *Eleocharis elliptica* (Elliptic Spike-rush) B, W*, R, V
34. *Eriophorum viridi-carinatum* (Thin-leaved Cotton-grass) G
35. *Equisetum palustre* (Marsh Horsetail) B, W*
36. *Galium labradoricum* (Labrador Marsh Bedstraw) B, W*, R, V
37. *Juncus canadensis* (Canada Rush) B, W*, R, V, S
38. *Lathyrus palustris* (Marsh Vetchling) W*, S
39. *Ledum groenlandicum* (Labrador-tea) M
40. *Lobelia kalmii* (Kalm's Lobelia) B, T, G, A
41. *Lonicera oblongifolia* (Swamp Fly Honeysuckle) W*, G
42. *Ludwigia plaustris* (Water Purslane) W
43. *Lycopodium annotinum* (Stiff Clubmoss) G
44. *Lysimachia terrestris* (Swamp Loosestrife) W*, R, V
45. *Malaxis monophyllos* (White Adder's-mouth) G
46. *Menyanthes trifolia* (Bog Buckbean) B, W, R, V, G
47. *Muhlenberiga glomerata* (Wild Timothy) B, W*, R, S, G
48. *Myrica gala* (Sweet Gale) B, W*, R, V, O
49. *Myriophyllum sibiricum* (Pale Water-milfoil) W*, R*
50. *Myriophyllum verticillatum* (Whorled Water-milfoil) T
51. *Nemopanthus mucronatus* (Mountain Holly) W
52. *Ophioglossum vulgatum* (Northern Adder's-tongue Fern) R
53. *Picea mariana* (Black Spruce) W
54. *Platanthera dilatata* (Tall White Bog Orchid) A
55. *Platanthera lacera* (Ragged Fringed Orchid) B, W, R, V
56. *Platanthera psycodes* (Small Purple Fringed Orchid) B, W, R, V
57. *Pogonia ophioglossoides* (Rose-pogonia) B, W, R, V
58. *Polygonum hydropiperoides* (Mild Water-pepper) W*
59. *Polygonum punctatum* (Dotted Smartweed) W
60. *Polygonum sagittatum* (Arrow-leaved Tearthumb) R
61. *Potentilla fruiticosa* (Shrubby Cinquefoil) G, O, A
62. *Pontederia cordata* (Pickerelweed) W*
63. *Potamogeton berchtoldii* (Slender Pondweed) B, W*
64. *Potamogeton epihydrus* (Ribbonleaf Pondweed) W*
65. *Potamogeton gramineus* (Variable-leaved Pondweed) W*
66. *Potamogeton nodosus* (Knotty Pondweed) W*
67. *Potamogeton richardsonii* (Richardson's Pondweed) B, W*
68. *Ranunculus aquatilis* (White Water-crowfoot) W*
69. *Ranunculus pensylvanicus* (Bristly Buttercup) W, R
70. *Rhynchospora alba* (White Beak-rush) B, W*, R, S, G
71. *Ribes hirtellum* (Smooth Gooseberry) B, W*
72. *Rosa palustris* (Marsh Rose) W*, G
73. *Rudbeckia laciniata* (Cut-leaved Coneflower) W
74. *Rubus hispidus* (Swamp Dewberry) W*
75. *Salix candida* (Hoary Willow) B, W*, R, V, G
76. *Salix pedicellaris* (Bog Willow) B, W*, R, V
77. *Salix serissima* (Autumn Willow) R, V, G
78. *Sarracenia purpurea* (Pitcher-plant) W* V, G, O
79. *Solidago uliginosa* (Bog Goldenrod) B, W*, R, V, S, G
80. *Scirpus acutus* (Hard-stemmed Bulrush) W, G
81. *Scirpus fluviatilis* (River Bulrush) W
82. *Scirpus hudsonianus* (Hudson Bay Bulrush) B, V, G, A

