







NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706, Falling Creek</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/12/2018</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>NCDOT</u></td> <td>4. Assessor name/organization: <u>A.Keith/Axiom</u></td> </tr> <tr> <td>5. County: <u>Rockingham</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek-east</u></td> </tr> <tr> <td>7. River basin: <u>Yadkin-PeeDee</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.938082 -79.753796</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>Falling Creek</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>100</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>2-5</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. 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Estimated geomorphic valley shape (skip for Tidal Marsh Stream):</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%; vertical-align: top;"> <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) </td> <td style="width:50%; vertical-align: top;"> <input type="checkbox"/> B  (less sinuous stream, steeper valley slope) </td> </tr> </table> <p>17. Watershed size: (skip for Tidal Marsh Stream)</p> <p><input type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input checked="" type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.</p> <p>List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706, Falling Creek</u>	2. Date of evaluation: <u>7/12/2018</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>A.Keith/Axiom</u>	5. County: <u>Rockingham</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek-east</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.938082 -79.753796</u>		9. Site number (show on attached map): <u>Falling Creek</u>	10. Length of assessment reach evaluated (feet): <u>100</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>2-5</u> <input type="checkbox"/> Unable to assess channel depth.		12. Channel width at top of bank (feet): <u>10-20</u> 13. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | | | |
|---------------------------------------|---------------------------------------|---|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: _____ (explain in “Notes/Sketch” section)
- J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

- Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

- 10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- | | | |
|---|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

- 11a. Yes No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- A Riffle-run section **(evaluate 11c)**
- B Pool-glide section **(evaluate 11d)**
- C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams).** Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

- | | | | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------------------|
| NP | R | C | A | P | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cobble (64 – 256 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Sand (.062 – 2 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Artificial (rip-rap, concrete, etc.) |

- 11d. Yes No Are pools filled with sediment? **(skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Portion of Falling Creek below Hinson Lake and below beaver impoundment. East side of Long Drive.



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706,Falling Creek Date of Assessment 7/12/2018
 Stream Category Ia4 Assessor Name/Organization A.Keith/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	MEDIUM	
(3) Stream Stability	HIGH	
(4) Channel Stability	HIGH	
(4) Sediment Transport	NA	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	MEDIUM	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	MEDIUM	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	HIGH	
(3) Baseflow	HIGH	
(3) Substrate	NA	
(3) Stream Stability	HIGH	
(3) In-stream Habitat	MEDIUM	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	MEDIUM	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	HIGH	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:		
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p>			
1. Project name (if any):	<u>U-5706 Falling Creek west</u>	2. Date of evaluation:	<u>7/12/2018</u>
3. Applicant/owner name:	<u>NCDOT</u>	4. Assessor name/organization:	<u>A.Keith/Axiom</u>
5. County:	<u>Rockingham</u>	6. Nearest named water body on USGS 7.5-minute quad:	<u>Falling Creek</u>
7. River basin:	<u>Yadkin-PeeDee</u>	8. Site coordinates (decimal degrees, at lower end of assessment reach):	<u>34.938082 -79.753796</u>
<p>STREAM INFORMATION: (depth and width can be approximations)</p>			
9. Site number (show on attached map):	<u>Falling Creek-west</u>	10. Length of assessment reach evaluated (feet):	<u>100</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	<u>2-5</u>	<input type="checkbox"/> Unable to assess channel depth.	
12. Channel width at top of bank (feet):	<u>10-20</u>	13. Is assessment reach a swamp steam?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type:	<input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		
<p>STREAM CATEGORY INFORMATION:</p>			
15. NC SAM Zone:	<input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)		
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) </div> <div style="text-align: center;"> <input type="checkbox"/> B  (less sinuous stream, steeper valley slope) </div> </div>		
17. Watershed size: (skip for Tidal Marsh Stream)	<input type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input checked="" type="checkbox"/> Size 4 (≥ 5 mi ²)		
<p>ADDITIONAL INFORMATION:</p>			
<p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <input type="checkbox"/> Section 10 water <input type="checkbox"/> Essential Fish Habitat <input type="checkbox"/> Publicly owned property <input type="checkbox"/> Anadromous fish <input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____ <input type="checkbox"/> Designated Critical Habitat (list species) _____ </div> <div style="width: 30%;"> <input type="checkbox"/> Classified Trout Waters <input type="checkbox"/> Primary Nursery Area <input type="checkbox"/> NCDWR Riparian buffer rule in effect <input type="checkbox"/> 303(d) List </div> <div style="width: 30%;"> <input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V) <input type="checkbox"/> High Quality Waters/Outstanding Resource Waters <input type="checkbox"/> Nutrient Sensitive Waters <input type="checkbox"/> CAMA Area of Environmental Concern (AEC) </div> </div>			
<p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>			

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone
I Other: (explain in "Notes/Sketch" section)
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of habitat types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Portion of Falling Creek below Hinson Lake and below beaver impoundment. West side of Long Drive. This section of Falling Creek has development on left and right bank.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706,Falling Creek-west Date of Assessment 7/12/2018
 Stream Category Ia4 Assessor Name/Organization A.Keith/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	HIGH	
(2) Flood Flow	LOW	
(3) Streamside Area Attenuation	LOW	
(4) Floodplain Access	MEDIUM	
(4) Wooded Riparian Buffer	LOW	
(4) Microtopography	LOW	
(3) Stream Stability	MEDIUM	
(4) Channel Stability	MEDIUM	
(4) Sediment Transport	NA	
(4) Stream Geomorphology	MEDIUM	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	MEDIUM	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	LOW	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	MEDIUM	
(3) Baseflow	HIGH	
(3) Substrate	NA	
(3) Stream Stability	MEDIUM	
(3) In-stream Habitat	MEDIUM	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	LOW	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	LOW	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706, Stream SA</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/12/2018</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>NCDOT</u></td> <td>4. Assessor name/organization: <u>A.Keith/Axiom</u></td> </tr> <tr> <td>5. County: <u>Rockingham</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u></td> </tr> <tr> <td>7. River basin: <u>Yadkin-PeeDee</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.930911 -79.727539</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>Stream SA</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>100</u></td> </tr> <tr> <td>11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1-2</u></td> <td><input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td>12. Channel width at top of bank (feet): <u>2-4</u></td> <td>13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%; vertical-align: top;"> <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) </td> <td style="width:50%; vertical-align: top;"> <input type="checkbox"/> B  (less sinuous stream, steeper valley slope) </td> </tr> </table> <p>17. 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List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706, Stream SA</u>	2. Date of evaluation: <u>7/12/2018</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>A.Keith/Axiom</u>	5. County: <u>Rockingham</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.930911 -79.727539</u>		9. Site number (show on attached map): <u>Stream SA</u>	10. Length of assessment reach evaluated (feet): <u>100</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1-2</u>	<input type="checkbox"/> Unable to assess channel depth.	12. 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1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[A] [A] Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
[C] [C] Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
[I] Other: (explain in "Notes/Sketch" section)
[J] Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[C] No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[Yes] [X]No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. [Yes] [No] Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[E] Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

