Florida Department of Environmental Protection

Stream Habitat Assessment Procedure

Aquatic Ecology and Quality Assurance

2018
What is a Habitat Assessment?

✓ Companion field method to the SCI.
✓ Evaluation of habitat quality in a stream.
✓ Critical to any assessment of ecological integrity.
✓ Should be performed with all biological sampling.
✓ Incorporates all aspects of physical and chemical components along with the biotic interactions.
✓ Results will assist in interpreting biological data.
<table>
<thead>
<tr>
<th>Habitat Parameter</th>
<th>Optimal</th>
<th>Suboptimal</th>
<th>Marginal</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Habitat Components</td>
<td>Four or more major productive habitats present (snags, tree roots, aquatic vegetation, leaf packs, partially decaying, root)</td>
<td>Three major productive habitats present. Adequate habitat. Some substrates may be near fall (rough leaves or snags)</td>
<td>Two major productive habitats present. Less than desirable habitat, frequently disturbed or not at all harvest</td>
<td>One or less major productive habitat. Lack of habitat is obvious, substrate unstable or unfavorable</td>
</tr>
<tr>
<td>Substrate Diversity</td>
<td>Greater than 30% major productive habitat present at site</td>
<td>19% to 30% major productive habitat, by area extent</td>
<td>5% to 15% major productive habitat</td>
<td>Less than 5% major productive habitat</td>
</tr>
<tr>
<td>Substrate Availability</td>
<td>20 19 18 17 15</td>
<td>14 13 12 11</td>
<td>9 8 7 6</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Water Velocity</td>
<td>Max. observed at vertical transect: &gt; 0.25 m/sec. But &lt; 1 m/sec: 0.33 0.31 0.29 0.27 &gt; 0.25</td>
<td>Max. observed at vertical transect: 0.1 to 0.25 m/sec: 0.32 0.31 0.27 0.25 &gt; 0.25</td>
<td>Max. observed at vertical transect: 0.05 to 0.1 m/sec: 0.01</td>
<td>Max. observed at vertical transect: &lt; 0.05 m/sec or staple occurring: &gt; 1 m/sec: 0.00 0.00 0.00 0.00 0.00</td>
</tr>
<tr>
<td>Habitat Smoothening</td>
<td>Adequate number of stable pools (1-2 per 12 times width) and &lt;25% of habitats affected by sand, silt, or silt-like sediment</td>
<td>Adequate number of stable pools (1-2 per 12 times width) and &gt;25% of habitats affected by sand, silt, or silt-like sediment</td>
<td>Does not have required number of stable pools (1-2 per 12 x width) and/or has shallow pools (&lt;2 x prevailing depth).</td>
<td>Stable pools are absent. Most habitats affected by sand, silt, or silt-like sediment</td>
</tr>
<tr>
<td>Primary Score</td>
<td>20 19 18 17 15</td>
<td>14 13 12 11</td>
<td>9 8 7 6</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Secondary Habitat Components</td>
<td>Expected stream flow given the stream width. No evidence of artificial or natural stream channeling. No spill banks.</td>
<td>Good stream flow within channelized area. Evidence of stream channeling in the past (&gt;25 yrs) but mostly recovered.</td>
<td>Straightened with trap-all cross section, but has a small degree of stream flow within channelized area.</td>
<td>Straightened or engineered by channeling; has trap-all or box cross section, lacks required pools. May have spill banks.</td>
</tr>
<tr>
<td>Artificial Channelization</td>
<td>20 19 18 17 15</td>
<td>14 13 12 11</td>
<td>9 8 7 6</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Bank Stability Right Bank Left Bank</td>
<td>Bankfull &gt; 60% of bank height. Slope of bank &lt; 60° from bankfull to top of bank. Bankfull line within or above the root zone with few raw, eroded areas.</td>
<td>Only meets 2 of the 3 requirements for optimal bank stability.</td>
<td>Only meets 1 of the 5 requirements for optimal bank stability.</td>
<td>Bankfull &lt; 60% of bank height. Slope of bank &gt; 60°. Bankfull line below the top of bank.</td>
</tr>
<tr>
<td>Riparian Buffer Zone Width Right Bank Left Bank</td>
<td>Width of vegetation greater than 18 m.</td>
<td>Width of vegetation &gt; 12 to 18 m.</td>
<td>Width of vegetation &gt; 12 to 18 m.</td>
<td>Less than 18 m. of buffer zone due to intensive human activities</td>
</tr>
<tr>
<td>Riparian Buffer Zone Vegetation Quality Right Bank Left Bank</td>
<td>8 7 6</td>
<td>8 7 6</td>
<td>8 7 6</td>
<td>8 7 6</td>
</tr>
<tr>
<td>Secondary Score</td>
<td>10 9</td>
<td>8 7 6</td>
<td>5 4</td>
<td>3 2 1</td>
</tr>
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</table>
Overview of Habitat Sketch