83. *Spiranthes romanzoffiana* (Hooded Ladies' Tresses) B, S
84. *Stachys palustris* (Marsh Hedge-nettle) W, R*
85. *Stellaria longifolia* (Long-leaved Stitchwort) W*, R
86. *Teucrium canadense* (Wood Germander) W*
87. *Triglochin maritimum* (Seaside Arrow-Grass) W*, R, V
88. *Triglochin palustris* (Marsh Arrow-grass) W*
89. *Utricularia intermedia* (Flat-leaved Bladderwort) B, W*, V
90. *Utricularia minor* (Small Bladderwort) G, A
91. *Vaccinium marcocarpon* (Cranberry) B, W*, R, V, S, G, O
92. *Vallisneria americana* (Tape-grass) B, W*, O
93. *Wolffia borealis* (Northern Water-meal) W
94. *Wolffia columbiana* ((Columbia Water-meal) W
95. *Zizania palustris* (Northern Wild Rice) M

4.2 SIGNIFICANT FEATURES AND/OR FISH & WILDLIFE HABITAT

4.2.1 NESTING OF COLONIAL WATERBIRDS

Status	Name of species	Source of Information	Score
1) Currently nesting	Great Blue Heron	Steve Varga, MNR Aurora District	50 points
2) Known to have nested within past 5 years			25
3) Active feeding area (Do not include feeding by great blue herons)			15
4) None known			0

Attach documentation (nest locations etc., if known).

Score highest applicable category only; maximum score 50 points.

Score for Nesting Colonial Waterbirds (maximum 50 points) 50

4.2.2. WINTER COVER FOR WILDLIFE

(Check only highest level of significance.) (one only)			Score
1)		Provincially significant	l00
2)		Significant in Site Region	50
3)		Significant in Site District	25
3)	x	Locally significant	10
4)		Little or poor winter cover present	0

Source of information: Winter cover for deer - Angus Norman

Winter Cover for Wildlife Score (maximum l00 points) 10

4.2.3 WATERFOWL STAGING AND/OR MOULTING

(Check only highest level of significance for both staging and moulting; score is cumulative across columns, maximum score 150.)

		Staging	Score (one only)	Moulting	Score (one only)
1)	Nationally significant		150		150
2)	Provincially significant		100		100
3)	Regionally significant	x	50		50
4)	Known to occur		10	x	10
5)	Not possible		0		0
6)	Unknown		0		0
	Total:	0		0	

Source of information: Angus Norman - large staging of waterfowl in Cook's Bay

Waterfowl Moulting and Staging Score (maximum 150 points) 60

4.2.4 WATERFOWL BREEDING

		(Check only highest level of significance.)	Score
1)		Provincially significant	100
2)		Regionally significant	50
3)	x	Habitat suitable	10
4)		Habitat not suitable	0

Source of information: Angus Norman

Waterfowl Breeding Score (maximum 100 points) 10

4.2.5 MIGRATOR PASSERINE, SHOREBIRD OR RAPTOR STOPOVER AREA

(Check highest applicable category)

1)		Provincially significant	100
2)		Significant in Site Region	50
3)		Significant in Site District	10
4)	x	Not significant	0

Source of information: Angus Norman

Passerine, Shorebird or Raptor Stopover Score (maximum 100 points) 0

4.2.6 FISH HABITAT

4.2.6. Spawning and Nursery Habitat

Table 5. Area Factors for Low Marsh, High Marsh, and Swamp Communities.

No. of ha of Fish Habitat	Area Factor
< 0.5 ha	0.1
0.5- 4.9	0.2
5.0- 9.9	0.4
10.0- 14.9	0.6
15.0 -19.9	0.8
20.0+ ha	1.0

Step 1:

_____ Fish habitat is not present within the wetland (Score = 0)

x Fish habitat is present within the wetland (Go to Step 2)

Step 2: Choose only one option

1) x Significance of the spawning and nursery habitat within the wetland is known (Go to Step 3)

2) _____ Significance of the spawning and nursery habitat within the wetland is not known (Go through Steps 4, 5, 6 and 7)

Step 3: Select the highest appropriate category below attach documentation:

1)	_____	Significant in Site Region	l00 points
2)	_____	Significant in Site District	50
3)	x	Locally Significant Habitat (5.0+ ha)	25
4)	_____	Locally Significant Habitat (<5.0 ha)	15

