1 METHODOLOGY

1.1 Wetlands Functions

Wetland functions assessment was carried out based on the approach presented by Tiner (2003, 2011). The approach enables to assess wetland functions at the watershed level. Functions were chosen based on knowledge of the RSA ecology and hydrology and literature review (Hanson et al., 2008; Tiner; 2003; OWES, 2013). OWES (2013) includes the evaluation of functions in the ecological value assessment and the functions determined for wetlands in northern Ontario can be applied to western Labrador.

The terrestrial ecosystem classification carried out for Howse Project (Groupe Hémisphères, 2014, See Volume 3, Appendix J) and the wetland classification based on the Canadian Wetland Classification System (NWWG, 1997) were also used to determine wetland functions. Wetland functions were attributed to wetlands, whether or not they are located in a complex.

1.1.1 Position in the Watershed

Wetlands or wetland complexes were first attributed a position in the watershed based on the Strahler stream order (Tarborton et *al.*, 1991). The headwaters are the first order and downstream segments are defined at confluences (two streams running into each other). At a confluence, if the two streams are not of the same order, the highest numbered order is maintained on the downstream segment. At a confluence of two streams with the same order, the downstream segment gets the next highest numbered order. Figure 1 shows a representation of the Strahler stream order.

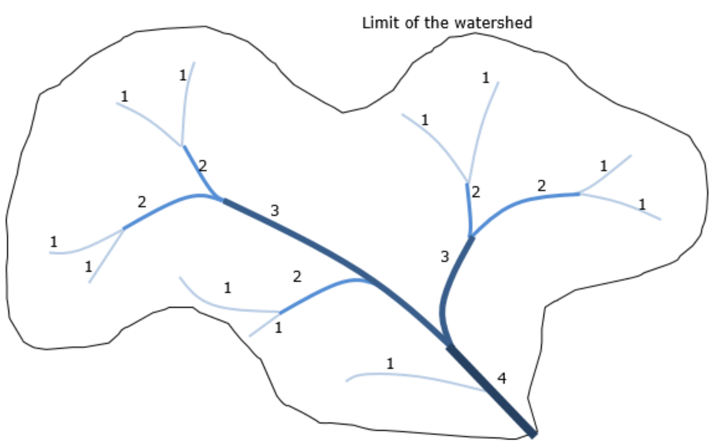


Figure 1 Representation of the Strhaler stream order

1.1.2 Water Flow Path

The water flow path indicates the type of directional flow of water associated with wetlands. Table 1 presents the type and definitions of the water flow path used in the assessment. Figure 2 shows a representation of the water flow paths.

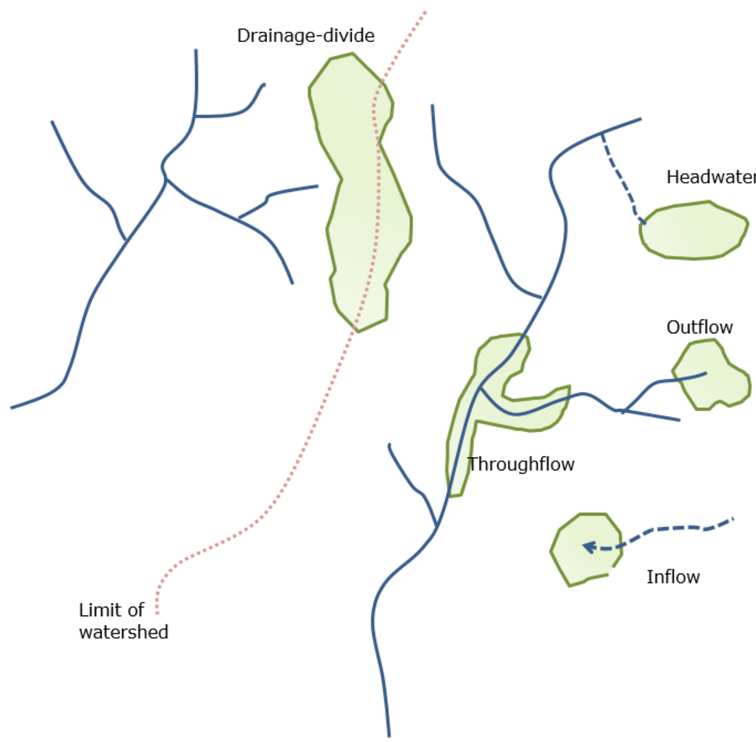


Figure 2 Representation of the Water Flow Paths

Table 1 Water Flow Path Identified Regionally

NAME	DEFINITION
Drainage-divide	Wetlands that have outflow in two directions to two separate drainage systems.
Headwater	Sources of streams or wetlands along first-order intermittent streams.
Inflow	Sinks where no surface water outlets exist, yet water is entering via a stream or river or upslope wetland
Isolated	Closed depressions or flats where water comes from direct precipitation, localized surface runoff and/or groundwater discharge
Outflow	Have water leaving and moving downstream via a watercourse or a slope wetland
Throughflow	Water flows though due to presence of a watercourse or other wetland above and below these wetlands

1.1.3 Wetlands Late-seral Ecotype

Several terrestrial ecosystem mapping (TEM) were carried out in the Schefferville area, including the Howse local study area. Table 2 presents the wetland ecotypes that are found locally and regionally. The TEM report for Howse Project is available in Volume 3, Appendix J.