Check for Tidal Marsh Streams Only

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. [X]Yes [No] Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [X]A Riffle-run section (evaluate 11c)
[X]B Pool-glide section (evaluate 11d)
[C] Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of substrate types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. [X]Yes [No] Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Intermittent channel within forested crenulation draining to Falling Creek. Shallow channel with inconsistent bed and bank. Ordinary high water mark present.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706, Stream SA Date of Assessment 7/12/2018
 Stream Category Ia2 Assessor Name/Organization A.Keith/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	LOW	
(2) Flood Flow	LOW	
(3) Streamside Area Attenuation	LOW	
(4) Floodplain Access	LOW	
(4) Wooded Riparian Buffer	LOW	
(4) Microtopography	LOW	
(3) Stream Stability	LOW	
(4) Channel Stability	LOW	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	LOW	
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	LOW	
(2) Baseflow	LOW	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	MEDIUM	
(3) Thermoregulation	MEDIUM	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	LOW	
(2) In-stream Habitat	LOW	
(3) Baseflow	LOW	
(3) Substrate	HIGH	
(3) Stream Stability	LOW	
(3) In-stream Habitat	LOW	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	LOW	
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	LOW	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706, Stream SB</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/12/2018</u></td> </tr> <tr> <td>3. 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Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706, Stream SB</u>	2. Date of evaluation: <u>7/12/2018</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>A.Keith/Axiom</u>	5. County: <u>Rockingham</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.940532 -79.727356</u>		9. Site number (show on attached map): <u>Stream SB</u>	10. Length of assessment reach evaluated (feet): <u>100</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1-2</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[A] [A] Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
[C] [C] Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone
[I] Other:
[J] Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[C] No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[Yes] [No] Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. [Yes] [No] Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[E] Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. [Yes] [No] Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [A] Riffle-run section (evaluate 11c)
[B] Pool-glide section (evaluate 11d)
[C] Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of substrate types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. [Yes] [No] Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to “individuals” for Size 1 and 2 streams and “taxa” for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider “leaf-on” condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Channelized feature forming below drainage patterns. Origin at headcut where bed and bank become more naturalized and ordinary high water mark present.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706, Stream SB Date of Assessment 7/12/2018
 Stream Category Ia2 Assessor Name/Organization A.Keith/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	MEDIUM	MEDIUM
(2) Baseflow	HIGH	HIGH
(2) Flood Flow	MEDIUM	MEDIUM
(3) Streamside Area Attenuation	HIGH	HIGH
(4) Floodplain Access	HIGH	HIGH
(4) Wooded Riparian Buffer	HIGH	HIGH
(4) Microtopography	LOW	LOW
(3) Stream Stability	LOW	LOW
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	LOW	LOW
(4) Stream Geomorphology	LOW	LOW
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	HIGH	HIGH
(2) Baseflow	HIGH	HIGH
(2) Streamside Area Vegetation	HIGH	HIGH
(3) Upland Pollutant Filtration	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	OMITTED	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	LOW	LOW
(2) In-stream Habitat	LOW	LOW
(3) Baseflow	HIGH	HIGH
(3) Substrate	MEDIUM	MEDIUM
(3) Stream Stability	MEDIUM	MEDIUM
(3) In-stream Habitat	LOW	LOW
(2) Stream-side Habitat	HIGH	HIGH
(3) Stream-side Habitat	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	MEDIUM	MEDIUM

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706, Stream SC</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/12/2018</u></td> </tr> <tr> <td>3. 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1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone
I Other:
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of habitat types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Stream receiving accelerated runoff from US Hwy 1 and Mt. Olive Church Road.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	<u>U-5706, Stream SC</u>	Date of Assessment	<u>7/12/2018</u>
Stream Category	<u>Ia1</u>	Assessor Name/Organization	<u>A.Keith/Axiom</u>

Notes of Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>NO</u>
Additional stream information/supplementary measurements included (Y/N)	<u>YES</u>
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	<u>Intermittent</u>

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	HIGH
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	HIGH	HIGH
(3) Streamside Area Attenuation	HIGH	HIGH
(4) Floodplain Access	MEDIUM	MEDIUM
(4) Wooded Riparian Buffer	HIGH	HIGH
(4) Microtopography	HIGH	HIGH
(3) Stream Stability	MEDIUM	MEDIUM
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	LOW	LOW
(4) Stream Geomorphology	MEDIUM	MEDIUM
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	MEDIUM	MEDIUM
(2) Baseflow	MEDIUM	MEDIUM
(2) Streamside Area Vegetation	HIGH	HIGH
(3) Upland Pollutant Filtration	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	MEDIUM	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	HIGH	HIGH
(2) In-stream Habitat	MEDIUM	HIGH
(3) Baseflow	MEDIUM	MEDIUM
(3) Substrate	HIGH	HIGH
(3) Stream Stability	HIGH	HIGH
(3) In-stream Habitat	LOW	HIGH
(2) Stream-side Habitat	HIGH	HIGH
(3) Stream-side Habitat	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	HIGH	HIGH

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706, Stream SD</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/12/2018</u></td> </tr> <tr> <td>3. 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Watershed size: (skip for Tidal Marsh Stream)</p> <p><input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706, Stream SD</u>	2. Date of evaluation: <u>7/12/2018</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>A.Keith/Axiom</u>	5. County: <u>Rockingham</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Hinson Lake</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.952126, -79.733021</u>		9. Site number (show on attached map): <u>Stream SD</u>	10. Length of assessment reach evaluated (feet): <u>50</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>0-1</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

- Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
- A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | | | |
|---------------------------------------|---------------------------------------|---|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: _____ (explain in “Notes/Sketch” section)
- J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- | | | |
|---|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

- | | | | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cobble (64 – 256 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Sand (.062 – 2 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Artificial (rip-rap, concrete, etc.) |

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Intermittent channel below steep fill from US Hwy 1 which cuts across valley. Stream receiving roadside runoff. No culvert found.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706, Stream SD Date of Assessment 7/12/2018
 Stream Category Ia1 Assessor Name/Organization A.Keith/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	HIGH
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	HIGH	HIGH
(3) Streamside Area Attenuation	HIGH	HIGH
(4) Floodplain Access	HIGH	HIGH
(4) Wooded Riparian Buffer	HIGH	HIGH
(4) Microtopography	HIGH	HIGH
(3) Stream Stability	HIGH	HIGH
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	HIGH	HIGH
(4) Stream Geomorphology	HIGH	HIGH
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	MEDIUM	MEDIUM
(2) Baseflow	MEDIUM	MEDIUM
(2) Streamside Area Vegetation	HIGH	HIGH
(3) Upland Pollutant Filtration	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	HIGH	HIGH
(2) In-stream Habitat	MEDIUM	HIGH
(3) Baseflow	MEDIUM	MEDIUM
(3) Substrate	HIGH	HIGH
(3) Stream Stability	HIGH	HIGH
(3) In-stream Habitat	LOW	HIGH
(2) Stream-side Habitat	HIGH	HIGH
(3) Stream-side Habitat	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	HIGH	HIGH