✓ Measure out 100m along the stream.
✓ Mark every 10m with flagging tape, making observations as you go.
✓ Begin downstream (0m).
✓ Draw shape of stream channel.
✓ Draw location and type of each habitat.
✓ Show areas of bank instability.
✓ Note number and location of pools.
✓ Note areas of sand, silt, & algae smothering.
✓ Note where riparian zone is <18m (roads, paths, clearings, exotic vegetation).
1. Substrate Diversity

- **Number** of different productive habitats: snags, roots, leaves, aquatic vegetation, rock.
- **Minimum amount** to be “major” = 2 m^2 (otherwise a “minor” habitat)
- **Factor in quality** by scoring within the category chosen above.

<table>
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<tr>
<th>Habitat Parameter</th>
<th>Optimal</th>
<th>Suboptimal</th>
<th>Marginal</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Habitat Components</td>
<td>Four or more major productive habitats present [snags, tree roots, aquatic vegetation, leaf packs (partially decayed), rock]</td>
<td>Three major productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags)</td>
<td>Two major productive habitats present. Less than desirable habitat, frequently disturbed or removed</td>
<td>One or less major productive habitat. Lack of habitat is obvious, substrates unstable or smothered</td>
</tr>
<tr>
<td>Substrate Diversity</td>
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Good Snags

✓ In the flow
✓ Larger than thumb diameter
✓ Have lots of crevices for bugs to hide, peeling bark
Poor Snag (sand-smothered)
Good Roots

✓ In the flow
✓ Fine & fibrous (less than thumb width)
✓ Individual fibers visible (not smothered)
Poor Roots
Larger than thumb or heavily smothered
Not in the water
Good Leaf Packs

- In the flow
- Partially decayed

Good Leaf Mats

- In the flow
- Partially decayed
- Not smothered
- Sample the aerobic portion (top 2cm)
Poor Leaf Packs

- Fresh leaves
- Pine & cypress needles

Poor Leaf Mats

- Silt-smothered
- Anaerobic
Good Aquatic Vegetation

- In the flow
- In contact with the water
- Structurally complex
Poor vegetation

- Out of the water
- Submersed terrestrial vegetation
Good Rock

- In the flow
- >5cm diameter
- Rough texture

Poor Rock

- Smooth
- Pebble-sized
- Clay
- Asphalt
2. Substrate Availability

✓ Only good quality habitat should be included in the mapping and scoring process
✓ Score is based on the sum of the percentages of productive habitats
✓ **Minimum of 2m²** for each habitat type to be a major habitat
✓ Count the number of blocks for a given habitat type and divide it by the total number of blocks within the stream sketch

<table>
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<tr>
<th>Substrate Availability</th>
<th>Greater than 30% major productive habitat present at site</th>
<th>16% to 30% major productive habitat, by aerial extent</th>
<th>8% to 15% major productive habitat</th>
<th>Less than 5% major productive habitat</th>
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<tr>
<td></td>
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3. Water Velocity

