Headwater Drainage Features Guideline

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Guideline Structure

1. Evaluation

2. Classification

3. Management
Evaluation: Pre-screening

Guideline applies to:

- part of the drainage network (i.e. drainage channels that are identified from aerial photography, and/or drainage lines result from ArcHydro analysis), or
- a groundwater seepage area or spring, or
- a connected headwater wetland (a surface outlet connects to downstream), and
- not a mapped or known perennially flowing stream.
On-line ponds, distinct HDFs to be sampled

Unconnected wetland, not an HDF, therefore not sampled

Fish and Fish Habitat

Amphibians

Connected wetland, to be sampled. A second sampling location for outflow

Scale 1:4,000

Potential Sampling Locations

HDF1
HDF2
HDF3
HDF4
HDF5
HDF6
HDF7
HDF8
HDF9
HDF10
HDF11
HDF12
HDF13
HDF14
Evaluation

**OSAP M4:S10**

- **Hydrology**
  - flow conditions (substantial flow, minimal flow, interstitial flow, standing water, dry)
  - feature type (wetland, swale, defined channel, etc.)

- **Riparian vegetation**
  - dominant vegetation in any of the 0 – 1.5 m, 1.5 – 10 m and 10 – 30 m riparian zones (forest, scrubland, meadow, lawn, cropped land, none).

**OSAP S3.M1 or S3.M2 and S4.M9**

- **Fish and Fish Habitat, and barriers**
  - year-round, seasonal, or contributing

- **Terrestrial Habitat (not OSAP)** – Marsh Monitoring Protocol (amphibians), Ecological Land Classification, connectivity
Classification

Using the data collected in the Evaluation section, features are assessed in terms of four functional attributes:

1. Hydrology
2. Riparian Conditions
3. Fish and Fish Habitat
4. Terrestrial Habitat
All functional attributes are assessed using a common categories of function*:

1. Important
2. Valued
3. Contributing
4. Limited

*with slight modifications as necessary
Classification: Hydrology

1. Important – Perennial – year-round flow or standing water
2. Valued – Intermittent – seasonal groundwater
3. Contributing – Ephemeral – spring freshet flows
4. Recharge – Dry or Standing Water, with sandy/gravelly soils
5. Limited – Dry or Standing Water

Table 4: Hydrology classification using flow condition and feature type as evaluated using data from OSAP S4.M10. More than one field assessment is required in order to assess hydrology, particularly if the assessment does not occur prior to spring plowing/tilling.

<table>
<thead>
<tr>
<th>Assessment Period</th>
<th>Limited or Recharge</th>
<th>Valued or Contributing</th>
<th>Important*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring freshet (Late March – mid-April)</td>
<td>FC = 1 or 2 AND FT = 4 or 7</td>
<td>FC = 3, 4, or 5 AND FT = 1, 2, 3, 4, 5, 7 or 8; OR if wetland (FT = 6) occurs upstream</td>
<td></td>
</tr>
<tr>
<td>Late April - May</td>
<td>FC = 1 or 2 AND FT = 4 or 7</td>
<td>i. FC = 1 or 2 AND FT = 1, 2, 3, 4 or 5 OR if wetland (FT = 6) occurs upstream; OR ii. FC = 3, 4, or 5 AND FT = 4, 5 or 7 OR if wetland (FT = 6) occurs upstream</td>
<td></td>
</tr>
<tr>
<td>July - August</td>
<td></td>
<td>FC = 2, 3, 4 or 5 AND FT = 1, 2, 3, or 8; OR FT = 6 AND FC = 2</td>
<td></td>
</tr>
</tbody>
</table>

The following categories are hierarchical with highest level of function increasing from left to right. The highest level of function satisfied according to the conditions outlined above is to be used to classify hydrology for features. Assessments may be completed for important features earlier in the season, but flow conditions need to be confirmed in summer in order to satisfy the criteria for this class.