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706- Stream SE</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/12/2018</u></td> </tr> <tr> <td>3. 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Watershed size: (skip for Tidal Marsh Stream)</p> <p><input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706- Stream SE</u>	2. Date of evaluation: <u>7/12/2018</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>A.Keith/Axiom</u>	5. County: <u>Rockingham</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.939022, -79.725261</u>		9. Site number (show on attached map): <u>Stream SE</u>	10. Length of assessment reach evaluated (feet): <u>50</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1-3</u>	<input type="checkbox"/> Unable to assess channel depth.	12. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | | | |
|---------------------------------------|---------------------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: _____ (explain in “Notes/Sketch” section)
- J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- | | | |
|---|------------------------------------|---|
| <input checked="" type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

- | | | | | | |
|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cobble (64 – 256 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Sand (.062 – 2 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Artificial (rip-rap, concrete, etc.) |

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to “individuals” for Size 1 and 2 streams and “taxa” for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider “leaf-on” condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Stream flows from forest into a maintained clear-cut powerline easement. No wooded buffer or canopy present.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706- Stream SE Date of Assessment 7/12/2018
 Stream Category Ia1 Assessor Name/Organization A.Keith/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	MEDIUM	
(2) Flood Flow	LOW	
(3) Streamside Area Attenuation	LOW	
(4) Floodplain Access	MEDIUM	
(4) Wooded Riparian Buffer	LOW	
(4) Microtopography	MEDIUM	
(3) Stream Stability	MEDIUM	
(4) Channel Stability	HIGH	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	LOW	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	MEDIUM	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	LOW	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	LOW	
(3) Baseflow	MEDIUM	
(3) Substrate	LOW	
(3) Stream Stability	MEDIUM	
(3) In-stream Habitat	MEDIUM	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	LOW	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	LOW	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706, Stream SF</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/12/2018</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>NCDOT</u></td> <td>4. Assessor name/organization: <u>A.Keith/Axiom</u></td> </tr> <tr> <td>5. County: <u>Rockingham</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Terry's Pond</u></td> </tr> <tr> <td>7. River basin: <u>Yadkin-PeeDee</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.957567, -79.732787</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>Stream SF</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>50</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>0-2</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>1-3</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%; vertical-align: top;"> <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) </td> <td style="width:50%; vertical-align: top;"> <input type="checkbox"/> B  (less sinuous stream, steeper valley slope) </td> </tr> </table> <p>17. Watershed size: (skip for Tidal Marsh Stream)</p> <p><input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input checked="" type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706, Stream SF</u>	2. Date of evaluation: <u>7/12/2018</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>A.Keith/Axiom</u>	5. County: <u>Rockingham</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Terry's Pond</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.957567, -79.732787</u>		9. Site number (show on attached map): <u>Stream SF</u>	10. Length of assessment reach evaluated (feet): <u>50</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>0-2</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[A] [A] Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
[C] [C] Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone
[I] Other:
[J] Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[C] No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[Yes] [No] Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. [Yes] [No] Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[E] Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. [Yes] [No] Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [A] Riffle-run section (evaluate 11c)
[B] Pool-glide section (evaluate 11d)
[C] Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 6 rows of substrate types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. [Yes] [No] Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Intermittent stream originating in headwater forest- stream channel bed and bank inconsistent above origin.



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	<u>U-5706, Stream SF</u>	Date of Assessment	<u>7/12/2018</u>
Stream Category	<u>Ia1</u>	Assessor Name/Organization	<u>A.Keith/Axiom</u>

Notes of Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>NO</u>
Additional stream information/supplementary measurements included (Y/N)	<u>YES</u>
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	<u>Intermittent</u>

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	HIGH
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	HIGH	HIGH
(3) Streamside Area Attenuation	HIGH	HIGH
(4) Floodplain Access	HIGH	HIGH
(4) Wooded Riparian Buffer	HIGH	HIGH
(4) Microtopography	MEDIUM	MEDIUM
(3) Stream Stability	HIGH	HIGH
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	LOW	LOW
(4) Stream Geomorphology	HIGH	HIGH
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	MEDIUM	MEDIUM
(2) Baseflow	MEDIUM	MEDIUM
(2) Streamside Area Vegetation	HIGH	HIGH
(3) Upland Pollutant Filtration	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	HIGH	HIGH
(2) In-stream Habitat	MEDIUM	HIGH
(3) Baseflow	MEDIUM	MEDIUM
(3) Substrate	HIGH	HIGH
(3) Stream Stability	HIGH	HIGH
(3) In-stream Habitat	LOW	HIGH
(2) Stream-side Habitat	HIGH	HIGH
(3) Stream-side Habitat	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	HIGH	HIGH

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																														
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706 Stream SG</u></td> <td style="width:50%;">2. Date of evaluation: <u>190110</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>NCDOT</u></td> <td>4. Assessor name/organization: <u>A.Keith/Axiom</u></td> </tr> <tr> <td>5. County: <u>Rockingham</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u></td> </tr> <tr> <td colspan="2">7. River basin: <u>Yadkin-PeeDee</u></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.964274, -79.738322</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>Stream SG</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>50</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>0-1</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>1-3</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input type="checkbox"/> A  (more sinuous stream, flatter valley slope) </div> <div style="text-align: center;"> <input checked="" type="checkbox"/> B  (less sinuous stream, steeper valley slope) </div> </div> <p>17. Watershed size: (skip for Tidal Marsh Stream)</p> <p><input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706 Stream SG</u>	2. Date of evaluation: <u>190110</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>A.Keith/Axiom</u>	5. County: <u>Rockingham</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.964274, -79.738322</u>		9. Site number (show on attached map): <u>Stream SG</u>	10. Length of assessment reach evaluated (feet): <u>50</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>0-1</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
 B No flow, water in pools only.
 C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
 B 10 to 25% of channel unstable
 C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone
I Other: (explain in "Notes/Sketch" section)
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of habitat types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Intermittent stream originating at culvert(21.5 on SWIT form). Top of stream appears to be excavated. Low energy, abundant iron oxidizing bacteria and detritus making little habitat for benthics. Stream stream flows into wetland.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	<u>U-5706 Stream SG</u>	Date of Assessment	<u>190110</u>
Stream Category	<u>Ib1</u>	Assessor Name/Organization	<u>A.Keith/Axiom</u>

Notes of Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>NO</u>
Additional stream information/supplementary measurements included (Y/N)	<u>YES</u>
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	<u>Intermittent</u>