Table 2 Late-Seral Wetland Ecotypes

LATE-SERAL ECOTYPE		DESCRIPTION
CODE	COMMON NAME	
Mid Subarctic Forest (MSF)		
MSF07	Fluvial White Spruce / Sedge	White spruce-moss stand; thin-thick deposits; fine soil texture; riparian; flooded sites imperfectly to poorly drained
MSF08	Black Spruce/ Tamarack Forested Swamp	Forested swamp; denser stand than Ecotype MSF10; organic deposits; Sphagnum-dominated; poorly drained
MSF09	Black Spruce/ Tamarack Fluvial Spruce Fen	Forested fen; fluvial or organic deposits; sedge-dominated; poorly drained
MSF10	Black Spruce Bog	Uniform forested bog; organic deposits; forest floor dominated by sedge and grass; poorly drained
MSF11	Structured Herb Fen	Structured non-forested herb fen; organic deposits; vegetation dominated by sedge and grass; very poorly drained
MSF12	Uniform Herb Fen	Uniform non-forested herb fen; organic deposits; vegetation cover dominated by sedge and grass; poorly drained
MSF13	Non-Uniform Herb Fen	Random non-forested herb fen; organic deposits; vegetation cover dominated by sedge and grass; poorly drained
MSF14	Uniform Shrub Fen	Uniform non-forested shrub fen; organic deposits; vegetation cover dominated by sedge and grass; poorly drained
MSF15	Uniform Fluvial Shrub Fen	Uniform non-forested shrub fen; fluvial or rich organic deposits; vegetation cover dominated by sedge and grass; soil richer and more diverse plant community than Ecotype MSF14; imperfectly to very poorly drained
High Subarctic Tundra (HST)		
HST05	Riparian Artic Alpine Shrub	Riparian fen; fluvial or organic deposits; ground cover dominated by sedge and grass; imperfect to poor drainage
HST06	Uniform Sedge Fen	Uniform herb fen; organic deposits; ground cover dominated by sedge and grass; poor to very poor drainage
HST07	Uniform Shrub Fen	Uniform shrub fen; dominated by diverse shrub species of the Ericaceae family; ground cover dominated by sedge and grass; poor drainage

☐ Absent from Howse LSA

1.1.4 Defining Key Functions for Wetlands

Functions were chosen from the literature (See section 1.1) and based on the knowledge of the regional area. Information concerning hydrology, fish and fish habitat, as well as bird habitat that were used for the wetland functions assessment were selected based on the different surveys carried out locally and regionally.

Functions are classified as hydrological, ecological or biogeochemical. Table 3 presents the functions with its correlation to watershed position and water flow path. Functions were attributed to ecotypes.

Table 3 Wetland Functions and Correlation to Characteristics

FUNCTION	TYPICAL WATERSHED POSITION	WATER FLOW PATH	WETLAND TYPES DESCRIPTION AND REQUIREMENTS	WETLANDS TYPES THAT ACCOMPLISH THE FUNCTION	
				High	Moderate
Hydrological					
H1. Flood control	3 or higher	Throughflow	Wetlands along rivers and lakes	Any	–
H2. Stream flow regulation	1	Headwater Outflow	Any wetlands along first order streams	MSF15 HST05	Any other
	2	Throughflow	Wetlands along ponds and lakes	–	Any
	Any	Throughflow	Floodplain	–	MSF07, MSF09, MSF15 HST05
H3. Recharge of regional local supply aquifer	Any	Outflow	Wetlands classified as discharge swamps or fens	MSF08 (only type locally present)	–
H4. Surface water detention	1	Headwater Outflow	Dominated by trees or dense stands of shrubs	MSF07, MSF08, MSF09, MSF15 HST05	MSF10, MSF14 HST07
Ecological					
E1. Highly productive habitat	Any	Any	Known productive wetland based on survey	MSF07	MSF09, MSF15
E2. Potential species at risk habitat	Any	Any	Potential habitat for Grey-cheeked Thrush and Rusty Blackbird	MSF08, MSF09, MSF10	MSF15, HST05
E3. Fish habitat protection	Any	Any	Any wetland along a stream, pond or lake with fish habitat	MSF07, MSF09, MSF10, MSF15, HST05	–

FUNCTION	TYPICAL WATERSHED POSITION	WATER FLOW PATH	WETLAND TYPES DESCRIPTION AND REQUIREMENTS	WETLANDS TYPES THAT ACCOMPLISH THE FUNCTION	
				High	Moderate
E4. Waterfowl and waterbird significant stopover habitat	Any	Any	Known stopover based on survey	MSF11, MSF12 MSF13, MSF14	–
Biogeochemical					
B1. Shoreline protection	Any	–	Wetlands along waterbodies	Any	–
	Any	–	Wetlands along streams	MSF07, MSF15 HST05	
	Any	–	Wetlands along ponds	–	Any
B2. Contaminant control	Any	Throughflow	Wetlands downstream of Anthropogenically altered landscapes	Forested wetland MSF07, MSF08, MSF09, MSF10	Non-forested wetland MSF11, MSF12, MSF14, MSF15 HST05, HST06
B3. Sediment control	Any	Throughflow	Seasonnally flooded wetlands (except bogs) and wetland along ponds	Forested wetland MSF07, MSF09	Non-forested wetland MSF11, MSF12, MSF14, MSF15 HST05, HST06
	Any	Throughflow	Flat wetlands less frequently flooded (periodically and short time of high water level)	–	Forested wetland MSF08, MSF10
	Any	Outflow	Wetlands along ponds	–	Forested wetland MSF07, MSF08, MSF09, MSF10
	Any	Throughflow	Wetlands downstream of Anthropogenically altered landscapes	–	Any

1.2 Wetland Ecological Value Assessment

The assessment is based on the criteria used for assessing the ecological value of wetlands (Joly et al., 2008; OWES, 2013). A total of 6 criteria were used, all complementary with the ecological function assessment.