NB: OSAP Flow condition codes (FC): 1 = no surface water (dry), 2 = standing water, 3 = interstitial flow, 4 = surface flow minimal (<0.5l/s), 5 = surface flow substantial (>0.5 l/s)

OSAP Feature type codes (FT): 1 = defined natural channel (visible banks), 2 = channelized (historically natural channel, now straight with banks), 3 = multi-thread (>1 channel), 4 = no defined feature (overland flow only), 5 = tiled drainage (buried stream/pipe with outlet), 6 = wetland, 7 = swale, 8 = roadside ditch (channelized running parallel with roadway), 9 = online pond outlet

*Springs and seeps can be assessed based on data from the Upstream and Downstream Site Features from the field sheet.
Classification: Riparian Conditions

1. Important – feature is a wetland or any riparian category is dominated by woody or wetland vegetation

2. Valued – any riparian category is dominated by meadow vegetation and there are no important riparian functions

3. Contributing – any riparian category is dominated by lawn vegetation and there are no important or valued riparian functions

4. Limited – riparian corridor is dominated by cropped land or no vegetation and there are no important, valued or contributing riparian functions

Table 5: Riparian condition classification using data from OSAP S4. If the data for the left and right bank categories differ, classification will be according to that which is highest functioning.

<table>
<thead>
<tr>
<th>Riparian Conditions</th>
<th>OSAP Riparian Codes Observed</th>
<th>OSAP Code Descriptions</th>
<th>ELC Equivalent Codes for Riparian Codes Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important Functions</td>
<td>5, 6, 7 (and/or feature type=wetland)</td>
<td>Scrubland, forest, or wetland</td>
<td>Thicket, plantation, woodland, forest (CUT, CUS, CUW, CUP, TPS, TPW, FO)</td>
</tr>
<tr>
<td>Valued Functions</td>
<td>4</td>
<td>Meadow</td>
<td>Meadow (CUM)</td>
</tr>
<tr>
<td>Contributing Functions</td>
<td>2</td>
<td>Lawn</td>
<td>-</td>
</tr>
<tr>
<td>Limited Functions</td>
<td>1 or 3</td>
<td>None or cropped land</td>
<td>-</td>
</tr>
</tbody>
</table>
Riparian Conditions

Meadow

Valued Riparian

Lawn
1. Important – Fish are present year-round in standing pools; or suitable habitat present for spawning/rearing; or feature is SAR habitat
2. Valued – Seasonal fish habitat (feeding, cover, refuge) or contributing habitat for SAR
3. Contributing – Allochthonous transport through feature to downstream habitat

Table 6: Fish and fish habitat classification using data from OSAP S3.M1 module.

<table>
<thead>
<tr>
<th>Fish and Fish Habitat</th>
<th>Fish Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important Functions</td>
<td>Any fish present species present in spring and mid-summer; suitable spawning</td>
</tr>
<tr>
<td></td>
<td>habitat for any fish species; species-at-risk present at any time; or feature</td>
</tr>
<tr>
<td></td>
<td>provides critical habitat to downstream species-at-risk</td>
</tr>
<tr>
<td>Valued Functions</td>
<td>Fish present in spring only or suitable habitat identified for feeding, cover,</td>
</tr>
<tr>
<td></td>
<td>refuge, migration; or contributing habitat for species-at-risk</td>
</tr>
<tr>
<td>Contributing Functions</td>
<td>Allochthonous transport through feature to downstream habitat</td>
</tr>
</tbody>
</table>
Classification: Terrestrial Habitat

1. Important – wetlands with breeding amphibians
2. Valued – general amphibian habitat (stepping stone habitat or suitable for feeding or hydration for low mobility wildlife)
3. Contributing – movement corridors (feature supports wildlife movement connecting u/s and d/s habitats for higher mobility sp.)
4. Limited – no terrestrial habitat present

Table 7: Terrestrial habitat classification using data from OSAP S4.M10 and the Marsh Monitoring Protocol (MMP) for amphibians

<table>
<thead>
<tr>
<th>Terrestrial Habitat</th>
<th>OSAP S4.M10 Feature Type Code (and Description)</th>
<th>Marsh Monitoring Protocol call code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important Functions</td>
<td>6 (wetland)</td>
<td>1, 2 or 3</td>
</tr>
<tr>
<td>Valued Functions</td>
<td>6 (wetland); considering wetland pockets associated with the HDF that are within 400 m of other wetlands upstream and downstream is recommended for assessing stepping stone habitat function</td>
<td>0</td>
</tr>
<tr>
<td>Contributing Functions</td>
<td>This is assessed at the landscape scale, potentially with guidance from an EIS. However, one recommendation is to use the following criteria: RC$^3 = 5, 6, 7$ within 0-10 m that functions as riparian habitat along corridor with the sampling point connecting two habitat features upstream and downstream to facilitate movement of wildlife through the corridor</td>
<td></td>
</tr>
<tr>
<td>Limited Functions</td>
<td>1-5 (one of: defined channel, channelized, no defined channel, buried drainage) or 7-9 (one of: swale, roadside ditch, on-line pond)</td>
<td>0</td>
</tr>
</tbody>
</table>

1 Both OSAP and MMP criteria must be satisfied to fulfill the classification category.

2 Environment Canada (2013) reviews a number of studies that consider the critical function zone from wetland habitat for amphibians. Depending on the species the critical range varies, but for some species such as Green Frog and Bullfrog, the mean range is 405 and 406 m respectively. For other anurans mean ranges are much less. Therefore, it is recommended that 400 m is a reasonable distance to wetlands when considering stepping stone function.