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	LOW
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	LOW	LOW
(3) Streamside Area Attenuation	MEDIUM	MEDIUM
(4) Floodplain Access	MEDIUM	MEDIUM
(4) Wooded Riparian Buffer	HIGH	HIGH
(4) Microtopography	NA	NA
(3) Stream Stability	LOW	LOW
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	LOW	LOW
(4) Stream Geomorphology	LOW	LOW
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	MEDIUM	MEDIUM
(2) Baseflow	MEDIUM	MEDIUM
(2) Streamside Area Vegetation	HIGH	HIGH
(3) Upland Pollutant Filtration	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	LOW	HIGH
(2) In-stream Habitat	LOW	HIGH
(3) Baseflow	MEDIUM	MEDIUM
(3) Substrate	MEDIUM	MEDIUM
(3) Stream Stability	MEDIUM	MEDIUM
(3) In-stream Habitat	LOW	HIGH
(2) Stream-side Habitat	HIGH	HIGH
(3) Stream-side Habitat	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	LOW	MEDIUM

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706- Stream SH</u></td> <td style="width:50%;">2. Date of evaluation: <u>180717</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>NCDOT</u></td> <td>4. Assessor name/organization: <u>Perkinson/Axiom</u></td> </tr> <tr> <td>5. County: <u>Richmond</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u></td> </tr> <tr> <td>7. River basin: <u>Yadkin-PeeDee</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.963017, -79.743343</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>Stream SH</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>150</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>8</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%; vertical-align: top;"> <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) </td> <td style="width:50%; vertical-align: top;"> <input type="checkbox"/> B  (less sinuous stream, steeper valley slope) </td> </tr> </table> <p>17. Watershed size: (skip for Tidal Marsh Stream)</p> <p><input type="checkbox"/> Size 1 (< 0.1 mi²) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706- Stream SH</u>	2. Date of evaluation: <u>180717</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>Perkinson/Axiom</u>	5. County: <u>Richmond</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.963017, -79.743343</u>		9. Site number (show on attached map): <u>Stream SH</u>	10. Length of assessment reach evaluated (feet): <u>150</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | | | |
|---------------------------------------|---------------------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: _____ (explain in “Notes/Sketch” section)
- J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

- Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- | | | |
|---|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- A Riffle-run section **(evaluate 11c)**
- B Pool-glide section **(evaluate 11d)**
- C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams).** Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

- | | | | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------------------|
| NP | R | C | A | P | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cobble (64 – 256 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sand (.062 – 2 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Artificial (rip-rap, concrete, etc.) |

11d. Yes No Are pools filled with sediment? **(skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Assessment completed on the north side of Richmond Road. South of road the stream is piped through part of the study area, the pipe is failing. On north/west side of the road the channel is incised. Mature trees growing from stream bank, beyond the few mature trees maintained yards abut stream. Stream is intrenched.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706- Stream SH Date of Assessment 180717
 Stream Category Ia2 Assessor Name/Organization Perkinson/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) NO
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	MEDIUM	
(2) Flood Flow	LOW	
(3) Streamside Area Attenuation	LOW	
(4) Floodplain Access	LOW	
(4) Wooded Riparian Buffer	LOW	
(4) Microtopography	LOW	
(3) Stream Stability	LOW	
(4) Channel Stability	HIGH	
(4) Sediment Transport	LOW	
(4) Stream Geomorphology	LOW	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	MEDIUM	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	LOW	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	LOW	
(3) Baseflow	MEDIUM	
(3) Substrate	MEDIUM	
(3) Stream Stability	MEDIUM	
(3) In-stream Habitat	LOW	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	MEDIUM	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	LOW	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706, Stream SI</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/12/2018</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>NCDOT</u></td> <td>4. Assessor name/organization: <u>A.Keith/Axiom</u></td> </tr> <tr> <td>5. County: <u>Rockingham</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u></td> </tr> <tr> <td>7. River basin: <u>Yadkin-PeeDee</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.961418, -79.744127</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>Stream SI</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>50</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4-7</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>4-8</u> 13. 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Watershed size: (skip for Tidal Marsh Stream)</p> <p><input type="checkbox"/> Size 1 (< 0.1 mi²) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706, Stream SI</u>	2. Date of evaluation: <u>7/12/2018</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>A.Keith/Axiom</u>	5. County: <u>Rockingham</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.961418, -79.744127</u>		9. Site number (show on attached map): <u>Stream SI</u>	10. Length of assessment reach evaluated (feet): <u>50</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4-7</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | | | |
|---------------------------------------|---------------------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: _____ (explain in “Notes/Sketch” section)
- J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- | | | |
|---|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bedrock/saprolite
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Boulder (256 – 4096 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cobble (64 – 256 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Gravel (2 – 64 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sand (.062 – 2 mm)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Silt/clay (< 0.062 mm)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Detritus
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

- Check all contributors within the assessment reach or within view of and draining to the assessment reach.**
- A Streams and/or springs (jurisdictional discharges)
 - B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
 - C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
 - D Evidence of bank seepage or sweating (iron in water indicates seepage)
 - E Stream bed or bank soil reduced (dig through deposited sediment if present)
 - F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

- Check all that apply.**
- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
 - B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
 - C Urban stream (≥ 24% impervious surface for watershed)
 - D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
 - E Assessment reach relocated to valley edge
 - F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

- Consider aspect. Consider "leaf-on" condition.
- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
 - B Degraded (example: scattered trees)
 - C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Urban stream flowing between two maintained residential yards. Incised with no streamside interaction.



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706, Stream SI Date of Assessment 7/12/2018
 Stream Category la2 Assessor Name/Organization A.Keith/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	LOW	
(2) Flood Flow	LOW	
(3) Streamside Area Attenuation	LOW	
(4) Floodplain Access	LOW	
(4) Wooded Riparian Buffer	LOW	
(4) Microtopography	LOW	
(3) Stream Stability	LOW	
(4) Channel Stability	LOW	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	LOW	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	LOW	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	MEDIUM	
(3) Thermoregulation	MEDIUM	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	LOW	
(3) Baseflow	LOW	
(3) Substrate	HIGH	
(3) Stream Stability	LOW	
(3) In-stream Habitat	LOW	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	LOW	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	LOW	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:		
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p>			
1. Project name (if any):	U-5706 Stream SJ	2. Date of evaluation:	7/12/2018
3. Applicant/owner name:	NCDOT	4. Assessor name/organization:	A.Keith/Axiom
5. County:	Rockingham	6. Nearest named water body on USGS 7.5-minute quad:	Hitchcock Creek
7. River basin:	Yadkin-PeeDee	8. Site coordinates (decimal degrees, at lower end of assessment reach):	34.958494, -79.748720
<p>STREAM INFORMATION: (depth and width can be approximations)</p>			
9. Site number (show on attached map):	Stream SJ	10. Length of assessment reach evaluated (feet):	50
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	1-2	<input type="checkbox"/> Unable to assess channel depth.	
12. Channel width at top of bank (feet):	1-4	13. Is assessment reach a swamp stream?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type:	<input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		
<p>STREAM CATEGORY INFORMATION:</p>			
15. NC SAM Zone:	<input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)		
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) </div> <div style="text-align: center;"> <input type="checkbox"/> B  (less sinuous stream, steeper valley slope) </div> </div>		
17. Watershed size: (skip for Tidal Marsh Stream)	<input checked="" type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)		
<p>ADDITIONAL INFORMATION:</p>			
<p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <input type="checkbox"/> Section 10 water <input type="checkbox"/> Essential Fish Habitat <input type="checkbox"/> Publicly owned property <input type="checkbox"/> Anadromous fish <input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: <input type="checkbox"/> Designated Critical Habitat (list species) </div> <div style="width: 30%;"> <input type="checkbox"/> Classified Trout Waters <input type="checkbox"/> Primary Nursery Area <input type="checkbox"/> NCDWR Riparian buffer rule in effect <input type="checkbox"/> 303(d) List </div> <div style="width: 30%;"> <input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V) <input type="checkbox"/> High Quality Waters/Outstanding Resource Waters <input type="checkbox"/> Nutrient Sensitive Waters <input type="checkbox"/> CAMA Area of Environmental Concern (AEC) </div> </div>			
<p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>			