The assessment of the ecological value is carried out at a wetland polygon-scale. This encounters the fact that complexes of wetland are so vast that parts of a same complex may be several kilometres away and thus have a very different ecological value as their characteristics and functions differ.

Ecological value assessment of wetland wetland complexes, has been made for comparison purposes. A complex is actually a group of adjacent wetlands hydrologically connected. Wetlands distant of 30 meters or less are considered part of a complex. Figure 3 illustrates a wetland complex.

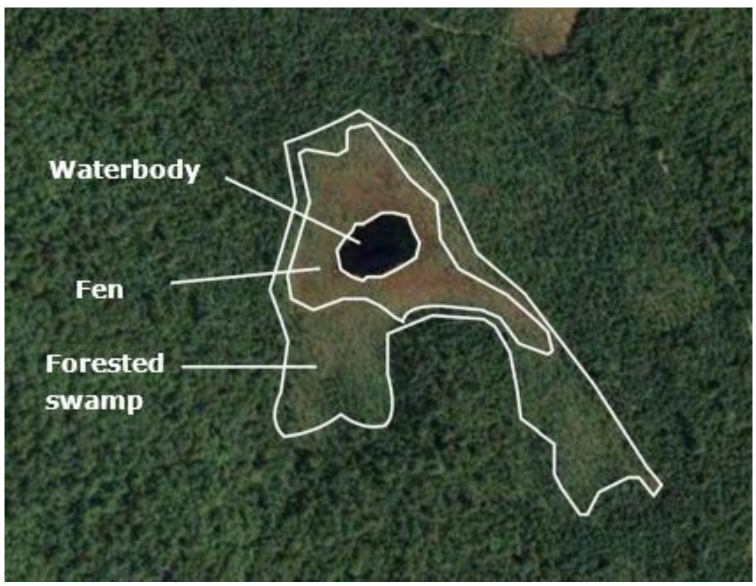


Figure 3 Example of a wetland complex

1.2.1 Wetland Area /10

The value is assessed comparing the area of a wetland to the largest wetland present within the RSA. Classes of areas were therefore determined to take into account the average area of wetlands present in the RSA.

More than 20 ha	10
10 to 20 ha	8
5 to 10 ha	6
1 to 5 ha	4
Less than 1 ha	2

1.2.2 Complexity /6

The complexity refers to the number of ecosystems within a wetland or a complex. A high number of different ecosystems brings a high diversity of habitats and therefore of wildlife and plant species. For guidance, two types of treed swamps characterized by different populations represent two different ecosystems.

Maximum 6 points, 2 points per different ecosystem

1.2.3 Hydrological Connectivity /10

Hydrological connectivity also takes into account the proximity of other wetlands. The method is based on the Ontario Wetland Evaluation system (OWES, 2013). The proximity analysis is done on wetlands outside of a wetland complex (more than 30 m distance). Hydrological connectivity is essential to ensure exchanges between ecosystems and ensure the sustainability of wetlands.

Hydrologically connected by surface water to other wetlands (different dominant wetland type), or open lake or deep river within 1.5 km	10
Hydrologically connected by surface water to other wetlands (same dominant wetland type) within 0.5 km	9
Hydrologically connected by surface water to other wetlands (different dominant wetland type), or open lake or deep river from 1.5 to 4 km away	7
Hydrologically connected by surface water to other wetlands (same dominant wetland type) from 0.5 to 1.5 km away	5
Within 0.75 km of other wetlands (different dominant wetland type) or open lake or deep river, but not hydrologically connected by surface water	3
Within 1 km of other wetlands, but not hydrologically connected by surface water	1
No wetland within 1 km	0

1.2.4 Scarcity /20

The scarcity of wetland is defined by its uniqueness and its relative rarity, within the LSA and compared to the RSA. The scarcity of a wetland indicates the fragility and the vulnerability of its various habitats to disappear. The scarcity is thereby calculated crossing the rank values obtained for the relative rarity and uniqueness of each ecotype in a bidimensional relational matrix, as presented at Table 4. A relatively rare and unique ecosystem thus obtain maximum points.

The relative rarity of an ecosystem is defined by the proportion that this ecosystem occupies within the LSA compared to the proportion of the same ecosystem outside the LSA. If the proportion is higher in the LSA than in the RSA, its vulnerability is increased because a disturbance in the LSA can cause a substantial decline of an ecosystem and habitat it supports.

The uniqueness defines the global rarity of an ecosystem. The smaller the area occupied by a wetland is, the more it is unique. An ecosystem unique in the RSA obtain maximum points.