3 OSAP Riparian condition (RC) codes: 1 = none; 2 = lawn; 3 = cropped land; 4 = meadow; 5 = scrubland; 6 = forest; 7 = wetland
On-line ponds, distinct HDFs to be sampled

Unconnected wetland, not an HDF, therefore not sampled

Connected wetland, to be sampled. A second sampling location for outflow

Forest

Wetland, no breeding amphibians

Valued - stepping stone habitat
Link Classification to Management

- **Limited or Recharge Hydrology**
  - Is the feature a wetland?*
    - Yes → **Important Fish Habitat?**
    - No → **Recharge Hydrology?**
      - No → **Contributing Terrestrial Habitat?**
        - No → **No Management Required**
        - Yes → **Maintain/Replicate Terrestrial Linkage**
    - Yes → **Maintain Recharge**
  - No → **Minimum of Valued Terrestrial Habitat?**
    - Yes → **Important Terrestrial Habitat?**
    - No → **Important Riparian Vegetation?**
      - Yes → **Conservation**
      - No → **Mitigation**

- **Valued or Contributing Hydrology**
  - **Important Fish Habitat?**
    - Yes → **Conservation**
    - No → **Valued Fish Habitat?**
      - Yes → **Conservation**
      - No → **Important Terrestrial Habitat?**
        - Yes → **Conservation**
        - No → **Important Riparian Vegetation?**
          - Yes → **Conservation**
          - No → **Mitigation**

- **Important Hydrology**
  - **Important Terrestrial Habitat?**
    - Yes → **Conservation**
    - No → **Important Riparian Vegetation?**
      - Yes → **Conservation**
      - No → **Mitigation**

*Other Conservation Authority policies or other legislation with respect to wetlands, watercourses and/or species at risk need to be assessed in the context of this key.
+Note that headwater wetlands are considered to be HDWs in the context of this guideline.

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TORONTO AND REGION CONSERVATION AUTHORITY
Management

1. Protection – protect or enhance in-situ feature and riparian corridor
2. Conservation – maintain, relocate and/or enhance feature
3. Mitigation – replicate and enhance function w lot level conveyance
4. Maintain Recharge – maintain overall water balance
5. Maintain Terrestrial Linkage – maintain corridor bw features
6. No Management Required

Table 9: Summary of management recommendation and implications for development proposals

<table>
<thead>
<tr>
<th>Management Implications</th>
<th>Protection</th>
<th>Conservation</th>
<th>Mitigation</th>
<th>Recharge Protection</th>
<th>Maintain Terrestrial Linkage</th>
<th>No Management Recommendation Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Must remain open</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>Relocate using natural channel design</td>
<td>Not permitted, enhancement only</td>
<td>May be considered, not preferred</td>
<td>Natural Channel Design not required</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Maintain or replicate groundwater or wetlands</td>
<td>Maintain or enhance</td>
<td>Maintain or replicate, restore if possible</td>
<td>N/A</td>
<td>Maintain overall infiltration rates at site</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Maintain hydroperiod</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Direct connection to downstream</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Replicate function through enhanced lot level conveyance</td>
<td>N/A</td>
<td>N/A</td>
<td>Replicate using bioswales, LID, vegetated swales or constructed wetlands</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

1. Recharge zone may qualify as a High Aquifer Vulnerability Area and is therefore subject to the policies of the Oak Ridges Moraine Conservation Plan.
2. Unless the management recommendations call for restoration of lost function or enhancement and creation fish habitat.

Note: Replicated functions must be located downstream of stormwater management facilities.
On-line ponds, distinct HDFs to be sampled

Protection
Conservation
Mitigation
Maintain Terr. Linkage
Maintain Recharge
No Management Requ’d

Unconnected wetland, not an HDF, therefore not sampled

Connected wetland, to be sampled. A second sampling location for outflow

Scale 1:4,000
Potential Sampling Locations