Nova Scotia Wetland Evaluation Technique (Version 3.0, September 2011)

Introduction to Nova Scotia Wetland Evaluation Technique (NovaWET 3.0)

NovaWET is a method designed to assess the condition and functions of Nova Scotia wetlands. It is intended to provide Nova Scotia Environment (NSE) with basic information for Wetland Alteration or Environmental Assessment Applications on project site wetlands, the surrounding landscape, and the contributing watershed to help evaluate the significance of wetlands in a project area that may be affected by proposed alterations. It requires landscape-level assessment using maps and aerial imagery and field evaluation to record site-specific information on wetland characteristics and indicators of wetland functions for wetlands in the project area. The key result of the analysis is an estimate of the most significant wetland functions based on correlations between wetland characteristics and wetland functions derived from scientific literature. Evaluating the condition of the wetland buffer, characterizing the relationship between wetlands in a project area and neighboring wetlands and waterbodies, and a general assessment of the contributing watershed are also part of the analysis.

The landscape-level assessment methods were adapted from a watershed assessment approach (*Watershed-based Preliminary Assessment of Wetland Functions*, W-PAWF) developed for the northeastern United States (Tiner 2003, 2005). The method is based on wetland classification and available geospatial information (e.g., aerial imagery, maps, and geospatial data accessible via geographic information system - GIS).

The field-based methods were adapted from various state rapid assessment methods including Wisconsin (Wisconsin Department of Natural Resources 2001), Minnesota (Minnesota Board of Water & Soil Resources 2009, 2010), North Carolina (North Carolina Department of Environment and Natural Resources 2009), Oregon (Adamus et al. 2009), California (Collins et al. 2008), from method reviews (Hanson et al. 2008; Fennessy et al. 2004) and from earlier version of NovaWET developed by Ralph Tiner for wetland assessment courses taught for wetland assessors in Nova Scotia in 2009 and 2010.

NovaWET is divided into eleven sections associated with key wetland functions. Each section includes questions intended to help assessors determine the significance of specific functions associated with a particular wetland. Descriptive guidance is provided to aid in the interpretation of significant functions **(SFs)**. A summary table of the functional significance typical of different wetland types is provided as Appendix A for additional guidance. Selection of the appropriate responses related to a ***SF*** rating (e.g., high, medium or low) will be primarily based on the combined responses to the preceding questions for that section, but professional judgment and other reference material may need to be incorporated as well.

SF ratings highlighted in red on the field data sheet (Appendix C) indicate critical wetland functions or watershed conditions that are highly degraded. The critical wetland functions are often unique or rare or associated with high risk to the watershed if lost (e.g., flood control), so that minimizing or compensating for their loss may be difficult or impossible. Whenever a wetland is found to have red-highlighted **SFs** the proponent is encouraged to contact NSE for advice about the

approval because NSE is unlikely to approve alterations to wetlands that would affect these red-rated functions.

An experienced professional with appropriate wetland expertise must be hired by proponents to complete all NovaWET evaluations. The importance of SFs for a particular wetland must be evaluated on a case-by-case basis as the watershed context is critical to this evaluation and the approval decision. NovaWET assessments should provide NSE with basic information on wetlands located in the immediate vicinity of a development area and the surrounding watershed and an assessment the potential significance of wetland functions that may be lost if proposed developments are approved.

A completed NovaWET package must include:

- Digital and hard copy data sheet with required responses;
- Maps/aerial photographs as indicated below;
- Photos of the wetland(s) in question;
- Brief written description of wetland(s) (e.g., one short paragraph);
- Brief conclusion/summary of results, with a focus on significant functions.

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Project Name: _____

Site Location: Address_____ City/Town_____
County _____ Property Identification Number (PID):_____

GPS Coordinates (NAD83):Lat _____ Lon _____

Evaluator:_____ Date of Evaluation _____

Date of Site Visit(s)_____

Weather Conditions: Describe weather conditions for the last 48 hours, and seasonal weather conditions relative to Environment Canada climate "normals"
(http://www.climate.weatheroffice.gc.ca/climate_normals/index_e.html**)**
Note unusual climatic conditions experienced during this assessment due to seasonal considerations and/or unusual existing hydrologic and climatologic conditions.

Maps (Identify sources and dates of imagery/data)
Provide and use the following three types of maps: 1) general map showing the location of the project area position in the tertiary watershed and general land-use/land-cover (e.g., forested, agricultural, urban/commercial, wetlands, lakes, rivers, roads – data available at,

http://www.gov.ns.ca/natr/forestry/gis/forest-inventory.asp); 2) detailed map showing all ground delineated wetland boundaries (label each wetland with a unique number), waterbodies, property boundaries, nearby roads/highways, and buildings in the vicinity of the project area, the project footprint, scale, and a north-south directional indicator; 3) aerial image(s) with the project footprint and any delineated wetland boundaries; and, 4) *Optional* - provincial wet areas map showing potential wet areas and flow accumulation channels data (http://www.gov.ns.ca/natr/forestry/gis/wamdownload.asp).

SECTION ONE: WATERSHED CHARACTERISTICS

Complete this section separately for each watershed where wetlands are being assessed.

1. **Watershed Name (Tertiary): _____ Size of Watershed: ____ km^2**
(Source: contact NS Geomatics Centre for tertiary watershed boundary data: geoinfo@novascotia.ca or 800-798-0706).

2. **Estimate the percent of the tertiary watershed that is in each land cover (from aerial imagery or maps):** % Forested ___ % Open Natural Land/Old fields ____ %Pasture/Hay___ % Cropland ___ % Urban/Commercial ___ % Roads____ % Other Developed _____(specify) – (land-cover/land-use data available at, http://www.gov.ns.ca/natr/forestry/gis/forest-inventory.asp)

3. **Estimate the total % of wetland cover in the tertiary watershed and the relative percentage of each wetland class (% of total wetland cover):** Total %___ ; %Salt Marsh (SM)___ %Bog (BO) ___ %Fen (FE)___ %Freshwater Marsh (FM) __ %Forested Swamp (FS) ___ %Shrub Swamp (SS) ___ %Coastal Saline Pond (CP) __ % Vernal pool (VP)___ (***simply mark as present [P] if cover cannot be estimated***)

Consider the above responses to answer the ***Significant Functions (SFs)*** below:

SF1: Describe watershed condition: H (Significantly Modified) __ M (Modified)__ L (Relatively Unaltered) ___

H = Watershed conditions highly modified; e.g., >20% impervious surfaces (i.e., high density residential, lots smaller than 0.1 hectare, high impervious industrial, commercial, institutional) maximizing overland flow to the wetland; intensive agriculture or grazing with a high amount of bare ground, no residue management on moderate or steep slopes, intensive mining activities

M = Watershed conditions somewhat modified; e.g., 5–20 % impervious (i.e., medium density residential, 0.1 to 0.4 hectare lots); moderate intensity grazing or haying with some bare ground; conventional till with residue management on moderate slopes, no-till on steep slopes.

L= Watershed conditions relatively unaltered; < 5% impervious (i.e., low density residential, >0.4 hectare lots); land-use development minimal, idle lands, lands in hay or

forests or low intensity grazing.