Table 4 Scarcity Relational Matrix Between Uniqueness and Relative Rarity

			RELATIVE RARITY					
			1	**2**	**3**	**4**	**5**	**6**
			Proportion is higher in the LSA compared to the RSA		Proportion is similar in the LSA compared to the RSA		Proportion is smaller in the LSA compared to the RSA	
UNIQUENESS	**1**	Regionally unique	20	18	16	14	12	10
	2		18	16	14	12	10	8
	3	Regionally uncommon	16	14	12	10	8	6
	4		14	12	10	8	6	4
	5	Regionally common	12	10	8	6	4	3
	6		10	8	6	4	3	2

Table 5 Final Score for Each Ecosystem

ECOTYPE	UNIQUENESS	RELATIVE RARITY	POINTS
MSF07	4	3	10
MSF08	6	2	8
MSF09	1	1	20
MSF10	4	3	10
MSF11	2	6	8
MSF12	6	3	6
MSF13	1	1	20
MSF14	5	4	4
MSF15	3	3	12
HST05	5	5	4
HST06	3	4	10
HST07	2	5	10

The evaluation of scarcity value of wetlands is calculated with the proportion of each ecosystem within a delineated polygon. Thus, if 30% of a polygon is covered with an ecotype that scores 16 points and 70% is covered with an ecotype that scores 6 points, the evaluation will be made with the following equation:

$$Scarcity = (0,3 \times 16) + (0,7 \times 6)$$

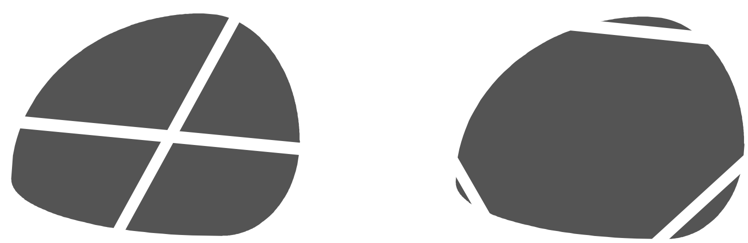
1.2.5 Fragmentation /10

Fragmentation is the division of an ecosystem in several pieces. This is generally attributed to the presence of roads, power lines or other human disturbance.

Fragmentation results in a loss of surface area and an alteration of the hydraulic connectivity between the fragments. The most observed effect is the edge effect. Indeed, the opening of the ecosystem at the edge of fragments can lead to change in the floristic composition and thereby animal communities (Fonseca, 2008). Some species are more sensitive to fragmentation and require large areas connected to the natural environment.

The number and size of residual fragments are the factors to consider in assessing the effect of fragmentation (Figure 4). In terms of assessment of the ecological value of wetlands, the remaining size of the main fragment compared to the total area is used.

Recent exploration work has not been considered as aerial photographs dated from 2008.



Four fragments of similar size important impact

Four fragments with one bigger impact less noticeable

Figure 4 Examples of fragmentation

No fragmentation	10
The most important fragment represents 76 to 99 % of the initial area	8
The most important fragment represents 51 to 75 % of the initial area	5
The most important fragment represents 26 to 50% of the initial area	2
The most important fragment represents 0 to 25% of the initial area	0

1.2.6 Wetland Functions /44

Functions for wetland were classified as "High" or "Moderate". It is based on the capacity of a specific ecotype to fulfill a function, as seen in Table 3.

Points are attributed based on this capacity: 7 points for each "High" and 4 points for each "Moderate".

In case of a complex that has 2 wetlands fulfilling a same function with different capacities, the maximum score is considered.

This criteria has a higher ponderation since several characteristics are encountered in the function assessment.

1.2.7 Ecological Value Assessment

The ecological value is evaluated using six criteria. Each one has a predefined score in the calculation of the final value. The maximum score is 100 points. Table 6 summarizes the weighting of criteria.

Table 6 Summary of Criteria for Ecological Value Assessment

CRITERIA	VALUE
Wetland area	/10
Complexity	/6
Hydrological connectivity	/10
Scarcity	/20
Fragmentation	/10
Wetland functions	/44
Ecological value **Low : 0-25** **Medium : 26-50** **High 51-75** **Very High : 76-100**	**/100**

2 RESULTS

Table 1 presents a summary of the wetland functions and ecological value assessment. Table x presents the complete ecological value assessment.

Table 1 Summary of Wetland Functions

WETLAND NUMBER	ECOTYPE	CWC CLASSIFICATION	FUNCTIONS - HIGH	FUNCTIONS - MODERATE
H-MH-01	MSF08	Discharge Swamp	H3 E2	
H-MH-02	MSF12/10	Basin Fen		
H-MH-03	MSF12/10	Basin Fen		
H-MH-04	MSF10/12	Veneer Bog	E2	H4
H-MH-05	MSF08/12/10	Discharge Swamp	H3 H4 E2	
H-MH-06	MSF12/10	Basin Fen		
H-MH-07	MSF14	Riparian Fen		B3
H-MH-08	MSF15	Riparian Fen	E3 B1	H2 E1 E2
H-MH-09	MSF15/09	Riparian Fen	B1	H2 E1 E2
H-MH-10	MSF08/10	Flat Swamp	E2 H4	
H-MH-11	MSF10/12/14	Veneer Bog	E2	H4
H-MH-12	MSF15/08	Riparian Fen	B1	H2 E1 E2 B3
H-MH-13	MSF12	Channel Fen		B3
H-MH-14	MSF12/10	Spring Fen		B3
H-MH-15	MSF15	Riparian Fen	B1	H2 E1 E2 B3
H-MH-16	MSF14/12	Riparian Fen	E3	B3
H-MH-17	MSF14/12	Riparian Fen		B3
H-MH-18	MSF10/12	Flat Bog	E2	H2 H4
H-MH-19	MSF12/10	Basin Fen		H2
H-MH-20	MSF12/10	Basin Fen		
H-MH-21	MSF08	Discharge Swamp	H3 E2 H4	H2
H-MH-22	MSF10	Riparian Bog	E2 E3 B1	H2 H4
H-MH-23	MSF12	Basin Fen		
H-MH-24	MSF10/12	Basin Bog	E2	
H-MH-25	MSF10	Riparian Bog	E2 E3 B1	H2 H4
H-MH-26	MSF12	Riparian Fen	B1	B3