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone
I Other:
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of substrate types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.
- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

- Check all contributors within the assessment reach or within view of and draining to the assessment reach.**
- A Streams and/or springs (jurisdictional discharges)
 - B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
 - C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
 - D Evidence of bank seepage or sweating (iron in water indicates seepage)
 - E Stream bed or bank soil reduced (dig through deposited sediment if present)
 - F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

- Check all that apply.**
- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
 - B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
 - C Urban stream (≥ 24% impervious surface for watershed)
 - D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
 - E Assessment reach relocated to valley edge
 - F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

- Consider aspect. Consider "leaf-on" condition.
- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
 - B Degraded (example: scattered trees)
 - C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input checked="" type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Intermittent stream that flows into wetland with maintain yard on the right bank. Large decaying animal carcass creating debris jam. Left bank comprised of invasive vegetation near road, with native wetland vegetation occurring downstream.



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706 Stream SJ Date of Assessment 7/12/2018
 Stream Category Ia1 Assessor Name/Organization A.Keith/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	MEDIUM	MEDIUM
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	MEDIUM	MEDIUM
(3) Streamside Area Attenuation	MEDIUM	MEDIUM
(4) Floodplain Access	MEDIUM	MEDIUM
(4) Wooded Riparian Buffer	MEDIUM	MEDIUM
(4) Microtopography	MEDIUM	MEDIUM
(3) Stream Stability	MEDIUM	MEDIUM
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	HIGH	HIGH
(4) Stream Geomorphology	LOW	LOW
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	LOW	LOW
(2) Baseflow	MEDIUM	MEDIUM
(2) Streamside Area Vegetation	HIGH	HIGH
(3) Upland Pollutant Filtration	HIGH	HIGH
(3) Thermoregulation	MEDIUM	MEDIUM
(2) Indicators of Stressors	YES	YES
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	MEDIUM	MEDIUM
(2) In-stream Habitat	MEDIUM	MEDIUM
(3) Baseflow	MEDIUM	MEDIUM
(3) Substrate	HIGH	HIGH
(3) Stream Stability	MEDIUM	MEDIUM
(3) In-stream Habitat	LOW	LOW
(2) Stream-side Habitat	MEDIUM	MEDIUM
(3) Stream-side Habitat	MEDIUM	MEDIUM
(3) Thermoregulation	MEDIUM	MEDIUM
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	MEDIUM	MEDIUM

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																														
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706- Stream SK</u></td> <td style="width:50%;">2. Date of evaluation: <u>180717</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>NCDOT</u></td> <td>4. Assessor name/organization: <u>Perkinson/Axiom</u></td> </tr> <tr> <td>5. County: <u>Richmond</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u></td> </tr> <tr> <td>7. River basin: <u>Yadkin-PeeDee</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.953309, -79.753081</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>SK</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>150</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1-2</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>8</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)</p> <p>17. Watershed size: (skip for Tidal Marsh Stream) <input type="checkbox"/> Size 1 (< 0.1 mi²) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706- Stream SK</u>	2. Date of evaluation: <u>180717</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>Perkinson/Axiom</u>	5. County: <u>Richmond</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.953309, -79.753081</u>		9. Site number (show on attached map): <u>SK</u>	10. Length of assessment reach evaluated (feet): <u>150</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1-2</u> <input type="checkbox"/> Unable to assess channel depth.		12. Channel width at top of bank (feet): <u>8</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		14. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | | | |
|---------------------------------------|---------------------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: _____ (explain in “Notes/Sketch” section)
- J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

- Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- | | | |
|---|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- A Riffle-run section **(evaluate 11c)**
- B Pool-glide section **(evaluate 11d)**
- C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams).** Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bedrock/saprolite
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Boulder (256 – 4096 mm)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cobble (64 – 256 mm)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gravel (2 – 64 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sand (.062 – 2 mm)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Silt/clay (< 0.062 mm)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Detritus
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? **(skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

- Check all contributors within the assessment reach or within view of and draining to the assessment reach.**
- A Streams and/or springs (jurisdictional discharges)
 - B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
 - C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
 - D Evidence of bank seepage or sweating (iron in water indicates seepage)
 - E Stream bed or bank soil reduced (dig through deposited sediment if present)
 - F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

- Check all that apply.**
- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
 - B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
 - C Urban stream (≥ 24% impervious surface for watershed)
 - D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
 - E Assessment reach relocated to valley edge
 - F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

- Consider aspect. Consider "leaf-on" condition.
- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
 - B Degraded (example: scattered trees)
 - C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Urban stream with lots of "wrack" and debris. NCSAM completed upstream of road crossing, downstream of culverted crossing stream bed drops several feet. Wetlands on either bank most likely culvert is partially blocked restricting storm events. Lots of rip rap detritus in channel. either side of the road is being regularly maintained.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706 -Stream SK Date of Assessment 180717
 Stream Category Ia2 Assessor Name/Organization Perkinson/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	LOW	
(2) Flood Flow	MEDIUM	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	LOW	
(3) Stream Stability	LOW	
(4) Channel Stability	MEDIUM	
(4) Sediment Transport	LOW	
(4) Stream Geomorphology	MEDIUM	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	LOW	
(2) Streamside Area Vegetation	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	LOW	
(3) Baseflow	LOW	
(3) Substrate	MEDIUM	
(3) Stream Stability	MEDIUM	
(3) In-stream Habitat	LOW	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	LOW	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706 Stream SL-int</u></td> <td style="width:50%;">2. Date of evaluation: <u>180717</u></td> </tr> <tr> <td>3. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone
I Other: (explain in "Notes/Sketch" section)
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of habitat types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Narrow stream originating outside project area and flowing through several regularly maintained residential yards....stream enters culvert in yard and daylighted from underneath a private shed a perennial stream