Guidance: The more developed and intensively the watershed is used, the greater will be the delivery of runoff and sediments to the wetland and the less likely the wetland will have the opportunity to minimize flooding downstream. Numerous studies have shown that once a watershed has more than 10% impervious surface, water quality begins to degrade as evidenced by a decline in benthic macroinvertebrate diversity (e.g., Schueler 1994; Arnold and Gibbons 1996), while others show evidence of rapid deterioration of stream habitat and biological integrity in the 5-10% range (e.g., May et al. 1997, Horner et al. 1996; Wang and Lyons 2003) or in the 8-12% range (Stepenuck et al. 2002, Wang et al. 2001). In the Piedmont region of Maryland (USA), a detectable decline in water quality was first observed when the impervious cover reached 12% and severe degradation occurred in areas with more than 30% impervious cover (Klein 1979). A study of Delaware watersheds found that 8-15% impervious cover was a level above which stream macroinvertebrates declined dramatically (Shaver et al. 1994). The effect of impervious surfaces on water quality is most pronounced at the tertiary watershed level (Caraco et al. 1998). A review of numerous studies across the United States led researchers to conclude that biological impacts generally first appear around 8-12% total impervious cover and in the 14-20% range, macroinvertebrate and fish assemblages are always in poor condition. NovaWET takes a conservative approach and uses 5% impervious area as a breakpoint for separating essentially unaltered watersheds from somewhat modified ones because some studies in the Pacific Northwest, USA (May et al. 1997, Horner et al. 1996) and the upper Midwest USA (Wang and Lyons 2003) found that from 5-10% impervious cover, stream quality based on stream habitat and biological integrity declined rapidly and when impervious cover is below this level, water quality appears to be only minimally affected. The watershed is considered to be highly modified when impervious cover is >20%.

SF2: Are wetlands likely to contribute to floodwater detention based on the proportion of wetland area in the tertiary watershed? H(<10%)_____ M(10-20%)_____ L(>20%)_____.

Guidance: The density of wetland area in the watershed will determine the benefit each wetland provides downstream. Wetlands reduce flood peaks up to 75% compared to rolling topography when they occupy only 20% of the total basin area. When wetland densities in the watershed exceed 20% total cover, the flood storage benefits of additional wetlands rapidly decrease.

SECTION TWO: SITE DESCRIPTION AND WETLAND CHARACTER

Refer to Appendix B for descriptors to answer the following 6 questions:

Wetland Type: _____ Wetland Size (ha):_____

Landscape Position: _____ Landform: _____

Water Flow Path: _____ Wetland Origin: _____

1. **What is the water regime for the wetland?** Permanently flooded__ Seasonally flooded __ Temporarily flooded__ Seasonally saturated__ Permanently saturated__ Regularly flooded tidal __ Irregularly flooded tidal__ Artificially Flooded__

2. **How many wetlands are in the project area by type (see Appendix B)?** Total#: ____; # by Type: SM__, BO__, FE__, FM__, FS__, SS__, CP__, VP__

3. **Is this wetland part of a complex**? Yes ___ No ___

4. **What is the percent area of each wetland type in the complex**: SM___, BO___, FE___, FM___, FS___, SS___, CP___

5. **Is the wetland bordering a lake or pond?** Yes (specify name)___ N/A___ ; **If no, are there lakes or ponds within 100m of the wetland boundary?** Yes (specify number and names)___ N/A____

6. **Does the wetland have standing water?** Yes___ No___, **if so, what is the average depth (cm)____, and what % of wetland is inundated ____?**

7. **Does the wetland have an inlet, outlet or both (circle those that apply)?**

8. **What is the adjacent upland land use for the wetland?**
   Estimate the percent of the buffer zone (100m) that is in each land category:
   % Forested ___ % Open Natural Land/Open field ___ % Pasture___ % Cropland ___ %Urban/Commercial ___ % Roads____ % Other Developed (specify)_____

9. **Check any stressors observed in and directly adjacent to the wetland (circle the primary stressor(s)):**
   Drainage ditch___ Channelized Watercourse___ Water-control structure___ Oil/chemical spill___ Eroded bank___ Discharge Pipe__ Fill___ Mowing___ Excessive sedimentation___ Nutrient enrichment___ Dead/dying woody plants___ Marina___ Golf course___ ATV/mountain bike trails___ Disposal of garbage/other wastes ___ Excessive algae___ Roads___ Rip-rap (hardened shoreline)___ Urban/Commercial Development___ Farms___ Forestry Activity/Clearcutting___ Other (specify)___

10. **Has the wetland hydrology been altered by ditching, tiles, dams, culverts, well pumping, diversion of surface flow (circle all that apply)?**

Consider the above responses to answer the questions below:

SF 3: What is the general condition/ecological integrity of the wetland?
High ___ Medium ___ Low ___

SECTION THREE: CONDITION AND INTEGRITY OF ADJACENT LAND

1. Average width of natural/undeveloped lands adjacent to wetland: _____metres

Guidance: Vegetated buffers (areas with limited or no development) around wetlands provide multiple benefits including wildlife habitat, erosion protection, and reduced surface water runoff. A natural buffer is an unmanicured vegetated area immediately adjacent to the wetland boundary - lawns should not be included. Estimate the average width of natural undeveloped land around the entire wetland boundary.

2. Water quality rating: High= >15m___; Medium= 8-15m___; Low= <8m___

3. Wildlife habitat rating: High= >100m__; Medium= 15-100m__; Low= <15m__

FOR ADJACENT LAND QUESTIONS 4, 5,AND 6 - evaluate conditions in the 15 metre area immediately adjacent to the wetland (*adjacent area*). Total for each question should equal 100% (make estimates to the nearest 10%).

4. Describe condition of vegetative cover for water quality in adjacent area:

___% High (full vegetative cover)

___% Medium (manicured, primarily vegetated i.e., short-grass lawn, mowing, haying, spraying or burning)

___% Low (lacking vegetation: bare soil or cropped, unfenced pasture, rip-rap, impervious/pavement, other_____, specify).

5. Describe adjacent area diversity and structure (composition of characteristics for wildlife habitat):

____% High (full vegetative cover, dominance of native non-invasive vegetation)

____% Medium (mixed native/non-native vegetation with moderate density coverage, or dense non-native cover)

____% Low (sparse vegetation and/or high impervious surfaces)

Guidance: Many wetland-associated wildlife utilize upland areas for breeding, nesting, and foraging activities. Quality of the upland will affect the diversity and stability of the wetland wildlife community. This question combines estimates of both diversity and density—most wetlands will fall in the middle.

6. Describe adjacent upland slope:

____ % steep slopes >12%,

____ % moderate slopes, >6-12%,

____ % gentle slopes, 0-6%

Guidance: Gentle slopes are associated with greater use by wildlife and also are less likely to erode.

7. Do adjacent lands support/provide water quality functions (Responses 1, 2, 4, 6)? Yes___ No___

8. Do adjacent lands support/provide wildlife habitat functions (Responses 1, 3, 5, 6)? Yes___ No___

Consider the above responses to answer the ***SF*** question below:

SF4: Rate the overall condition and integrity of lands adjacent to the wetland – High ___ Medium ___ Low ___

SECTION FOUR: IDENTIFICATION OF EXCEPTIONAL FEATURES

Identify any documented features listed in questions below and consult with appropriate agencies where necessary prior to further assessment. ([1]may require consultation with Department of Fisheries and Oceans; [2.]may require consultation with Environment Canada; [3.]may require consultation with Nova Scotia Department of Natural Resources; [4.]may require consultation with local authority/municipality, [5.]may require consultation with Nova Scotia Environment Regional Office).