WETLAND NUMBER	ECOTYPE	CWC CLASSIFICATION	FUNCTIONS - HIGH	FUNCTIONS - MODERATE
H-MH-27	MSF08	Flat Swamp	E2 H4	H2
H-MH-28	MSF08	Discharge Swamp	H3 E2 H4	H2
H-MH-29	MSF15/07/12	Riparian Fen	H1 E3 B1	H2 E1 E2 B3
H-MH-30	MSF08	Riparian Swamp	E2 B1	B3
H-MH-31	MSF12/10	Basin Fen		
H-MH-32	MSF12/10	Basin Fen		
H-MH-33	MSF12	Basin Fen		
H-MH-34	MSF12	Basin Fen		
H-MH-35	MSF12/10	Basin Fen		
H-MH-36	MSF12/08	Spring Fen		
H-MH-37	MSF08	Flat Swamp	E2	
H-MH-38	MSF08	Flat Swamp	E2 H4	H2
H-MH-39	MSF08/12	Slope Swamp	E2 H4	
H-MH-40	MSF12/08	Channel Fen		B3
H-MH-41	MSF12/08	Channel Fen		
H-MH-42	MSF08	Slope Swamp	E2 H4	
H-MH-43	MSF08/14	Discharge Swamp	H3 E2 H4	
H-MH-44	MSF14	Basin Fen		
H-MH-45	MSF10/12/14	Riparian Bog	E2	H2 H4
H-MH-46	MSF12	Riparian Fen		H2
H-MH-47	MSF14	Riparian Fen		B3
H-MH-48	MSF08	Riparian Swamp	E2 H4	H2
H-MH-49	MSF08	Riparian Swamp	E2	B3
H-MH-50	MSF12	Basin Fen		
H-MH-51	MSF13/12	Channel Fen		
H-MH-52	MSF12	Basin Fen		
H-MH-53	MSF12	Channel Fen		
H-MH-54	MSF14/08	Spring Fen		H4
H-MH-55	MSF15/10	Riparian Fen	E3 B1	H2 E1 E2 B2 B3
H-MH-56	MSF12/14	Basin Fen		

WETLAND NUMBER	ECOTYPE	CWC CLASSIFICATION	FUNCTIONS - HIGH	FUNCTIONS - MODERATE
H-MH-57	MSF10/12	Veneer Bog	E2	
H-MH-58	MSF14/12	Basin Fen		
H-MH-59	MSF14/10/12	Basin Fen		
H-MH-60	MSF14/12	Basin Fen		
H-MH-61	MSF14	Basin Fen		
H-MH-62	MSF15	Riparian Fen	E3 B1	H2 E1 E2 B3
H-MH-63	MSF08	Slope Swamp	E2 H4	
H-MH-64	MSF08	Slope Swamp	E2 H4	
H-MH-65	MSF08	Slope Swamp	E2 H4	
H-MH-66	HST06	Horizontal Fen		H2
H-MH-67	HST05/06	Riparian Fen		E2
H-MH-68	HST05	Riparian Fen	H2 H4 B1	E2 B2
H-MH-69	HST05	Riparian Fen	B1	H2 E2 B3
H-MH-70	HST05/06	Riparian Fen	H2 H4 B1	E2
H-MH-71	HST06	Channel Fen		H2 B1
H-MH-72	HST05/06	Riparian Fen	H2 H4	E2 B1
H-MH-73	HST05	Riparian Fen	B1	E2 B3
H-MH-74	HST05	Channel Fen		E2
H-MH-75	MSF07	Basin Fen		
H-MH-76	MSF06	Basin Fen		
H-MH-77	MSF07/15	Riparian swamp	E1 E3 B1 B2 B3	H2
H-MH-78	MSF07/15	Riparian swamp	E1 E3 B1 B3	H2
H-MH-79	MSF07/15	Riparian swamp	H1 E1 E3 B1 B2 B3	H2
H-MH-80	MSF07/15	Riparian swamp	E1 E3 B1 B3	H2
H-MH-81	MSF07/15	Riparian swamp	H1 E1 E3 B1 B2 B3	H2
H-MH-82	MSF07	Riparian swamp	E1 E3 B1 B2 B3	H2
H-MH-83	MSF07	Riparian swamp	H1 E1 E3 B1 B2 B3	H2

