



Florida Department of Environmental Protection

Aquatic Ecology and Quality Assurance

Bioassessment Sampling Questions

March 30, 2016





Questions from You

- Habitat assessment/SCI SOP items of confusion
 - Large Rivers/Canals habitat calculations
 - Consideration of island in large river
 - Consideration of cypress knees and bases
 - “Productive” vegetation
 - Consideration of moss
 - Reporting of velocity measurement
 - Pools
- SCI
 - Use and constraints in Large Rivers
 - Difficulties with hydrologically modified sites
 - Insufficient reach length for full 100 m stretch



More Questions

- RPS SOP
 - “X” vs. “N”
 - Secchi measurements
- LVS – Index period
- IWR interpretation
 - Clarify how SCI is implemented, NNC vs. biocriteria
 - Clarify how RPS and LVS implemented



Cypress Knees

- Q: Can I sample cypress knees or trunks as snag?
- SOP SCI 1100 section 2.5 states: "Snags with rough, peeling bark are preferred because they have more hiding places and attachment points for organisms than fresh, smooth snags (e.g., cypress knees, live trees)."
- A: Dead wood is always better than live, but you can sample them if that's all you have.



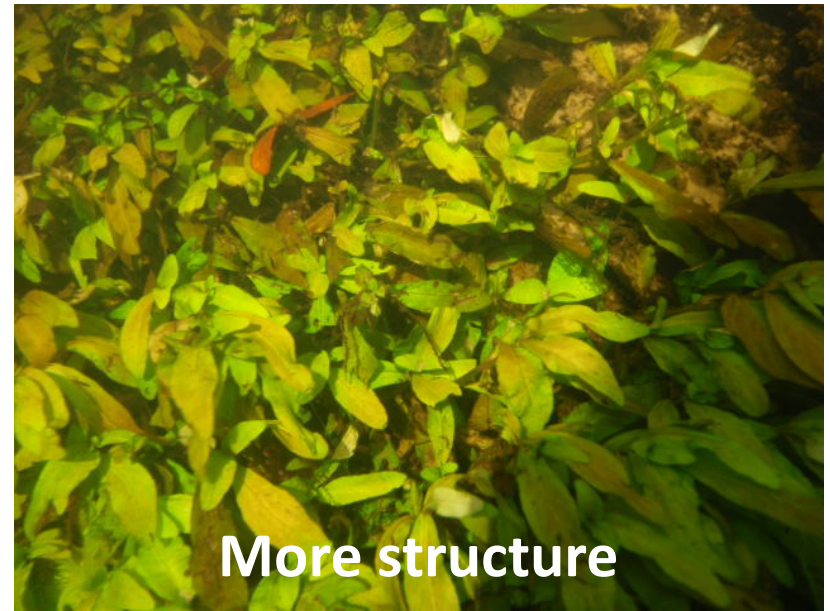


Productive Vegetation

- Q: Are some aquatic macrophytes more productive than others?
- A: Yes. Some species offer more structure for the macroinvertebrates to colonize. A plant with stems and leaves underwater provides better habitat than species with just stems in the water.