✓ Score based on the velocity at a typical cross section of stream
✓ Avoid areas immediately before or after snags and pools
✓ If too low: dissolved oxygen, food availability, and recruitment are reduced
✓ If too high: catastrophic drift, scouring of habitats

<table>
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<tr>
<th>Water Velocity</th>
<th>Max. observed at typical transect: &gt;0.25 m/sec. But &lt;1 m/sec</th>
<th>Max. observed at typical transect: &gt;0.1 to 0.25 m/sec</th>
<th>Max. observed at typical transect: 0.05 to 0.1 m/sec</th>
<th>Max. observed at typical transect: &lt;0.05 m/sec; or spate occurring: &gt;1 m/sec</th>
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<tr>
<td></td>
<td>≥0.33 0.31 0.29 0.27 &gt;0.25</td>
<td>0.25 0.21 0.17 0.13 &gt;0.1</td>
<td>0.1 0.09 0.07 0.06 0.05</td>
<td>&lt;0.05 0.04 0.03 0.01 &lt;0.01</td>
</tr>
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4. Habitat Smothering

- Evaluates excess sand, silt, and algae on habitats (light covering is expected)
- Look for the presence of pools

Pool = twice the prevailing depth; 1-2 pools for every 12 times stream width (e.g., a 4 m wide stream should have 1-2 pools per 48 m or 2-4 per 100 m).

<table>
<thead>
<tr>
<th>Pool</th>
<th>Prevailing Depth</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Pools Present</th>
<th>Minimal</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate number of stable pools (1-2 per 12 times width) and &lt;25% of habitats affected by sand, silt, or algae.</td>
<td>Does not have required number of stable pools (1-2 per 12 x width) and/or has shallow pools (&lt;2 x prevailing depth).</td>
<td>Stable pools are absent. Most habitats affected by sand, silt, or algae accumulation.</td>
</tr>
<tr>
<td>20</td>
<td>19</td>
<td>18</td>
</tr>
</tbody>
</table>
Types of Smothering

Sand

Algae

Silt
5. Artificial Channelization

✓ A measure of large-scale changes in the shape of the stream channel
✓ Straightened, deepened, down-cut
✓ Presence of spoil banks

<table>
<thead>
<tr>
<th>Secondary Habitat Components</th>
<th>Artificial Channelization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected sinuosity given the stream width. No evidence of dredging or artificial straightening. No spoil banks.</td>
<td>20 19 18 17 16</td>
</tr>
<tr>
<td>Good sinuosity within old channelized area. Evidence of dredging in the past (&gt;25 yrs) but mostly recovered.</td>
<td>15 14 13 12 11</td>
</tr>
<tr>
<td>Straightened with trapezoidal cross section, but has a small degree of sinuosity developed within channelized area.</td>
<td>10 9 8 7 6</td>
</tr>
<tr>
<td>Straightened or engineered by dredging, has trapezoidal or box cut cross section, lacks required pools. May have spoil banks.</td>
<td>5 4 3 2 1</td>
</tr>
</tbody>
</table>
Optimal Sinuosity

- No artificial straightening
- A diversity of depths
- No evidence of dredging
- No spoil banks

Erosion, transport, and deposition always occurring
- Outer banks erode
- Inner banks deposit
Artificial Channelization

Poor sinuosity

- Spoil banks
- Box-cut, monotypic depth
- Straightened

Secondary Component

Spoil Bank
6. Bank Stability

- Steep, unvegetated banks will erode and collapse (unstable).
- Gently sloping banks, with woody vegetation or limestone, are most stable.
- Evaluate banks on height, slope, armoring compared to bankfull level.