SF5: Is the wetland classified as a Wetland of Special Significance (contact Frances MacKinnon, Statistical Officer, NSDNR for information on WSSs - MACKINFM@gov.ns.ca***)?***

SF6: Does the wetland provide important support for fish, shellfish, or other species of commercial or recreational interest (especially estuaries and salmonid streams, their tributaries, and lakes)? Yes____ No____

SF7: Are there species in, near or using the wetland/project area that are:

A. Federally listed or pending (COSEWIC):
Endangered ____; Threatened ____; Special Concern (Vulnerable)____
http://www.sararegistry.gc.ca; http://www.cosewic.gc.ca/index.htm [2].

B. Provincially listed:
Endangered ____; Threatened ___; Species Concern (Vulnerable)___
http://www.gov.ns.ca/natr/wildlife/biodiversity/species-list.asp;
http://www.speciesatrisk.ca/municipalities/[3].

C. Species that are rated as: Red or Yellow by NSDNR in the general status of wild species ranks for Nova Scotia (red: known or thought to be at-risk; yellow: sensitive to human activities or natural disturbances)

http://www.gov.ns.ca/natr/wildlife/genstatus/ranks.asp

D. Ranked by Atlantic Conservation Data Center as S1, S2, or S3 (county occurrence data): http://accdc.com/Products/ranking.html

List the identified species, date of last occurrence, and their ranks:

_____

_____

SF8: Is the wetland restored or preserved under a conservation easement or other agreement, or wetland restored or created for compensatory purposes from a previous wetland alteration? Yes__ No__

SF9: Is the wetland a calcareous fen, cedar or black ash swamp (e.g., cedar or black ash dominant) or a large (> 3rd order) floodplain swamp? Yes_____ (specify) No____

SF10: Is the wetland in a public water supply system or other protected water area (including any contributing watershed designated as protected for public water supply?[5]
http://www.gov.ns.ca/nse/water/docs/Protected.Water.Areas.Map.pdf***;***
http://www.gov.ns.ca/just/regulations/rxaa-l.htm#env ***Yes__ No__ Specify_____***

SF 11: Is the wetland within a floodplain area and upstream of, or within, a populated area?[5]
Yes___ No___

SF12: Is the wetland within a Federal/Provincial/Municipal Area of Interest? (see below) Yes__ No__ Specify_____

A. Provincial or Federal fish and wildlife refuges and fish and wildlife management areas, waterfowl protection areas, areas designated as significant wildlife habitats, or lands acquired for specific wildlife management purposes (e.g., under North American Waterfowl Management Plan)
http://gis4.natr.gov.ns.ca/website/nssighabnew/viewer.htm;
http://www.gov.ns.ca/natr/wildlife/habitats/sanctuaries/existing.asp;
http://www.gov.ns.ca/natr/WILDLIFE/conserva/nr-ehjv.asp;
http://atlas.nrcan.gc.ca/auth/english/maps/peopleandsociety/tourismattractions/ecotourism/nwaincanada/1

B. Municipally, Provincially, or Federally designated Natural Area, Nature Reserve, Wilderness Area, Park, or Beach.
Specify: _____
http://www.gov.ns.ca/nse/protectedareas/docs/ProtAreas_map_color.pdf
http://www.gov.ns.ca/just/regulations/rxaa-l.htm
http://atlas.nrcan.gc.ca/auth/english/maps/reference/national/natpks_e;

http://parks.gov.ns.ca/

C. Canadian Heritage River http://www.chrs.ca/Main_e.htm

D. Ramsar wetland of international importance
http://ramsar.wetlands.org/Database/Searchforsites/tabid/765/Default.aspx

E. Local public park, forest, trail, or recreation area

F. Provincially or Federally designated archeological or historic site.
Specify:_____
(http://museum.gov.ns.ca/arch/).

SECTION FIVE: HYDROLOGIC CONDITION AND INTEGRITY

1. Is wetland either the source of a stream or along a headwater stream (perennial stream of order 1 or 2)? Yes___ No___
Guidance: Headwater wetlands are important for maintaining base stream flows and moderating peak flows and flooding

2. Is the wetland a geographically isolated one, completely surrounded by upland (lacking a channelized inlet and outlet)? Yes__ No__ **Evidence of ponding?**

Guidance: Isolated wetlands contain all water entering them via precipitation, surface water runoff, and groundwater discharge and by doing so they keep water out of tributaries thereby reducing potential flood flows and increase opportunities for groundwater recharge.

3. Describe wetlands capacity to maintain its characteristic hydrologic regime (based on the degree of alteration of wetland surface and subsurface storage capacity and estimated water retention duration):

High = Water storage capacity and storage duration not altered; wetland retains its ability to maintain its characteristic hydrologic regime.

Med = Minor alteration; constructed, reduced capacity outlet below the ground surface of the wetland; moderate indications of subsurface drainage; outlet raised but managed to mimic natural conditions; constructed outlets keep open-water wetlands as open water or keep saturated wetlands saturated for some time – the wetland is able to provide some temporary and long-term water retention (i.e. the wetland is only partially drained).

Low = Severe alteration; excavated or enlarged outlet constructed well below the ground surface of the wetland; intensive ditch network; strong indications of subsurface drainage; outlet removes most/all long-term and temporary storage; outlet changes hydrologic regime drastically; signs of scouring/erosion may be present; include situations where the constructed outlet changes the wetland to non-wetland or to

deepwater habitat or from saturated conditions to open water or from open water to saturated.

4. Describe percent (to nearest 10%) of wetland with water ponding (standing water) in the depth classes below:

>30cm depth___ 15-30cm depth___ up to 15cm depth___ No ponding___
Guidance: Deeper basins will typically have greater water detention capacity.

5. Signs of surface water retention observed.
Check indicators: Standing water___ (max depth:_____) Water-stained leaves___ Water-carried debris___ Water marks___ (depth above ground surface_____) Silt marks___ (depth above ground surface_____), Sediment deposits____ Algal deposits___ Iron deposits___ Pit and Mound Topography___ Aquatic Invertebrates___ Buttressed Trunks___ Adventitious Roots___ Other (specify)_____)

6. Describe the extent of observable/historical sediment delivery to the wetland from anthropogenic sources including agriculture and developed areas:

Low = No evidence of sediment delivery to wetland.

Med = Minor evidence of accelerated sediment delivery in the form of stabilized deltas, sediment fans, or sediment deposits on vegetation.

High = Major sediment delivery evidenced by buried A-horizon (through examination of soil profile), recent deposition of water-carried debris, sand and gravel deposits on surface, or recent deltas, sediment plumes, etc. in areas of concentrated flow or sedimentation raising elevation of wetland.

Guidance: Wetlands filled by sediment from anthropogenic sources will have reduced capacity to store stormwater. Land use, ground slope, and erodibility characteristics of the soils affect the potential for sediment delivery to the wetland.