Table 2 Wetland's Ecological Value Assessment

WETLAND NUMBER	ECOTYPE	AREA (HA)	CONNECTIVITY	CWC CLASSIFICATION	POSITION IN WATERSHED	WATERFLOW PATH	FUNCTIONS HIGH	FUNCTIONS MODERATE	ECOLOGICAL VALUE ASSESSMENT (POINTS)						ECOLOGICAL VALUE
									Area	Connectivity	Complexity	Scarcity	Fragmentation	Functions	
H-MH-01	MSF08	22.90	Intermittent Watercourse	Discharge Swamp	1	Drainage-divide	H3 E2		10	10	2	8.0	10	6	High
H-MH-02	MSF12/10	1.53	None	Basin Fen	1	Isolated			4	3	4	6.8	10	0	Medium
H-MH-03	MSF12/10	1.91	None	Basin Fen	1	Outflow		.	4	3	4	6.8	10	2	Medium
H-MH-04	MSF10/12	5.37	None	Veneer Bog	1	Outflow	E2	H4	6	3	4	8.6	10	7	Medium
H-MH-05	MSF08/12/10	16.78	None	Discharge Swamp	1	Drainage-divide	H3 H4 E2		8	3	6	7.8	10	6	High
H-MH-06	MSF12/10	3.33	None	Basin Fen	1	Isolated			4	3	4	6.8	10	0	Medium
H-MH-07	MSF14	1.10	Intermittent Watercourse	Riparian Fen	1	Throughflow		B3	4	10	2	4.0	10	1	Medium
H-MH-08	MSF15	1.27	Permanent Watercourse	Riparian Fen	2	Throughflow	E3 B1	H2 E1 E2	4	10	2	12.0	10	11	High
H-MH-09	MSF15/09	3.38	Permanent Watercourse	Riparian Fen	2	Throughflow	B1	H2 E1 E2	4	10	4	15.2	10	6	High
H-MH-10	MSF08/10	16.54	Intermittent Watercourse	Flat Swamp	1	Outflow	E2 H4		8	10	4	8.4	10	6	High
H-MH-11	MSF10/12/14	5.36	None	Veneer Bog	1	Outflow	E2	H4	6	3	6	8.0	10	7	Medium
H-MH-12	MSF15/08	11.88	Intermittent Watercourse	Riparian Fen	1	Throughflow	B1	H2 E1 E2 B3	8	10	4	10.0	10	6	High
H-MH-13	MSF12	3.55	Intermittent Watercourse	Channel Fen	1	Throughflow		B3	4	10	2	6.0	10	1	Medium
H-MH-14	MSF12/10	1.84	Permanent Watercourse	Spring Fen	1	Throughflow		B3	4	10	4	6.8	10	1	Medium
H-MH-15	MSF15	1.15	Intermittent Watercourse	Riparian Fen	2	Throughflow	B1	H2 E1 E2 B3	4	10	2	12.0	10	6	High
H-MH-16	MSF14/12	2.78	Permanent Watercourse	Riparian Fen	2	Throughflow	E3	B3	4	10	4	4.6	10	4	Medium
H-MH-17	MSF14/12	26.81	Intermittent Watercourse	Riparian Fen	2	Throughflow		B3	10	10	4	5.6	10	1	Medium

WETLAND NUMBER	ECOTYPE	AREA (HA)	CONNECTIVITY	CWC CLASSIFICATION	POSITION IN WATERSHED	WATERFLOW PATH	FUNCTIONS HIGH	FUNCTIONS MODERATE	ECOLOGICAL VALUE ASSESSMENT (POINTS)						ECOLOGICAL VALUE
									Area	Connectivity	Complexity	Scarcity	Fragmentation	Functions	
H-MH-18	MSF10/12	6.78	Permanent Watercourse	Flat Bog	1	Outflow	E2	H2 H4	6	10	4	8.4	10	7	High
H-MH-19	MSF12/10	5.00	Permanent Watercourse	Basin Fen	1	Outflow		H2	6	10	4	6.8	10	2	Medium
H-MH-20	MSF12/10	9.74	None	Basin Fen	1	Outflow			6	3	4	6.8	10	2	Medium
H-MH-21	MSF08	12.71	Intermittent Watercourse	Discharge Swamp	1	Outflow	H3 E2 H4	H2	8	10	2	8.0	10	10	High
H-MH-22	MSF10	4.74	Water Body	Riparian Bog	1	Outflow	E2 E3 B1	H2 H4	4	10	2	10.0	10	13	High
H-MH-23	MSF12	0.90	None	Basin Fen	1	Isolated			2	3	2	6.0	10	0	Low
H-MH-24	MSF10/12	2.83	None	Basin Bog	1	Isolated	E2		4	3	4	9.6	10	3	Medium
H-MH-25	MSF10	3.21	Water Body	Riparian Bog	1	Outflow	E2 E3 B1	H2 H4	4	10	2	10.0	10	13	High
H-MH-26	MSF12	5.70	Water Body	Riparian Fen	1	Throughflow	B1	B3	6	10	2	6.0	10	4	Medium
H-MH-27	MSF08	5.15	Intermittent Watercourse	Flat Swamp	1	Outflow	E2 H4	H2	6	10	2	8.0	10	6	High
H-MH-28	MSF08	1.60	Permanent Watercourse	Discharge Swamp	1	Outflow	H3 E2 H4	H2	4	10	2	8.0	10	10	High
H-MH-29	MSF15/07/ 12	11.56	Permanent Watercourse	Riparian Fen	3	Throughflow	H1 E3 B1	H2 E1 E2 B3	8	10	6	10.4	10	12	Very High
H-MH-30	MSF08	7.71	Water Body	Riparian Swamp	1	Throughflow	E2 B1	B3	6	10	2	8.0	10	9	High
H-MH-31	MSF12/10	1.05	None	Basin Fen	1	Isolated			4	3	4	6.8	10	0	Medium
H-MH-32	MSF12/10	1.84	None	Basin Fen	1	Isolated			4	3	4	7.6	10	0	Medium
H-MH-33	MSF12	0.66	None	Basin Fen	1	Isolated			2	3	2	6.0	10	0	Low
H-MH-34	MSF12	0.66	None	Basin Fen	1	Isolated			2	3	2	6.0	10	0	Low
H-MH-35	MSF12/10	0.86	None	Basin Fen	1	Isolated			2	3	4	6.8	10	0	Medium
H-MH-36	MSF12/08	14.12	None	Spring Fen	2	Isolated			8	3	4	4.6	10	0	Medium
H-MH-37	MSF08	2.34	None	Flat Swamp	2	Isolated	E2		4	3	2	8.0	10	3	Medium
H-MH-38	MSF08	0.82	Permanent Watercourse	Flat Swamp	1	Outflow	E2 H4	H2	2	10	2	8.0	10	7	Medium
H-MH-39	MSF08/12	4.22	None	Slope Swamp	1	Outflow	E2 H4		4	3	4	7.4	10	7	Medium
H-MH-40	MSF12/08	5.26	Permanent Watercourse	Channel Fen	1	Throughflow		B3	6	10	4	6.4	10	1	Medium