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	<u>U-5706 Stream SL-int</u>	Date of Assessment	<u>180717</u>
Stream Category	<u>la2</u>	Assessor Name/Organization	<u>Axiom/Perkinson</u>

Notes of Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>NO</u>
Additional stream information/supplementary measurements included (Y/N)	<u>YES</u>
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	<u>Intermittent</u>

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	LOW
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	LOW	LOW
(3) Streamside Area Attenuation	LOW	LOW
(4) Floodplain Access	LOW	LOW
(4) Wooded Riparian Buffer	LOW	LOW
(4) Microtopography	LOW	LOW
(3) Stream Stability	LOW	LOW
(4) Channel Stability	MEDIUM	MEDIUM
(4) Sediment Transport	LOW	LOW
(4) Stream Geomorphology	LOW	LOW
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	LOW	LOW
(2) Baseflow	MEDIUM	MEDIUM
(2) Streamside Area Vegetation	MEDIUM	MEDIUM
(3) Upland Pollutant Filtration	HIGH	HIGH
(3) Thermoregulation	LOW	LOW
(2) Indicators of Stressors	YES	YES
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	LOW	LOW
(2) In-stream Habitat	LOW	LOW
(3) Baseflow	MEDIUM	MEDIUM
(3) Substrate	MEDIUM	MEDIUM
(3) Stream Stability	MEDIUM	MEDIUM
(3) In-stream Habitat	LOW	LOW
(2) Stream-side Habitat	LOW	LOW
(3) Stream-side Habitat	LOW	LOW
(3) Thermoregulation	LOW	LOW
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	LOW	LOW

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706- Stream SL (perennial)</u></td> <td style="width:50%;">2. Date of evaluation: <u>180717</u></td> </tr> <tr> <td>3. 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List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706- Stream SL (perennial)</u>	2. Date of evaluation: <u>180717</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>Axiom/Perkinson</u>	5. County: <u>Richmond</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.951273, -79.755373</u>		9. Site number (show on attached map): <u>SL</u>	10. Length of assessment reach evaluated (feet): <u>150</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | | | |
|---------------------------------------|---------------------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: _____ (explain in “Notes/Sketch” section)
- J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

- Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- | | | |
|---|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input checked="" type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

- | | | | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------------------|
| NP | R | C | A | P | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cobble (64 – 256 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sand (.062 – 2 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Artificial (rip-rap, concrete, etc.) |

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Stream side area recently clear cut, no woody vegetation. Evidence that herbicide applications have been based on observations of dead ligustrum, watershed is urban, draining a large residential area. Perennial origin was unable to be located, no rain in several days, strong baseflow.



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706 Stream SL (perennial) Date of Assessment 180717
 Stream Category Ia2 Assessor Name/Organization Axiom/Perkinson

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) _____
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	MEDIUM	
(2) Flood Flow	LOW	
(3) Streamside Area Attenuation	LOW	
(4) Floodplain Access	LOW	
(4) Wooded Riparian Buffer	LOW	
(4) Microtopography	LOW	
(3) Stream Stability	LOW	
(4) Channel Stability	MEDIUM	
(4) Sediment Transport	LOW	
(4) Stream Geomorphology	LOW	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	MEDIUM	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	LOW	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	LOW	
(3) Baseflow	MEDIUM	
(3) Substrate	MEDIUM	
(3) Stream Stability	MEDIUM	
(3) In-stream Habitat	LOW	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	LOW	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	LOW	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																														
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706 Stream SM</u></td> <td style="width:50%;">2. Date of evaluation: <u>180717</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>NCDOT</u></td> <td>4. Assessor name/organization: <u>Axiom/Perkinson</u></td> </tr> <tr> <td>5. County: <u>Richmond</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u></td> </tr> <tr> <td>7. River basin: <u>Yadkin-PeeDee</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.951482 -79.755150</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>SM</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>150</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>5</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)</p> <p>17. Watershed size: (skip for Tidal Marsh Stream) <input type="checkbox"/> Size 1 (< 0.1 mi²) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706 Stream SM</u>	2. Date of evaluation: <u>180717</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>Axiom/Perkinson</u>	5. County: <u>Richmond</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Hitchcock Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.951482 -79.755150</u>		9. Site number (show on attached map): <u>SM</u>	10. Length of assessment reach evaluated (feet): <u>150</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.

2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A

3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A

4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A

5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
I Other: (explain in "Notes/Sketch" section)
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of substrate types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Adjacent to Stream SL. Stream side area recently clear cut, no woody vegetation. Evidence that herbicide applications have been based on observations of dead ligustrum, watershed is urban, draining a large residential area. Perennial origin was unable to be located, no rain in several days, strong baseflow.



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706 Stream SM Date of Assessment 180717
 Stream Category Ia2 Assessor Name/Organization Axiom/Perkinson

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	MEDIUM	
(2) Flood Flow	LOW	
(3) Streamside Area Attenuation	LOW	
(4) Floodplain Access	LOW	
(4) Wooded Riparian Buffer	LOW	
(4) Microtopography	LOW	
(3) Stream Stability	LOW	
(4) Channel Stability	HIGH	
(4) Sediment Transport	LOW	
(4) Stream Geomorphology	LOW	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	MEDIUM	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	LOW	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	LOW	
(3) Baseflow	MEDIUM	
(3) Substrate	MEDIUM	
(3) Stream Stability	MEDIUM	
(3) In-stream Habitat	LOW	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	LOW	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
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(2) Intertidal Zone	NA	
Overall	LOW	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

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Watershed size: (skip for Tidal Marsh Stream) <input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. 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List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706 Stream SN</u>	2. Date of evaluation: <u>1/10/2019</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>Axiom Smith/Radecki</u>	5. County: <u>Richmond</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.934901, -79.726055</u>		9. Site number (show on attached map): <u>Stream SN</u>	10. Length of assessment reach evaluated (feet): <u>100</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone
I Other:
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of habitat types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

- Check all contributors within the assessment reach or within view of and draining to the assessment reach.**
- A Streams and/or springs (jurisdictional discharges)
 - B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
 - C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
 - D Evidence of bank seepage or sweating (iron in water indicates seepage)
 - E Stream bed or bank soil reduced (dig through deposited sediment if present)
 - F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

- Check all that apply.**
- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
 - B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
 - C Urban stream (≥ 24% impervious surface for watershed)
 - D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
 - E Assessment reach relocated to valley edge
 - F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

- Consider aspect. Consider "leaf-on" condition.
- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
 - B Degraded (example: scattered trees)
 - C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Stream along side thin wooded strip in farm field.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706 Stream SN Date of Assessment 1/10/2019
 Stream Category Ia1 Assessor Name/Organization Axiom Smith/Radecki