7. Describe the disturbance of wetland soils:

Low = Undisturbed or relatively undisturbed; no signs or only minor evidence of recent disturbance or alteration to the wetland soils; idle land, hayed or lightly to moderately grazed or logged; minimal compaction, rutting, trampling, or excavation damage to wetland.

Med = Minor disturbance; some evidence of disturbance or alteration to the wetland soils; wetland heavily grazed in most years; logging or other activities have created some compaction, rutting, trampling, or excavation damage in wetland.

High = Severe disturbance; evidence of significant disturbance or alteration to the wetland soils; wetland tilled in most (>75%) years; significantly impacted (e.g., fill, sediment deposits, cleared, excavated); logging or other activities (e.g., ATV use) have created severe compaction, rutting, trampling, or excavation damage to wetland.

8. Describe the predominant upland soils within the wetland's immediate drainage area that affect the overland flow characteristics to the wetland:
Sands

Silts or loams

Clays or shallow bedrock

Guidance: Greater runoff and higher flood peaks occur in watersheds having primarily impermeable soils. These types of soils impede water infiltration and so produce increased runoff. Wetlands located downslope of more impermeable soils are more likely to provide flood attenuation.

9. Describe the functional capacity of the wetland in retarding or altering flows based on the surface flow characteristics through the wetland:
High = No surface flow channels present.

Med = Channels present, but not connected, or meandering channels.

Low = Channels connecting inlet to outlet.

Guidance: Channels are formed in the underlying substrate, not just as paths through emergent vegetation. Sheet flow, rather than channel flow, offers greater frictional resistance. The potential for flood flow desynchronization is greater when water flows through the wetland as sheet flow. Connecting channels will carry water directly from the inlet to the outlet preferentially in the channel. Channels not connected indicate that some channelized flow may occur within the wetland but not all the way through the wetland via a single channel; some sheet flow will occur. No channels present represents wetlands in which water from the inlet will spread out over the wetland to the outlet (e.g., unchannelized meadows, shallow marshes, deep marshes, ponds, typical floodplains without meander channels, etc.).

10. For wetlands along a watercourse and subject to periodic flooding, describe the roughness coefficient of the potential surface water flow path in relation to wetland vegetation biomass, numeric density and plant morphology:

High = Dense shrub understory, heavy stand of timber with or without downed trees, or mature field crops with flow at half or less of crop height.

Med = Dense grass with rigid stems, weeds, tree seedlings, or shrub vegetation where flows can be two to three times the height of the vegetation.

Low = Primarily flexible turf grass or other supple vegetative cover or unvegetated.

N/A = Not applicable if wetland is isolated.

Guidance: Forest cover and other woody stems increase surface roughness resulting in an increased detention of high flows with the cumulative effect being reduced peak flows downstream. A forest with a dense understory is best for detaining high flows. Manning's roughness coefficient decreases as water depth increases above the macrophytes and other surface roughness characteristics**.** Dense, robust, tall vegetation is best for floodplains. Without a forest present, woody shrubs can be extremely effective

but lose effectiveness once high flows approach and exceed the woody shrub height. Dense, non-woody vegetation (e.g., cattails and tall grasses) are effective at detaining minor flood flows but lay down to higher flows and the surface roughness greatly diminishes. Turf grass and other supple vegetation have minimal effects on flood flows. Open water wetlands with submergent and scattered emergent vegetation are part of the channel characteristics and have minimal effect on detaining flood flows.

11. Describe the characteristics of stormwater, wastewater, or concentrated agricultural runoff detention/water quality treatment prior to discharging into the wetland:

High = Receives significant volumes of untreated/undetained stormwater runoff, wastewater, or concentrated agricultural runoff directly, in relation to the wetland size.
Med = Receives moderate volumes of directed stormwater runoff, wastewater, or concentrated agricultural runoff in relation to wetland size, which has received some treatment (sediment removal) and detention.

Low = Does not receive directed stormwater runoff, wastewater, or concentrated agricultural runoff; receives small volumes of one or more of these sources in relation to wetland size; or stormwater is treated; and runoff rates controlled to nearly predevelopment conditions.

Guidance: An opportunity metric - wetlands receiving undetained, directed stormwater from developed areas generally provide a higher functional level for flood/stormwater storage than do similar wetlands that receive more diffuse or minimal levels of stormwater flow with rates and water quality similar to what they were before development.

12. Water source of the wetland.

Natural.

Mostly natural = some effect from modified hydrology; agricultural lands comprise less than 20% of the contributing watershed or only a few storm drains and scattered homes within 2 km; no large dams upstream.

Partly altered/controlled = Water affected by urban runoff, artificially impounded water (e.g., in-stream pond), water diversions, or other major alteration

Controlled = Water under direct control of upstream reservoir; water flow not natural.

13. Hydrology of tidal wetlands.

Tidal flow **unrestricted**.

Tidal flow is **reduced** but tidal cycle remains normal (e.g., causeway across marsh).

Tidal flow is **restricted** (limited tidal flooding) or altered so that drainage is inadequate (marsh remains flooded during low tide, frequently for extended periods)
N/A – not a tidal wetland

14. Coastal storm surge protection: Does the wetland experience salt water flooding in storms?

Yes__ No__

Consider the above responses to answer the ***SFs*** below:

SF13: Describe the wetland's hydrologic condition (Questions 3,6,7,11-13): Natural ___ Modified___ Significantly Modified___

SF14: Is the wetland important for maintaining stream flow (Question 1)? Yes___ No___

SF15: Is the wetland able to detain surface water (Questions 1,2,4,5,8-10,14)? H___M___L___

SECTION SIX: WATER QUALITY

1. Does the wetland receive substantial quantities of overland flow or direct discharge of stormwater, wastewater, or concentrated agricultural runoff as a primary source of water (circle that which applies)? High ___ Med___ Low or none ___ (see Question 11 from Section 5 for guidance).

2. Do the surrounding land uses have the potential to deliver significant nutrient and/or sediment loads to the wetland? High___ Med___ Low___

3. Based on your answers to questions about flood/stormwater detention in Section 5 (e.g., Questions 2,5-7,9,10) does the wetland perform significant flood/stormwater attenuation (residence time to allow settling of sediments and contaminants)? Yes___ No___

4. Does the wetland have significant vegetative density to decrease water energy and allow settling of suspended materials? High___ Med___ Low___

5. Is the type (e.g., riparian wetlands, wetlands with sheet flow and/or flow-impeding micro-topography, salt marshes, lotic marshes or swamps, seasonally flooded lentic marshes and swamps) or position of the wetland in the landscape such that run-off is held or filtered before entering a surface water? Yes___ No___

Based on the answers to the 5 previous questions:

SF16: Does the wetland have characteristics that improve water quality? Yes___ No__

Examples may include fluctuating water tables; riparian wetlands; wetlands with sheet flow and/or flow-impeding micro-topography (e.g., hummocks, sinuous/braided channels, ribs/ridges);salt marshes, lotic marshes or swamps, seasonally flooded lentic marshes and swamps (also see Questions 6,7,9-11 from previous section – Section 5).