Score for Spawning and Nursery Habitat (maximum score 100 points) 25

Step 4: **Proceed to Steps 4 to 7 only if Step 3 was not answered.**

(**Low Marsh**: marsh area from the existing water line out to the outer boundary of the wetland)

_____ Low marsh not present (Continue to Step 5)
_____ Low marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

Scoring is based on the one most clearly dominant plant species of the dominant form in each Low Marsh vegetation community. Check the appropriate Vegetation Group (see Appendix 16 Table 16-2) for each Low Marsh community. Sum the areas of the communities assigned to each Vegetation Group and multiply by the appropriate size factor from Table 5.

Vegetation Group Number	Vegetation Group Name	Present as a Dominant Form (check)	Total Area (ha)	Area Factor (see Table 5)	Score	Final Score (area factor x score)
1	Tallgrass				6 pts	
2	Shortgrass-Sedge				11	
3	Cattail-Bulrush-Burreed				5	
4	Arrowhead-Pickerelweed				5	
5	Duckweed				2	
6	Smartweed-Waterwillow				6	
7	Waterlily-Lotus				11	
8	Waterweed-Watercress				9	
9	Ribbongrass				10	
10	Coontail-Naiad-Watermilfoil				13	
11	Narrowleaf Pondweed				5	
12	Broadleaf Pondweed				8	
Sub Total Score (maximum 75 points)						
Total Score (maximum 75 points)						

Step 5: (**High Marsh**: area from the water line to the inland boundary of marsh wetland type. This is essentially what is commonly referred to as a wet meadow, in that there is insufficient standing water to provide fisheries habitat except during flood or high water conditions.)

_____ High marsh not present (Continue to Step 6)
_____ High marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

Scoring is based on the one most clearly dominant plant species of the dominant form in each High Marsh vegetation community. Check the appropriate Vegetation Group (see Appendix 16 Table 16-2) for each High Marsh community. Sum the areas of the communities assigned to each Vegetation Group and multiply by the appropriate size factor from Table 5.

Vegetation Group Number	Vegetation Group Name	Present as a Dominant Form (check)	Total Area (ha)	Area Factor (see Table 5)	Score	Final Score (area factor x score)
1	Tallgrass				6 pts	
2	Shortgrass-Sedge				11	
3	Cattail-Bulrush-Burreed				5	
4	Arrowhead-Pickerelweed				5	
Sub Total Score (maximum 25 points)						
Total Score (maximum 25 points)						

Step 6: (**Swamp**: Swamp communities containing fish habitat, either seasonally or permanently. Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

_____ Swamp containing fish habitat not present (Continue to Step 7)
_____ Swamp containing fish habitat present (Score as follows)

Swamp containing fish habitat	Present (check)	Total area (ha)	Area Factor (see Table 5)	Score	TOTAL SCORE (factor x score)
Seasonally flooded				10	
Permanently flooded				10	
Sub SCORE (maximum 20 points)					
SCORE (maximum 20 points)					

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = _____

Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = _____

Score for Swamp Containing Fish Habitat (maximum 20) = _____

Sum (maximum score 100 points) = _____

4.2.6.2 Migration and Staging Habitat

Step 1:

1) _____ Staging or Migration Habitat is not present in the wetland (Score = 0)

2) _____ Staging or Migration Habitat is present in the wetland, significance of the habitat is known (Go to Step 2)

3) x Staging or Migration Habitat is present in the wetland, significance of the habitat is not known (Go to Step 3)

NOTE: Only one of Step 2 or Step 3 is to be scored.

Step 2: Select the highest appropriate category below, attach documentation:

		Score
1)	Significant in Site Region	25 points
2)	Significant in Site District	15
3)	Locally Significant	10
4)	Fish staging and/or migration habitat present, but not as above	5

Score for Fish Migration and Staging Habitat (maximum score 25 points) 0

Step 3: Select the highest appropriate category below based on presence of the designated site type (does not have to be dominant). See Section 1.1.3. Note name of river for 2) and 3).