WETLAND NUMBER	ECOTYPE	AREA (HA)	CONNECTIVITY	CWC CLASSIFICATION	POSITION IN WATERSHED	WATERFLOW PATH	FUNCTIONS HIGH	FUNCTIONS MODERATE	ECOLOGICAL VALUE ASSESSMENT (POINTS)						ECOLOGICAL VALUE
									Area	Connectivity	Complexity	Scarcity	Fragmentation	Functions	
H-MH-41	MSF12/08	5.23	None	Channel Fen	2	Isolated			6	3	4	6.4	10	0	Medium
H-MH-42	MSF08	4.15	None	Slope Swamp	1	Outflow	E2 H4		4	3	2	8.0	10	7	Medium
H-MH-43	MSF08/14	3.49	None	Discharge Swamp	1	Outflow	H3 E2 H4		4	3	4	6.8	10	10	Medium
H-MH-44	MSF14	0.59	None	Basin Fen	1	Isolated			2	3	2	4.0	10	0	Low
H-MH-45	MSF10/12/14	2.30	Permanent Watercourse	Riparian Bog	1	Outflow	E2	H2 H4	4	10	6	8.2	10	7	High
H-MH-46	MSF12	0.32	Water Body	Riparian Fen	1	Outflow		H2	2	10	2	6.0	10	5	Medium
H-MH-47	MSF14	1.13	Permanent Watercourse	Riparian Fen	1	Throughflow		B3	4	10	2	4.0	10	1	Medium
H-MH-48	MSF08	2.74	Permanent Watercourse	Riparian Swamp	1	Outflow	E2 H4	H2	4	10	2	8.0	10	7	High
H-MH-49	MSF08	5.35	Permanent Watercourse	Riparian Swamp	1	Throughflow	E2	B3	6	10	2	8.0	10	6	Medium
H-MH-50	MSF12	0.43	None	Basin Fen	1	Isolated			2	3	2	6.0	10	0	Low
H-MH-51	MSF13/12	0.81	None	Channel Fen	1	Outflow			2	3	4	14.4	10	2	Medium
H-MH-52	MSF12	3.32	None	Basin Fen	1	Outflow			4	3	2	8.0	10	2	Medium
H-MH-53	MSF12	1.36	None	Channel Fen	1	Isolated			4	3	2	6.0	10	0	Low
H-MH-54	MSF14/08	4.29	None	Spring Fen	1	Outflow		H4	4	3	4	4.8	10	2	Medium
H-MH-55	MSF15/10	6.58	Permanent Watercourse	Riparian Fen	1	Throughflow	E3 B1	H2 E1 E2 B2 B3	6	10	4	11.6	10	10	High
H-MH-56	MSF12/14	1.29	None	Basin Fen	1	Isolated			4	3	4	5.2	10	0	Medium
H-MH-57	MSF10/12	1.80	None	Veneer Bog	1	Isolated	E2		4	3	4	8.8	10	3	Medium
H-MH-58	MSF14/12	1.11	None	Basin Fen	1	Isolated			4	3	4	4.4	10	0	Low
H-MH-59	MSF14/10/12	2.53	None	Basin Fen	1	Isolated			4	3	6	5.4	10	0	Medium
H-MH-60	MSF14/12	0.57	None	Basin Fen	1	Isolated			2	3	4	4.4	10	0	Low
H-MH-61	MSF14	1.05	None	Basin Fen	2	Isolated			4	3	2	4.0	10	0	Low
H-MH-62	MSF15	3.37	Water Body	Riparian Fen	2	Throughflow	E3 B1	H2 E1 E2 B3	4	10	2	12.0	10	10	High
H-MH-63	MSF08	1.78	None	Slope Swamp	1	Outflow	E2 H4		4	3	2	8.0	10	6	Medium
H-MH-64	MSF08	2.76	None	Slope Swamp	1	Outflow	E2 H4		4	3	2	8.0	10	6	Medium