SF17: Does the wetland water quality and/or plant community exhibit signs of excess nutrient loading or contamination inputs:

Low = No evidence of excess nutrient loading or nutrient/contaminant sources (e.g. diverse, native vegetative community, no pipes, etc.).

Med = Some evidence of excess nutrient loading and/or contaminant source, and/or evidence in the plant communities such as dense stands of invasive species (e.g., purple loosestrife, reed canary grass, cattails).

High = Strong evidence of excess nutrient loading and/or contaminants by evident sources or evidence in the plant community such as algal mats or excessive growth of emergent, submergent and/or floating macrophytes, or milky-colored or foul-smelling water, etc.

Guidance: Excessive nutrient loading to a wetland can cause nuisance algal blooms and the production of monotypic stands of invasive or weed species. Observed point source or nonpoint source of nutrients may include but is not limited to: fertilized lawns, agricultural runoff, manure storage or spreading, concentrated stormwater runoff, or pet waste inputs.

SF18: Does the wetland contribute to water quality maintenance in known downstream fish or water supply resources?

High = Wetlands with one or more fish or water supply resource within 1 km downstream via any form of channel or pipe, or an isolated wetland.

Med = One or more fish or water supply resource within 1 to 3 km downstream.

Low = No significant fish or water supply resources are located within 3 km downstream.

Guidance: The water quality function wetlands provide help disperse the physical, chemical, and biological impacts of pollution in downstream waters. Sensitive water resources located within 1 km downstream of the wetland will realize the greatest benefit to water quality from the wetland. As discharges from the wetland move farther downstream, the benefits to water quality provided by the wetland will continue to diminish.

SECTION SEVEN: GROUNDWATER INTERACTIONS

Classification of a given site as a primarily recharge or discharge wetland will be based on how a majority of the questions are answered and does not offer a definitive result as to the actual movement of groundwater in the assessment area. When the primary hydrology comes from groundwater, wetlands are labeled discharge, whereas recharge wetlands are those whose hydrology is primarily supported by surface-water that then seeps into a ground-water system. Check recharge or discharge, and circle any appropriate descriptors.

1. Describe the soils *within* the wetland:

___ Recharge = Mineral soils with a high organic content (all soils not included in discharge system).

___ Discharge = Organic soils, formed due to more continuous wetness associated with a ground water discharge system

Guidance: Wetlands with mineral hydric soils typically represent drier hydrologic regimes where groundwater recharge is more likely (i.e. saturated, seasonally flooded, and temporarily flooded) where the wetness does not significantly limit oxidation of organic materials. Groundwater discharge wetlands represent more stable and permanent hydrologic regimes where excessive wetness limits the oxidation of organic matter resulting in the accumulation of peat and/or muck. In addition, coarser-grained mineral hydric soils may have higher permeabilities allowing groundwater recharge, while histosols (organic soils) generally have low permeabilities, reducing groundwater recharge. Disturbed soils in excavated wetlands or stormwater ponds are subject to best professional judgement for this question.

2. Describe the land use/runoff characteristics in the local subwatershed upstream of the wetland:

___ Recharge = Land is primarily developed to high-density residential, commercial, industrial and road land uses (equivalent to lots 0.10 hectare or smaller) with many impervious surfaces which result in more runoff to wetlands and lowered water tables creating a gradient for recharge under wetlands.

___ Discharge = Upland watershed primarily undeveloped or with low to moderate density residential development (i.e., lots larger than 0.10 hectare) with a low cover in impervious surfaces promoting *upland* recharge to groundwater and discharge to adjacent wetlands.

Guidance: Watersheds with extensive paved surfaces, topographic disruptions, and the presence of wells are associated with human development that lowers the potentiometric contours (leading to more downward water flow). Lowered or diversified potentiometric contours therefore enhance the likelihood of recharge, not discharge. Wetlands with unpaved watersheds are more likely to allow discharge of groundwater to wetlands to occur.

3. Indicate conditions that best fit the wetland based on wetland size and the hydrologic properties of the *upland* soils within 200 meters of the wetland.

___ Recharge = Wetland is <81 hectares and surrounding upland soils (within 150 m) primarily: 1) have a layer that impedes the downward movement of water, 2) have moderately fine texture or fine texture, 3) clays that have a high shrink-swell potential, 4) have a high water table, 5) have a claypan or clay layer at or near the surface, or 6) shallow over nearly impervious material.

___ Discharge = Wetland is >81 hectares in size or wetland is <81 hectares and the

surrounding soils (within 150 m) are primarily: 1) deep, very well drained to excessively drained sands, 2) gravelly sands, or 3) moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture.

Guidance: The size or area of the wetland and the soil texture in the surrounding upland are two factors controlling the wetland's water budget. A large wetland with a proportionately small watershed may indicate subsidization of its water budget by groundwater discharge. The probability of groundwater discharge occurring may thus increase as the wetland/watershed ratio increases. The wetland size also controls the amount of recharge potential. The more fine-grained the soil texture in the surrounding uplands, the more water will flow to the wetland via overland flow and less likely water is to flow to the wetland via groundwater discharge. Williams (1968) observed that a small wetland situated in a large watershed favored groundwater recharge, because surface water inflow from a large watershed was sufficient to create a water mound conducive to recharge. Sandy and loamy upland soils allow more infiltration of precipitation than clayey soils. The infiltrated water will percolate downward vertically and/or flow laterally becoming groundwater discharge where wetlands intersect the water table.

4. Indicate the hydroperiod of the wetland:

___ Recharge = temporarily, intermittently, and seasonally flooded and seasonally saturated wetlands, as well as wetlands with a saturated water regime that: 1) are on flats; and/or 2) are acid bogs (indicates precipitation-driven systems).

___ Discharge = semipermanently flooded, permanently flooded, or wetlands with a saturated water regime that: 1) occur on slopes; 2) are on a river valley terrace or at the toe of a bluff or beach ridge, etc.; or 3) have any observed springs or seepages.

Guidance: Permanently flooded, semipermanently flooded, and saturated water regimes often indicate groundwater discharge to a wetland; exceptions = saturated wetlands on flats or bogs (precipitation-driven systems). Seasonally or temporarily-flooded wetlands are more likely to recharge groundwater.

5. Describe the inlet/outlet configuration that best fits the wetland:

___ Recharge = No outlet or restricted outlet in natural wetlands, inflow wetlands, and lentic wetlands.

___ Discharge = Perennial outlet but no perennial or intermittent stream inlet; perennial lotic wetland.

Guidance: A wetland with a permanent stream inlet but no permanent outlet is more likely to recharge groundwater than one with an outlet. Several factors support this ranking. First, a higher hydraulic gradient will likely be present in an area with no outlet, especially if an inlet is present. Second, the longer water is retained in an area, the greater

the opportunity for it to percolate through the substrate. Third, wetlands without outlets generally experience more water-level fluctuations, resulting in inundation of unsaturated soils. Finally, lack of an outlet suggests that water is being lost either through recharge or evapotranspiration, especially if an inlet is present. A wetland with a permanent outlet and no inlet is more likely to discharge groundwater than one with other combinations of inlets and outlets. Continuous discharge of water (i.e. permanent outlet) without surface water feeding the wetland through an inlet suggests an internal source of groundwater (e.g., springs or seeps). Throughflow wetlands would be considered discharge wetlands for the purposes of this question.