		Score
1)	x Wetland is riverine at rivermouth or lacustrine at rivermouth	25 points
2)	Wetland is riverine,within 0.75 km of rivermouth	15
3)	Wetland is lacustrine,within 0.75 km of rivermouth	10
4)	Fish staging and/or migration habitat present, but not as above	5

Score for Staging and Migration Habitat (maximum score 25 points) 25

4.3 ECOSYSTEM AGE

(Fractional Area = area of wetland/total wetland area)

		Fractional Area			Scoring
Bog	0		x	25 =	
Fen, treed to open on deep soils					
floating mats or marl		0.11	x	20 =	2.20
Fen, on limestone rock			x	5 =	
Swamp	0	0.36	x	3 =	1.08
Marsh	0	0.53	x	0 =	0.00
			Sub Total:		3.28

Ecosystem Age Score (maximum 25 points) 3

4.4 GREAT LAKES COASTAL WETLANDS

Score for coastal (see text for definition) wetlands only

Choose one only

wetland < 10 ha	=	10 points
wetland 10- 50 ha	=	25
wetland 51 -100 ha	=	50
wetland > 100 ha	=	75

Great Lakes Coastal Wetlands Score (maximum 75 points) 0

5.0 EXTRA INFORMATION

5.1 PURPLE LOOSESTRIFE

_____ Absent/Not seen

_____ Present

(a) One location in wetland _____
Two to many locations _____

Abundance code

(b) l) < 20 stems _____
2) 20-99 stems _____
3) 100-999 stems _____
4) >1000 stems _____

5.2 SEASONALLY FLOODED AREAS

Check one or more:

Ephemeral	(less than 2 weeks)	_____
Temporal	(2 weeks to 1 month)	_____
Seasonal	(1 to 3 months)	_____
Semi-permanent	(>3 months)	_____
No seasonal flooding		_____

5.3 SPECIES OF SPECIAL SIGNIFICANCE

5.3.1 Osprey

Present and nesting _____
Known to have nested in last 5 years _____
Feeding area for osprey _____
Not as above _____

5.3.2 Common Loon

Nesting in wetland _____
Feeding at edge of wetland _____
Observed or heard on lake or river adjoining the wetland _____
Not as above _____

INVESTIGATORS	AFFILIATION
Michael Power	MNR Maple District
C. Hall	"
S. Sheppard	"
M. Cromarty	"
B. Bruinse	"
C. Leggiadro	"
S. Austin	"

DATES WETLAND VISITED

July 26, 27, 30, 31, August 1-3, 9,10,13-17, 21-24, 27-30, 1984

DATE THIS EVALUATION COMPLETED 1984, updated to 3rd edition 1998, updated significant species 2012

ESTIMATED TIME DEVOTED TO COMPLETING THE FIELD SURVEY IN "PERSON HOURS"

451

WEATHER CONDITIONS

i)

ii)

OTHER POTENTIALLY USEFUL INFORMATION:

CHECKLIST OF PLANT AND ANIMAL SPECIES RECORDED IN THE WETLAND:

Attach a list of all flora and fauna observed in the wetland.

*Indicate if voucher specimens or photos have been obtained, where located, etc.

Southern Ontario Wetland Evaluation, Score Summary March 1993

WETLAND EVALUATION SCORING RECORD

WETLAND NAME AND/OR NUMBER	Holland Marsh Wetland Complex

1.0 BIOLOGICAL COMPONENT

1.1 PRODUCTIVITY

1.1.1	Growing Degree-Days/Soils	13	
1.1.2	Wetland Type	11	
1.1.3	Site Type	4	
	Total for Productivity		28

1.2 BIODIVERSITY

1.2.1	Number of Wetland Types	20	
1.2.2	Vegetation Communities (maximum 45)	37	
1.2.3	Diversity of Surrounding Habitat (maximum 7)	7	
1.2.4	Proximinty to Other Wetlands	8	
1.2.5	Interspersion	30	
1.2.6	Open Water Type	8	
	Total for Biodiversity		110
	Sub Total for Biodiversity	110	