WETLAND NUMBER	ECOTYPE	AREA (HA)	CONNECTIVITY	CWC CLASSIFICATION	POSITION IN WATERSHED	WATERFLOW PATH	FUNCTIONS HIGH	FUNCTIONS MODERATE	ECOLOGICAL VALUE ASSESSMENT (POINTS)						ECOLOGICAL VALUE
									Area	Connectivity	Complexity	Scarcity	Fragmentation	Functions	
H-MH-65	MSF08	2.07	None	Slope Swamp	2	Outflow	E2 H4		4	3	2	8.0	10	6	Medium
H-MH-66	HST06	1.48	Permanent Watercourse	Horizontal Fen	1	Outflow		H2	4	3	2	10.0	10	2	Medium
H-MH-67	HST05/06	6.46	None	Spring Fen	1	Isolated		E2	6	10	4	5.2	10	4	Medium
H-MH-68	HST05	6.05	Intermittent Watercourse	Riparian Fen	1	Headwater	H2 H4 B1	E2 B2	6	10	2	4.0	5	10	High
H-MH-69	HST05	5.82	Permanent Watercourse	Riparian Fen	1	Throughflow	B1	H2 E2 B3	6	9	2	4.0	10	6	Medium
H-MH-70	HST05/06	9.95	Intermittent Watercourse	Riparian Fen	1	Headwater	H2 H4 B1	E2	6	10	4	5.2	10	10	High
H-MH-71	HST06	7.35	Permanent Watercourse	Channel Fen	1	Outflow		H2 B1	6	9	2	10.0	10	2	Medium
H-MH-72	HST05/06	4.12	Permanent Watercourse	Riparian Fen	1	Outflow	H2 H4	E2 B1	4	7	4	6.4	10	7	High
H-MH-73	HST05	1.10	Permanent Watercourse	Riparian Fen	1	Throughflow	B1	E2 B3	4	9	2	4.0	10	5	Medium
H-MH-74	HST05	1.02	None	Channel Fen	1	Isolated		E2	4	3	2	10.0	10	1	Medium
H-MH-75	MSF07	0.53	None	Basin Fen	1	Isolated			2	3	2	10.0	10	0	Medium
H-MH-76	MSF06	0.58	None	Basin Fen	1	Isolated			2	3	2	10.0	10	0	Medium
H-MH-77	MSF07/15	7.99	Intermittent Watercourse	Riparian swamp	1	Throughflow	E1 E3 B1 B2 B3	H2	6	10	4	10.8	10	18	Very High
H-MH-78	MSF07/15	5.43	Permanent Watercourse	Riparian swamp	1	Throughflow	E1 E3 B1 B3	H2	6	10	4	10.2	10	18	High
H-MH-79	MSF07/15	2.86	Permanent Watercourse	Riparian swamp	3	Throughflow	H1 E1 E3 B1 B2 B3	H2	4	10	4	10.2	10	19	Very High
H-MH-80	MSF07/15	1.32	Permanent Watercourse	Riparian swamp	1	Throughflow	E1 E3 B1 B3	H2	4	10	4	10.2	10	18	High
H-MH-81	MSF07/15	24.54	Permanent Watercourse	Riparian swamp	3	Throughflow	H1 E1 E3 B1 B2 B3	H2	10	10	4	10.2	10	19	Very High
H-MH-82	MSF07	4.67	Permanent Watercourse	Riparian swamp	1	Throughflow	E1 E3 B1 B2 B3	H2	4	10	2	10.0	10	18	High
H-MH-83	MSF07	2.25	Waterbody	Riparian swamp	3	Throughflow	H1 E1 E3 B1 B2 B3	H2	4	10	2	10.0	10	20	Very High

3 REFERENCES

Bibliography

National Wetlands Working Group [NWWG] (1997) The Canadian Wetland Classification System, 2nd Edition. Wetlands Research Centre, University of Waterloo, Waterloo, Ontario, 68 p.

Hanson, A., L., D.E. Swanson, G. Grabas, S. Meyer, L. Ross, M. Watmough and J. Kirby (2008) Wetland ecological functions assessment: an overview of approaches. Canadian Wildlife Service technical report series No. 497. Atlantic Region. 59pp.

Ontario Wetland Evaluation System [OWES] (2013) *Northern Manual, 1st Edition, version 1.2*. Government of Ontario, Ministry of Environment and Energy, 277 p.

Tarboton, D. G., R. L. Bras, and I. Rodriguez-Iturbe (1991) *On the Extraction of Channel Networks from Digital Elevation Data*. Hydrological Processes. 5: 81–100. In: http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#//009z000000z3000000.htm

Tiner, R. (2003) *Correlating enhanced national wetlands inventory data with wetland functions for watershed assessments: a rationale for Northeastern US Wetlands*. U.S. Fish and Wildlife Service, National Wetlands Inventory Program, Region 5, Hadley, MA. 26 pp.

Tiner, R. (2011) Dichotomous Keys and Mapping Codes for Wetland Landscape Position, Landform, Water Flow Path, and Waterbody Type Descriptors: Version 2.0. U.S. Fish and Wildlife Service, National Wetlands Inventory Program, Northeast Region, Hadley, MA. 51 pp.