6. Characterize the topographic relief surrounding the wetland:

___ Recharge = Land slopes away from (below) the wetland (wetland is elevated in the subwatershed, e.g., at a high point or watershed divide).

___ Discharge = Surrounding lands slope toward the wetland around the majority of the wetland (wetland is found lower in the subwatershed).

Guidance: Groundwater discharge is more likely to occur in areas where the topographic relief is characterized by a sharp downslope toward the wetland (i.e. wetland is located at the toe of a slope). Groundwater recharge is more likely in wetlands where the topographic relief is characterized by a sharp downslope away from most of the wetland. The slope of the water table with respect to the wetland influences the hydraulic gradient for groundwater movement. The water table usually slopes roughly parallel to the land surface topography. Thus, when local topography slopes sharply toward the wetland, the result is typically a hydraulic gradient favorable for groundwater discharge.

Use the weight of evidence from the responses above to answer the ***SFs*** below:

SF19: Wetland likely serves as a recharge site: Yes___ No___

SF20: Wetland likely serves as a discharge site: Yes___ No___

SECTION EIGHT: SHORELINE STABILIZATION AND INTEGRITY

1. Is the wetland fringing an ocean, estuary, lake, pond, river or stream?

Yes___ No ___

If "Yes", complete rest of questions in this section; if "No", proceed to Section 9.

If a stream or river, what is the width of the stream? >4m___ ≤4m___

If a lake, pond, ocean or estuary, is the site exposed or sheltered?

Exposed___ Sheltered ___

Sheltered = waterbody <1000m wide and no regular boat traffic.

Exposed = waterbody ≥1000m or regular boat traffic.

Guidance: Open water distances more than 1000m may permit significant fetch that can generate waves sufficient to cause shoreline erosion.

2. Enter the percent cover of rooted wetland vegetation in the shallow water zone of the waterbody and check descriptor.

_____% (___High = > 50% macrophyte cover in the wetland; ___ Medium = 10-50% macrophyte cover in the wetland; ___ Low = < 10% macrophyte cover in the wetland)

Guidance: The erosive strength of waves and currents can be greatly dissipated by a dense vegetation cover including submerged macrophytes. The greater the vegetation density, the greater the shoreline protection.

3. Enter the average vegetated wetland width in meters along the shoreline of the waterbody (depth less than 2 m): _____ meters; (___ High = wetland width >10m ; ___ Medium = wetland width 3-10m; ___ Low = wetland width <3m)

Guidance: Wetlands with wide stands of vegetation are more likely to stabilize sediments than those with narrow stands. Knutson et al. (1981) found that wetlands wider than 10m reduced wave energy by 88% while emergent wetlands less than 2m wide were relatively ineffective in wave buffering. Measure or estimate average vegetated width from the wetted edge of shore out to the 2 m depth contour.

4. For marshes and fens/wet meadows along waterbodies, what is the prevalence of strong stemmed emergent vegetation that can withstand high flow?

High = Dominance of emergent species with strong stems present all year and/or dense root mats in the wash zone (e.g., cattails, shrubs) that are resistant to erosive forces.

Med = Presence of some emergent species with strong stems or dominance of weak-stemmed emergent species persisting most of the year and/or moderately dense root mats in the wash zone (e.g., bulrushes, grasses) that are resistant to erosive forces.

Low = Presence of some weak-stemmed emergent species and/or no dense root mats in the wash zone (e.g., rushes).

Guidance: The erosive strength of waves and currents can be greatly dissipated by a dense, emergent vegetation cover. In addition, species with stronger stems will provide greater protection than weak-stemmed species. The greater the vegetation density, the greater the shoreline protection.

5. Describe the shoreline erosion potential at the site:

High = Strong wave action or water current (e.g., most tidal wetlands, lentic wetlands facing greatest wind fetch on a lake or lotic wetlands on outside river bend); frequent boat traffic and restrictions that funnel boats into narrow passages; sandy soils or

evidence of erosion, ice scouring or slope failure.

Med = Moderate wave action or water current (e.g., tidal wetlands in protected coves, wetlands in small lakes or large ponds); moderate boat traffic with some evidence or potential for erosion or slope failure.

Low = Negligible erosive forces (little open water or wave action or slow-moving, straight river); minimal to no boat traffic or no-wake zone; no evidence of past erosion or slope failure.

Guidance: Wetlands located in areas with strong currents and wave action have the greatest potential for protecting shorelines. Shorelines composed of sandy or erodible soils will benefit the most from shoreline wetland protection.

6. Describe the shoreline/streambank vegetation conditions up slope from the waterline in relation to their ability to protect the bank from erosion or slope failure:

Low = Lack of vegetation; regularly manicured, short-grass lawn.

Med = Full vegetative cover composed of shrubs receiving only moderate maintenance or grasses/understory vegetation that is not manicured.

High = Deep-rooted vegetation not actively manicured (e.g., trees, shrubs and grasses).

Artificial = Shoreline artificially protected by rip-rap or bulkhead.

Guidance: The potential for erosion and/or slope failure of shoreline or streambank areas is also dependent on the land use and condition on the slope above the water level and on top of the bank. Bare soils or those with shallow rooted grasses that are manicured on a regular basis provide less protection than deep-rooted grasses allowed to grow naturally. For this question, consider that part of the wetland starting at the water's edge up to the upland edge, to encompass the shore area up out of the water itself.

Consider the above responses to answer the ***SF*** below:

SF21: Wetland's ability to stabilize shoreline: High ___ Moderate ___ Low ___ N/A___

SECTION NINE: PLANT COMMUNITY

The plant community assessment incorporates two principal components: diversity and integrity. **Diversity** refers to the richness of plant species in the wetland. Floristically diverse wetlands should be given higher ratings than those that are less diverse (e.g., monotypic cattail or reed canary grass stands). **Integrity** refers to the condition of the plant community in comparison to an undisturbed reference site for that community. The highest rating can be given to those wetlands that represent the characteristic condition of that wetland type. The degree (e.g., minor versus substantial) and type of disturbance typically play an important role in the diversity/integrity of plant communities. Some native plant communities are maintained by

periodic, natural disturbances (e.g., fire and annual floods). For purposes of this functional assessment, human-induced alterations (e.g., filling, dredging, drainage) are disturbances that typically alter natural vegetative diversity/integrity.

1. **Rate the overall vegetation diversity relative to a healthy wetland of this type (presence of a variety of native species is considered healthy; monotypic stands or high cover in non-native species is not):**

   High ____ Medium ____ Low ____

   List the three most dominant species and their % cover: _____

   _____

2. **Is the wetland plant community regionally scarce or rare? Yes___ No___**
   Describe rare type(s) _____
   (see ACCDC general status ranks, S1-S3, http://accdc.com/Products/ranking.html)

3. **List any dominant species that are non-native or invasive and the estimated cover of each (**see http://accdc.com/Products/ranking.html for nonnative (SE species, and Hill and Blaney 2010 for list of invasive species in NS):

   _____

4. **Vegetation disturbance:** High ___ Medium ___ Low ___

5. **Disturbance Types:** Harvest___ ATV damage___ Grazing___ Mowing___ Infilling ___ Ditching/drainage___ Impoundment___ Other Altered Hydrology___ Insect Infestation___ Storm Damage___ Eutrophication ___ Other:_____

6. **Characterize the current vegetative integrity of the plant community (if this is a complex, rate integrity of the plant communities associated with the different wetland types that form the complex as an overall average)**. Use the following definitions to determine the quality:

   Exceptional Integrity: Plant community is undisturbed, or sufficiently recovered from past disturbances, and/or non-native plant and invasive species are absent or, if present, constitute a minor percent cover (<5%) of the community; and/or unique features (e.g., old growth forest, never-plowed, rare/endangered species) are present; and/or wetland is undisturbed, surrounded by native plant communities.