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	LOW
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	LOW	LOW
(3) Streamside Area Attenuation	LOW	LOW
(4) Floodplain Access	LOW	LOW
(4) Wooded Riparian Buffer	MEDIUM	MEDIUM
(4) Microtopography	LOW	LOW
(3) Stream Stability	MEDIUM	MEDIUM
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	HIGH	HIGH
(4) Stream Geomorphology	LOW	LOW
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	LOW	LOW
(2) Baseflow	MEDIUM	MEDIUM
(2) Streamside Area Vegetation	LOW	LOW
(3) Upland Pollutant Filtration	MEDIUM	MEDIUM
(3) Thermoregulation	LOW	LOW
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	LOW	MEDIUM
(2) In-stream Habitat	MEDIUM	HIGH
(3) Baseflow	MEDIUM	MEDIUM
(3) Substrate	HIGH	HIGH
(3) Stream Stability	MEDIUM	MEDIUM
(3) In-stream Habitat	LOW	HIGH
(2) Stream-side Habitat	LOW	LOW
(3) Stream-side Habitat	LOW	LOW
(3) Thermoregulation	LOW	LOW
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	LOW	LOW

NC SAM FIELD ASSESSMENT RESULTS
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USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706 Stream SO</u></td> <td style="width:50%;">2. Date of evaluation: <u>190109</u></td> </tr> <tr> <td>3. 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Watershed size: (skip for Tidal Marsh Stream)</p> <p><input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706 Stream SO</u>	2. Date of evaluation: <u>190109</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>A.Keith/Axiom</u>	5. County: <u>Rockingham</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.940894, -79.729212</u>		9. Site number (show on attached map): <u>Stream SO</u>	10. Length of assessment reach evaluated (feet): <u>50</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1-2</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[A] [A] Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
[C] [C] Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
[I] Other: (explain in "Notes/Sketch" section)
[J] Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[C] No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[Yes] [No] Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. [Yes] [No] Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[E] Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. [Yes] [No] Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [A] Riffle-run section (evaluate 11c)
[B] Pool-glide section (evaluate 11d)
[C] Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of substrate types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. [Yes] [No] Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Intermittent stream channel within large wetland. Bed and bank frequently interrupted, spreading out into wetland and then reforming downstream. A large tree has fallen at the lower end of stream allowing sediment and debris build up--stream diverting around debris jam.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706 Stream SO Date of Assessment 190109
 Stream Category Ia1 Assessor Name/Organization A.Keith/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	HIGH
(2) Baseflow	HIGH	HIGH
(2) Flood Flow	HIGH	HIGH
(3) Streamside Area Attenuation	HIGH	HIGH
(4) Floodplain Access	HIGH	HIGH
(4) Wooded Riparian Buffer	HIGH	HIGH
(4) Microtopography	HIGH	HIGH
(3) Stream Stability	HIGH	HIGH
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	LOW	LOW
(4) Stream Geomorphology	HIGH	HIGH
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	MEDIUM	MEDIUM
(2) Baseflow	HIGH	HIGH
(2) Streamside Area Vegetation	HIGH	HIGH
(3) Upland Pollutant Filtration	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	LOW	HIGH
(2) In-stream Habitat	LOW	MEDIUM
(3) Baseflow	HIGH	HIGH
(3) Substrate	MEDIUM	MEDIUM
(3) Stream Stability	HIGH	HIGH
(3) In-stream Habitat	LOW	MEDIUM
(2) Stream-side Habitat	HIGH	HIGH
(3) Stream-side Habitat	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	MEDIUM	HIGH

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
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List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706 Stream SP</u>	2. Date of evaluation: <u>1/10/2019</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>Axiom Smith/Radecki</u>	5. County: <u>Richmond</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.939442, -79.730284</u>		9. Site number (show on attached map): <u>Stream SP</u>	10. Length of assessment reach evaluated (feet): <u>100</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone
I Other:
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of habitat types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

- Check all contributors within the assessment reach or within view of and draining to the assessment reach.**
- A Streams and/or springs (jurisdictional discharges)
 - B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
 - C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
 - D Evidence of bank seepage or sweating (iron in water indicates seepage)
 - E Stream bed or bank soil reduced (dig through deposited sediment if present)
 - F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

- Check all that apply.**
- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
 - B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
 - C Urban stream (≥ 24% impervious surface for watershed)
 - D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
 - E Assessment reach relocated to valley edge
 - F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

- Consider aspect. Consider "leaf-on" condition.
- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
 - B Degraded (example: scattered trees)
 - C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Stream originates at culvert south of Washington Street and flows through regularly maintained residential yards before entering into a <5year old clear-cut tract of land with abundant debris left in place. Stream loses energy and dies into a large wetland.







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706 Stream SP Date of Assessment 1/10/2019
 Stream Category Ia1 Assessor Name/Organization Axiom Smith/Radecki

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	HIGH
(2) Baseflow	HIGH	HIGH
(2) Flood Flow	HIGH	HIGH
(3) Streamside Area Attenuation	MEDIUM	MEDIUM
(4) Floodplain Access	MEDIUM	MEDIUM
(4) Wooded Riparian Buffer	HIGH	HIGH
(4) Microtopography	LOW	LOW
(3) Stream Stability	HIGH	HIGH
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	HIGH	HIGH
(4) Stream Geomorphology	MEDIUM	MEDIUM
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	LOW	LOW
(2) Baseflow	HIGH	HIGH
(2) Streamside Area Vegetation	MEDIUM	MEDIUM
(3) Upland Pollutant Filtration	HIGH	HIGH
(3) Thermoregulation	LOW	LOW
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	MEDIUM	MEDIUM
(2) In-stream Habitat	HIGH	HIGH
(3) Baseflow	HIGH	HIGH
(3) Substrate	HIGH	HIGH
(3) Stream Stability	MEDIUM	MEDIUM
(3) In-stream Habitat	MEDIUM	MEDIUM
(2) Stream-side Habitat	LOW	LOW
(3) Stream-side Habitat	MEDIUM	MEDIUM
(3) Thermoregulation	LOW	LOW
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	MEDIUM	MEDIUM

NC SAM FIELD ASSESSMENT RESULTS
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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone
I Other:
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of habitat types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Stream runs along side residential properties with maintained lawns







Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706 Stream SP-lower Date of Assessment 1/10/2019
 Stream Category Ia1 Assessor Name/Organization Axiom Smith/Radecki

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	LOW
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	LOW	LOW
(3) Streamside Area Attenuation	LOW	LOW
(4) Floodplain Access	LOW	LOW
(4) Wooded Riparian Buffer	LOW	LOW
(4) Microtopography	LOW	LOW
(3) Stream Stability	MEDIUM	MEDIUM
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	HIGH	HIGH
(4) Stream Geomorphology	LOW	LOW
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	LOW	LOW
(2) Baseflow	MEDIUM	MEDIUM
(2) Streamside Area Vegetation	MEDIUM	MEDIUM
(3) Upland Pollutant Filtration	MEDIUM	MEDIUM
(3) Thermoregulation	MEDIUM	MEDIUM
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	LOW	MEDIUM
(2) In-stream Habitat	MEDIUM	HIGH
(3) Baseflow	MEDIUM	MEDIUM
(3) Substrate	HIGH	HIGH
(3) Stream Stability	MEDIUM	MEDIUM
(3) In-stream Habitat	LOW	HIGH
(2) Stream-side Habitat	LOW	LOW
(3) Stream-side Habitat	LOW	LOW
(3) Thermoregulation	LOW	LOW
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	LOW	LOW