<table>
<thead>
<tr>
<th>Bank Stability</th>
<th>Bankfull &gt; 60% of bank height. Slope of bank ≤ 60°. Bankfull is within or above the root zone with few raw, eroded areas.</th>
<th>Only meets 2 of the 3 requirements for optimal bank stability.</th>
<th>Only meets 1 of the 3 requirements for optimal bank stability.</th>
<th>Bankfull &lt; 60% of bank height. Slope of bank &gt; 60°. Bankfull is below the root zone with raw, eroded areas.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Bank</td>
<td>10 9</td>
<td>8 7 6</td>
<td>5 4</td>
<td>3 2 1</td>
</tr>
<tr>
<td>Left Bank</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>
Determining Bankfull Level

- In natural systems, it is the water level where channel maintenance is most effective.
- It is also the “ordinary high water level”.

![Diagram showing bankfull level in a channel with labels for hydrologic floodplain, bankfull width, bankfull depth, and bankfull elevation.](image)
Bank Height

Determine bankfull, relative to bank height

- If bankfull is > 60% of bank height = +
- If bankfull is < 60% of bank height = −
Secondary Component

Bank Slope

Determine bankfull, relative to bank slope

- Bank angle is $\leq 60^\circ = +$
- Bank angle is $> 60^\circ = -$
Bank Armoring

Determine bankfull, relative to bank armoring

• Woody root zone covers >60% of bank; few raw, eroded areas = +

• Woody root zone cover <60% of bank; large raw, eroded areas = -
Stable Banks

- Bankfull > 60% bank height
- Bank slope < 60°
- Good woody root armoring
Unstable Banks

- Bank full <60% of slope
- Bank slope >60°
- Raw, eroded areas, not well armored
7. Riparian Buffer Zone Width

✓ Measured from the edge of the stream bank to where clearing or other adverse human activities begin.

✓ A vegetated buffer zone of greater than 18 m (approximately 60 feet) is currently considered optimal.

<table>
<thead>
<tr>
<th>Riparian Buffer Zone Width</th>
<th>Width of vegetation greater than 18 m</th>
<th>Width of vegetation &gt;12 to 18 m</th>
<th>Width of vegetation 5 to 12 m</th>
<th>Less than 6 m of buffer zone due to intensive human activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Bank</td>
<td>10 9</td>
<td>8 7 6</td>
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<td>Left Bank</td>
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</table>
Good Buffer Width

>18m natural expected vegetation
Poor Buffer Width

<6m expected vegetation
8. Riparian Zone Vegetation Quality

- Be familiar with native plant communities in the area where you are sampling
- Be familiar with exotic plant species in the area
- Based on how closely the plant community at the site approaches that expected of an undisturbed community in the region
- A typical optimal riparian zone typically has an understory, mid-story, and over-story of native plant species

| Riparian Zone Vegetation Quality | Right Bank _____ | Left Bank _____ | Secondary Score ______ | Over 80% of riparian surfaces consist of normal, expected plant community for given sunlight & habitat conditions (e.g., native plants; tree, shrub, and forbs represented, if appropriate). Minimal disturbance. | >50% to 80% of riparian zone is undisturbed (normal, expected plant community for given sunlight & habitat conditions). Some disruption in community observed. | 25% to 50% of riparian zone is undisturbed (normal, expected plant community for given sunlight & habitat conditions). Disruption obvious. | Less than 25% of riparian zone is undisturbed (normal, expected plant community for given sunlight & habitat conditions). | 10 9 | 8 7 6 | 5 4 | 3 2 1 |
Poor Riparian Vegetation

Wild taro (*Colocasia esculenta*)

Coral ardisia (*Ardisia crenata*)

Cogon grass (*Imperata cylindrica*)
Summary of Steps

Measure: Measure 100m segment.

Flag: Flag every 10m.

Begin: Begin downstream and sketch key features needed for establishing a score for each component of the habitat assessment.

Complete and Check: Add the primary and secondary scores into a Total Score. Does the total score make sense in terms of placing the site in the Poor, Marginal, Suboptimal, or Optimal category?