   High Integrity: Community is composed of native species characteristic of the wetland type and invasive species are absent or cumulatively comprise less than 10 percent cover of any stratum.

   Medium Integrity: Community is composed mostly of native species characteristic of the wetland type, and invasive species cumulatively comprise 10 to 30 percent cover of a stratum.

Low Integrity: Community where invasive species cumulatively comprise >30 percent cover of any stratum.

Consider the above responses to answer the ***SFs*** below:

SF22: Is the plant community unique or rare regionally or provincially? Yes___ No____

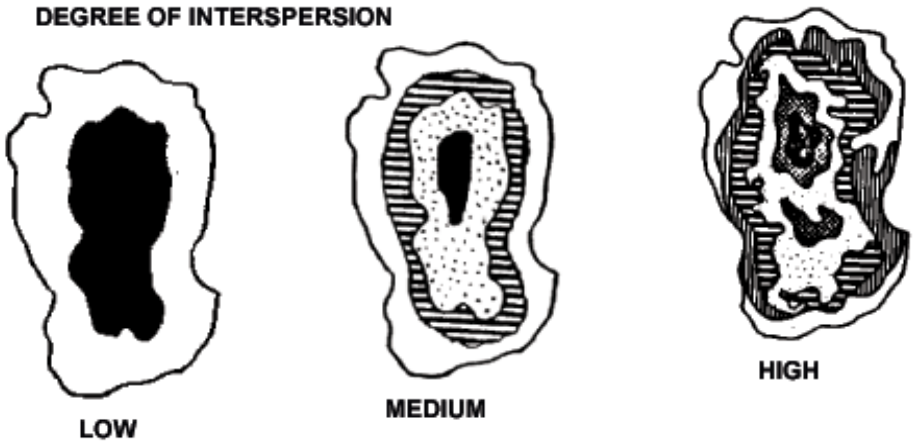
SF23: Are the wetland plant communities diverse?
High ___ Medium ___ Low ___

SF24: Estimate the overall integrity of plant community/species:
High ___ Medium ___ Low ___

SF25: *Were* ***any plant species with special status (rare/endangered/etc.) found in the wetland?***
No___ Yes___ Specify:_____

SECTION TEN: FISH AND WILDLIFE HABITAT & HABITAT INTEGRITY

1a. For freshwater marshes or shallow open water-wetland types select the cover category that best illustrates the interspersion of open water and emergent, submergent, or floating-leaved vegetation within the wetland. High___ Medium___ Low___ N/A___(Not applicable for other wetland types – go to Question 3)



1b. What is the total percent vegetative cover in this wetland? _____

Guidance: Wetlands that contain vegetation interspersed with open water are more likely to support notably greater on site diversity and/or abundance of fish and wildlife species. Those with very dense vegetation and no channels or open water areas are less likely to support this function. Vegetation interspersion is a measure of the amount of edge

between vegetation and open water, which is valuable to wildlife.

2. For wetlands complexes with more than one vegetative community (e.g., shrub swamp and shallow marsh), indicate the interspersion category that best fits the entire wetland complex. High___ Medium___ Low___ N/A = Only one community is present.

Guidance: For wetlands that are characterized by multiple vegetative communities, the increased structural diversity and amount of edge associated with greater interspersion is generally positively correlated with wildlife habitat quality.

3. A healthy wetland will have detritus (vegetative litter) in several stages of decomposition. Describe the wetland condition:
High = the presence of litter layer in various stages of decomposition.

Medium = some litter with apparent bare spots, or dense litter mat.

Low = no litter layer.

N/A = not applicable for marshes, shallow open water and bog communities.

Guidance: Detritus or vegetative litter in various stages of decomposition is a sign of a healthy wetland. Detrital biomass impacts nutrient cycling processes and disturbance regime and thereby influences plant assemblages. Detritus maintains thermal regulation of rhizomes and propagules, and is essential to nutrient cycling. The integrity of the system's vegetation components supplies the bulk of the faunal habitat requirements. When assessing a site, consider that the amount of detritus will vary with the time of year; floodplain forests may show no litter after spring flood events, for example. ***Marshes and shallow open water are not evaluated for this question*** due to their permanent or near permanent inundation, and ***bogs are also omitted*** because they typically contain living peat mosses on much of their surface.

4. Describe the relative interspersion of various wetlands in the vicinity of the assessment wetland (*based on aerial photo interpretation or knowledge on the ground***):**
H = The wetland occurs in a complex of wetlands of various types (general guideline: at least three wetlands within 1 km of assessment wetland, at least one of which has a different dominant plant community than the assessment wetland); or the assessment wetland is the only wetland within a 3 km radius.

M = Other wetlands of the same plant community as the assessment wetland are present within 1 km.

L = No other wetlands are present within 1 km of the assessment wetland but are present within 3 km.

Guidance: This question rates wetlands higher for having more wetland neighbors, recognizing, however, that research indicates that the critical radius varies by species. Wetlands that are isolated in the landscape may provide the last refuge for wetland dependent plant and animal species in an otherwise upland or developed area.

5. Habitat value diminishes when fragmented by barriers, which restrict wildlife migration and movement. Describe barriers present between the wetland and other habitats:

L = No barriers or minimal barriers present; i.e., low traffic; uncurbed roads, low density housing (> 0.4 hectare lots), golf courses, utility easements, or railroads.

M = Moderate barriers present; e.g., moderately traveled; curbed roads, moderate density housing (0.1 to 0.4 hectare lots), residential golf courses, low dikes, row crops.

H = Large barriers present; i.e., four-lane or wider, paved roads, parking lots, high-density residential (<0.1 hectare), industrial and commercial development.

Guidance: This variable serves as a measure of habitat fragmentation of the wetland relative to other wetlands and native plant communities to indicate the ecosystem connectivity. It identifies barriers to wildlife migration ranging from very small barriers such as unpaved roads and low-density housing to large hydrologic barriers such as regional canals and levied roads. Reference area will affect this rating: "other habitats" includes upland areas usable as wildlife resting or reproductive habitat. For this question, cropland is not considered "habitat."

6. List any other noteworthy wildlife species observed or in evidence (e.g., tracks, scat, nest/burrow, calls, viewer reports, egg masses in the water, presence of young/juveniles), including birds, amphibians, reptiles and mammals (e.g., breeding, forage, resting, overwintering).

Yes___ No___ If present, specify _____

_____

Guidance: Wetlands that are deep and well oxygenated can provide overwintering habitat for leopard, green and mink frogs, as well as turtles (> 1.5 m rarely winterkill). Evidence of over-wintering would be observations of migrations of frogs to the wetland in fall and away from the wetland in spring and basking turtles in the spring.