1.3 SIZE (Biological Component) 50

TOTAL FOR BIOLOGICAL COMPONENT (not to exceed 250) 188

2.0 SOCIAL COMPONENT

2.1 ECONOMICALLY VALUABLE PRODUCTS

2.1.1	Wood Products	18
2.1.2	Wild Rice	6
2.1.3	Commercial Fish	12
2.1.4	Bullfrogs	1
2.1.5	Snapping Turtles	1
2.1.6	Furbearers	12

Total for Economically Valuable Products: 50

2.2 RECREATIONAL ACTIVITIES (maximum 80): 80

2.3 LANDSCAPE AESTHETICS

2.3.1	Distinctness	3
2.3.2	Absence of Human Disturbance	2

Total for Landscape Aesthetics: 5

2.4 EDUCATION AND PUBLIC AWARENESS

2.4.1	Educational Uses	0
2.4.2	Facilities and Programs	2
2.4.3	Research and Studies	10

Total for Education and Public Awareness: 12

2.5 PROXIMITY TO AREAS OF HUMAN SETTLEMENT: 26

2.6 OWNERSHIP: 6

Subtotal for Social Component: 156

2.7 SIZE (Social Component): 20

2.8 ABORIGINAL AND CULTURAL VALUES: 0

TOTAL FOR SOCIAL COMPONENT (not to exceed 250): 199

Southem Ontario Wetland Evaluation, Score Summary March 1993

3.0 HYDROLOGICAL COMPONENT

3.1	FLOOD ATTENUATION		0
3.2	WATER QUALITY IMPROVEMENT		
3.2.1	Short Term Improvement	0	
3.2.2	Long Term Improvement	0	
3.2.3	Groundwater Discharge (maximum 30)	12	
	Total for Water Quality Improvement		12
3.3	CARBON SINK		3
3.4	SHORELINE EROSION CONTROL		8
3.5	GROUNDWATER RECHARGE		
3.5.1	Site Type	0	
3.5.2	Soils	0	
	Total for Groundwater Recharge		0
	TOTAL FOR HYDROLOGICAL COMPONENT (not to exceed 250)		23

4.0 SPECIAL FEATURES

4.1 RARITY

4.1.1 Wetlands

4.1.1.1	Rarity within the Landscape	40
4.1.1.2	Rarirty of Wetland Type (maximum 80)	80
	Total for Wetland Rarity	120

4.1.2 Species

4.1.2.1	Endangered or Threatened Species Breeding	1000
4.1.2.2	Traditional Use by Endangered or Threatened Species	0
4.1.2.3	Provincially Significant Animals	105
4.1.2.4	Provincially Significant Plants	50
4.1.2.5	Regionally Significant Species	64
4.1.2.6	Locally Significant Species	134
	Total for Species Rarity	1353

4.2 SIGNIFICANT FEATURES OR HABITAT

4.2.1	Colonial Waterbirds	50
4.2.2	Winter Cover for Wildlife	10
4.2.3	Waterfowl Staging and Moulting	60
4.2.4	Waterfowl Breeding	10
4.2.5	Migratory Passerine, Shorebird or Raptor Stopover	0
4.2.6	Fish Habitat	50
	Total for Significant Features and Habitat	180

4.3 ECOSYSTEM AGE 3

4.4 GREAT LAKES COASTAL WETLANDS 0

TOTAL FOR SPECIAL FEATURES (maximum 250) 250

Southern Ontario Wetland Evaluation, Score Summary — March 1993

SUMMARY OF EVALUATION RESULT

Wetland	Holland Marsh Wetland Complex
TOTAL FOR 1.0 BIOLOGICAL COMPONENT	188
TOTAL FOR 2.0 SOCIAL COMPONENT	199
TOTAL FOR 3.0 HYDROLOGICAL COMPONENT	23
TOTAL FOR 4.0 SPECIAL FEATURES COMPONENT	250
WETLAND TOTAL	660

INVESTIGATORS

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AFFILIATION

MNR Maple District

DATE

August, 1984

updated to 3rd edition 1998 & updated significant species 2012