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>U-5706 Stream SQ</u></td> <td style="width:50%;">2. Date of evaluation: <u>1/10/2019</u></td> </tr> <tr> <td>3. 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Watershed size: (skip for Tidal Marsh Stream)</p> <p><input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>U-5706 Stream SQ</u>	2. Date of evaluation: <u>1/10/2019</u>	3. Applicant/owner name: <u>NCDOT</u>	4. Assessor name/organization: <u>Axiom Smith/Radecki</u>	5. County: <u>Richmond</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>	7. River basin: <u>Yadkin-PeeDee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.947115, -79.728010</u>		9. Site number (show on attached map): <u>Stream SQ</u>	10. Length of assessment reach evaluated (feet): <u>100</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1</u> <input type="checkbox"/> Unable to assess channel depth.		12. 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1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | | | |
|---------------------------------------|---------------------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: _____ (explain in “Notes/Sketch” section)
- J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

- Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- | | | |
|---|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input checked="" type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- A Riffle-run section **(evaluate 11c)**
- B Pool-glide section **(evaluate 11d)**
- C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams).** Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

- | | | | | | |
|-------------------------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------------------|
| NP | R | C | A | P | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cobble (64 – 256 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Sand (.062 – 2 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Artificial (rip-rap, concrete, etc.) |

11d. Yes No Are pools filled with sediment? **(skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Intermittent feature within channelized ditch, two dams and a large pond upstream.



**Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1**

Stream Site Name U-5706 Stream SQ Date of Assessment 1/10/2019
 Stream Category Ia1 Assessor Name/Organization Axiom Smith/Radecki

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	HIGH
(2) Baseflow	HIGH	HIGH
(2) Flood Flow	HIGH	HIGH
(3) Streamside Area Attenuation	HIGH	HIGH
(4) Floodplain Access	MEDIUM	MEDIUM
(4) Wooded Riparian Buffer	HIGH	HIGH
(4) Microtopography	HIGH	HIGH
(3) Stream Stability	HIGH	HIGH
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	HIGH	HIGH
(4) Stream Geomorphology	MEDIUM	MEDIUM
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	MEDIUM	MEDIUM
(2) Baseflow	HIGH	HIGH
(2) Streamside Area Vegetation	HIGH	HIGH
(3) Upland Pollutant Filtration	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	HIGH	HIGH
(2) In-stream Habitat	HIGH	HIGH
(3) Baseflow	HIGH	HIGH
(3) Substrate	HIGH	HIGH
(3) Stream Stability	HIGH	HIGH
(3) In-stream Habitat	MEDIUM	HIGH
(2) Stream-side Habitat	HIGH	HIGH
(3) Stream-side Habitat	HIGH	HIGH
(3) Thermoregulation	HIGH	HIGH
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	HIGH	HIGH

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:		
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p>			
1. Project name (if any):	<u>U-5706 Stream SR</u>	2. Date of evaluation:	<u>1/23/19</u>
3. Applicant/owner name:	<u>NCDOT</u>	4. Assessor name/organization:	<u>Smith/Axiom</u>
5. County:	<u>Richmond</u>	6. Nearest named water body on USGS 7.5-minute quad:	<u>Hitchcock Creek</u>
7. River basin:	<u>Yadkin-PeeDee</u>	8. Site coordinates (decimal degrees, at lower end of assessment reach):	<u>34.960682, -079.746231</u>
<p>STREAM INFORMATION: (depth and width can be approximations)</p>			
9. Site number (show on attached map):	<u>Stream SR</u>	10. Length of assessment reach evaluated (feet):	<u>590</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	<u>3</u>	<input type="checkbox"/> Unable to assess channel depth.	
12. Channel width at top of bank (feet):	<u>5</u>	13. Is assessment reach a swamp steam?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type:	<input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		
<p>STREAM CATEGORY INFORMATION:</p>			
15. NC SAM Zone:	<input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)		
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) </div> <div style="text-align: center;"> <input type="checkbox"/> B  (less sinuous stream, steeper valley slope) </div> </div>		
17. Watershed size: (skip for Tidal Marsh Stream)	<input checked="" type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)		
<p>ADDITIONAL INFORMATION:</p>			
<p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"><input type="checkbox"/> Section 10 water</div> <div style="width: 33%;"><input type="checkbox"/> Classified Trout Waters</div> <div style="width: 33%;"><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</div> <div style="width: 33%;"><input type="checkbox"/> Essential Fish Habitat</div> <div style="width: 33%;"><input type="checkbox"/> Primary Nursery Area</div> <div style="width: 33%;"><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</div> <div style="width: 33%;"><input type="checkbox"/> Publicly owned property</div> <div style="width: 33%;"><input type="checkbox"/> NCDWR Riparian buffer rule in effect</div> <div style="width: 33%;"><input type="checkbox"/> Nutrient Sensitive Waters</div> <div style="width: 33%;"><input type="checkbox"/> Anadromous fish</div> <div style="width: 33%;"><input type="checkbox"/> 303(d) List</div> <div style="width: 33%;"><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</div> </div> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.</p> <p>List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p>			
<p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>			

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A Little or no evidence of conditions that adversely affect reference interaction
B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone
I Other:
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of habitat types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Roadside ditch in a natural topographic crenulation - more water than other ditches in the area. Maintained residential on LB and road shoulder on the RB.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name U-5706 Stream SR Date of Assessment 1/23/19
 Stream Category Ia1 Assessor Name/Organization Smith/Axiom

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) NO
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	LOW
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	LOW	LOW
(3) Streamside Area Attenuation	LOW	LOW
(4) Floodplain Access	LOW	LOW
(4) Wooded Riparian Buffer	LOW	LOW
(4) Microtopography	LOW	LOW
(3) Stream Stability	LOW	LOW
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	LOW	LOW
(4) Stream Geomorphology	LOW	LOW
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	LOW	LOW
(2) Baseflow	MEDIUM	MEDIUM
(2) Streamside Area Vegetation	LOW	LOW
(3) Upland Pollutant Filtration	LOW	LOW
(3) Thermoregulation	LOW	LOW
(2) Indicators of Stressors	NO	NO
(2) Aquatic Life Tolerance	LOW	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	LOW	LOW
(2) In-stream Habitat	LOW	MEDIUM
(3) Baseflow	MEDIUM	MEDIUM
(3) Substrate	LOW	LOW
(3) Stream Stability	MEDIUM	MEDIUM
(3) In-stream Habitat	LOW	HIGH
(2) Stream-side Habitat	LOW	LOW
(3) Stream-side Habitat	LOW	LOW
(3) Thermoregulation	LOW	LOW
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	LOW	LOW