7. Is the wetland contiguous or intermittently contiguous with a watercourse such that it may provide spawning/nursery habitat for native fish species? Choose the condition from the following list that best describes the wetland in relation to fish habitat:

Exceptional = Wetland is a known spawning habitat for native fish of high importance or interest (e.g. salmon or trout).

H = Wetland is lentic, lotic or estuarine or is otherwise contiguous with a permanent watercourse or watercourse and may provide spawning/nursery habitat, refuge for native fish species in adjacent waters, or provides shade to maintain water temperature in adjacent lakes, rivers or streams.

M = Wetland is intermittently connected to a permanent watercourse or watercourse that may support native fish populations as a result of colonization during flood events, or the wetland is isolated and supports native, non-game fish species.

L = Wetland is isolated from a permanent watercourse or watercourse

N/A = None of the above. Wetland does not have standing water during most of the growing season; site is not capable of supporting fish.

Guidance: Generally, the value of a wetland for fish habitat is related to its connection with deepwater habitats. A wetland should be rated as having high value for fish if it provides spawning/nursery habitat, or refuge for native fish species in adjacent estuaries, lakes, rivers or streams. Some isolated deep marshes may intermittently support populations of sunfish, perch and bass as a result of colonization during flood events. Permanently flooded isolated wetlands that support native populations of minnows provide moderate value. Isolated wetlands that are not permanently flooded do not generally support fish populations. If fish are present, consult with Department of Fisheries and Oceans.

8. Were any fish observed? Yes__ No__ If yes, list species_____

_____

9. Wetland is part of a large block of contiguous upland or wetland (e.g., wetland is within an area *not* bisected by paved roadways and *without* any significant presence of agricultural land or residential/commercial development)**:**
>50ha___ 25-50ha___ 10-25ha___ <10ha___

10. Wetland provides habitat for: Amphibians__ Reptiles___ Waterfowl___ Waterbirds ___ Mammals____ Fish____ Rare/Endangered Species____

Consider the above responses to answer the ***SFs*** below:

SF26: Is the wetland associated with watercourse/wetland supporting fish or fish habitat? Yes__ No__

SF27: Are any rare/endangered/etc fish and wildlife species found in the wetland? Yes__ No__

SF28: Overall fish and wildlife habitat quality: High___ Medium___ Low___ (compilation of the responses above)

SECTION ELEVEN: COMMUNITY USE/VALUE:

1. Does the wetland have any of the following community uses: Visible from vantage points__, Commercial Products __, Conservation Ownership__, Public Ownership__,

Public Access__, Aesthetic value__, Greenbelt__, Education__, Hiking__, Wildlife Viewing__, Boating__, Hunting__, Plant Gathering__, Berry picking__, Fishing__, Exploration__, Relaxation__, Other_____

Consider the above response to answer the ***SF*** below:

SF29: Rate the wetland's community use/value: High__Medium__Low__

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APPENDIX A: General Functions Associated with Wetland Types (based on Tiner 2003, 2005)

Function	Predicted Performance Level	Wetland Types
Surface Water Detention	High	Salt marsh, Lentic marsh, Lentic swamp, Lotic marsh, Lotic swamp, Terrene throughflow marsh, Terrene throughflow swamp
	Moderate	Terrene outflow marsh, Terrene outflow swamp, Bog, Fen
(Note: Slope wetlands do not provide this function to any significant degree.)		
Coastal Storm Surge Detention	High	Salt marsh, Lotic tidal wetlands
	Moderate	Terrene basin and flat wetlands contiguous with salt marsh (these are bordering non-tidal wetlands subject to infrequent or occasional tidal flooding during storms)
Streamflow Maintenance	High	Headwater wetlands that are not ditched
	Moderate	Ditched headwater wetlands, Lotic river marsh (nontidal), Lotic river floodplain swamp (nontidal), Lentic wetlands associated with a throughflow lake
Nutrient Transformation	High	Salt marsh, Marsh, Swamp, Fen
	Moderate	Bog, Any seasonally saturated or temporarily flooded wetland
Carbon Sequestration	High	Salt marsh, Marsh, Swamp, Bog, Fen (seasonally flooded or permanently saturated)
	Moderate	Any temporarily flooded or seasonally saturated Swamp or Fen
Sediment and Other Particulate Retention	High	Salt marsh, Lotic marsh, Lotic swamp Lentic marsh, Lentic swamp (subject to seasonal flooding)
	Moderate	Lotic and Lentic wetlands that are

		temporarily flooded wetland
Shoreline Stabilization	High Moderate	Salt marsh, Lotic wetlands, Lentic wetlands Terrene headwater marsh, Terrene headwater swamp

(Note: Wetlands that are islands in the waterbodies are excluded from this function.)

Fish Habitat or Support Such Habitat	High	Salt marsh, Lotic marsh, Lentic marsh
	Moderate	Terrene pond marsh (pond >0.4 ha)
	Stream Shading	Lotic swamp (shrub or treed, both along perennial streams only)
Waterfowl and Waterbird Habitat	High	Salt marsh, Lentic marsh, Lotic river marsh
	Moderate	Terrene pond marsh (pond >0.4 ha)
	Cavity Nesters	Lotic swamp (shrub and treed, both along perennial streams only)
Other Wildlife Habitat	High	Any vegetated wetland complex > 8 hectares, Wetlands 4-8 acres in size composed of two or more wetland types, Small isolated wetlands in dense cluster (≥3 per hectare) in a forest matrix (restrict to forest regions with woodland vernal pools)
	Moderate	Other vegetated wetlands

APPENDIX B: Descriptors for Characterizing Wetlands (additional detail in Tiner 1999)

Wetland Type: Aquatic Bed, Bog, Coastal Marsh, Fen, Freshwater Marsh, Forested Wetland, Shrub Wetland (DNR Wetland Inventory Classification http://www.gnb.ca/0078/publications/WETLANDS-Classificaton-e.pdf)
%Salt Marsh (SM)___ %Bog (BO) ___ %Fen (FE)___ %Freshwater Marsh (FM) __ %Forested Swamp (FS) ___ %Shrub Swamp (SS) ___ %Coastal Saline Pond (CP) __
% Vernal pool (VP)___

Landscape Position: Estuarine-Embayment, Estuarine-Channel, Lotic River-Unconfined, Lotic River-Confined, Lotic Stream-Unconfined, Lotic Stream-Confined, Lotic Pond, Lentic Lake, Lentic Reservoir, Terrene, Terrene Pond

Landform: Basin, Flat, Slope, Floodplain/basin, Floodplain/flat, Fringe, Island

Water Flow Path: Outflow (separate Perennial vs. Intermittent if possible), Throughflow (separate Perennial vs. Intermittent if possible), Inflow, Isolated, Bidirectional-nontidal, Bidirectional-tidal, Paludified

Water Regime: Permanently Flooded, Seasonally Flooded, Temporarily Flooded, Seasonally Saturated, Permanently Saturated, Regularly Flooded-Tidal, Irregularly Flooded-Tidal, Artificially Flooded

Wetland Origin: Natural, Created, Restored, Enhanced

APPENDIX C: Field Data Sheet (see Excel spreadsheet)