Less structure



More structure



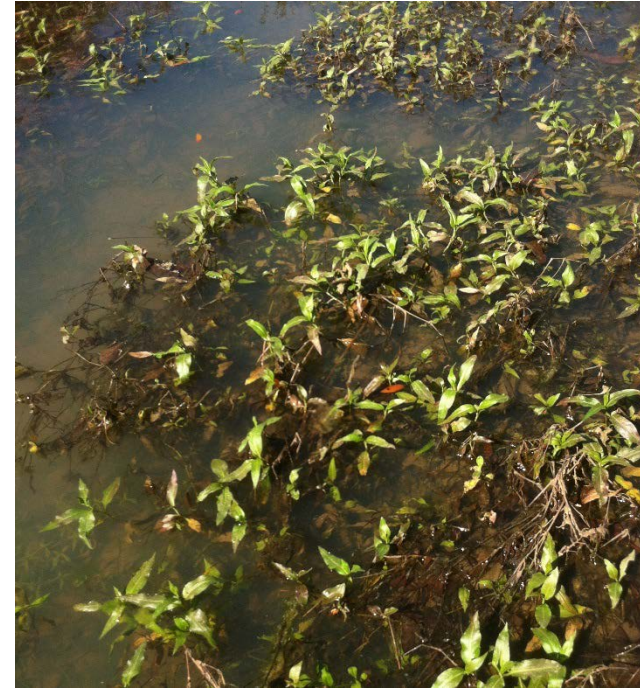
Productive Vegetation, cont'd

- Q: Should I count vegetation as “productive” if it is part of a mat and/or not in the flow?
- A: Vegetation is not productive if it is completely silt-smothered or completely out of the flow (during flowing conditions).

FT 3001, section 2.4 states: “Do not map habitats that are completely smothered by sand, silt, or algae; some smothering will still allow habitat use, but complete smothering will preclude use.”



Productive Vegetation, cont'd



Vegetation covering much of channel, but smothered and much not in the flow (even on higher flow days). However, there is still a lot of habitat present. Consider the fraction along the flow path to be productive.



Moss

- Aquatic moss (typically *Fontinalis* spp.) can be quite abundant, but neither SCI nor HA SOP addresses it
- Should it be considered Aquatic Macrophyte?
- Thin cover on log may be swept with snag
- Thick mat with structure similar to veg



Photo by Peggy Morgan



Moss, cont'd

Discussion?



Photo by Peggy Morgan



Reporting of HA Velocity

- Q: Can I report the velocity measurement I take for habitat assessment in STORET? If so, do I need to use the “J” qualifier?
- A: Your HA velocity measurement is data, and could be very useful information for end users, but must be characterized as an estimate. Yes, you can report it in STORET, but it must be accompanied by a “J” qualifier and should cite FT 3100 as the method.
 - Are you currently including a method and qualifier?



Clarification about Pools

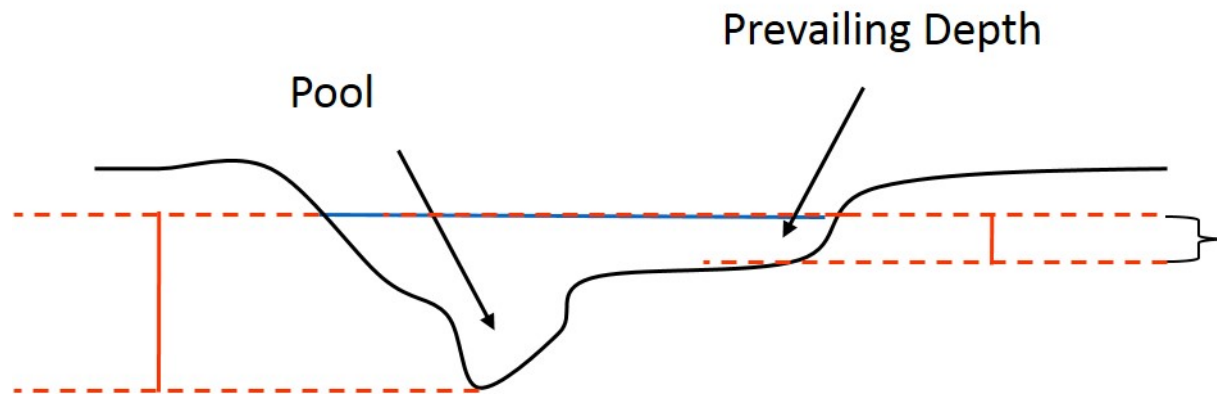
- Identification and enumeration of pools is used in HA to provide consistency in scoring for Habitat Smothering
- Interpretation of SOP definition of pool
- Sand vs. silt or algal smothering





Habitat Smothering-Pool Def

- Pools: **area 2 x the prevailing depth**, with 1-2 pools in a length of stream equal to 12 times the stream width (e.g., a 4 m wide stream should have 1-2 pools per 48 m or 2-4 per 100 m).

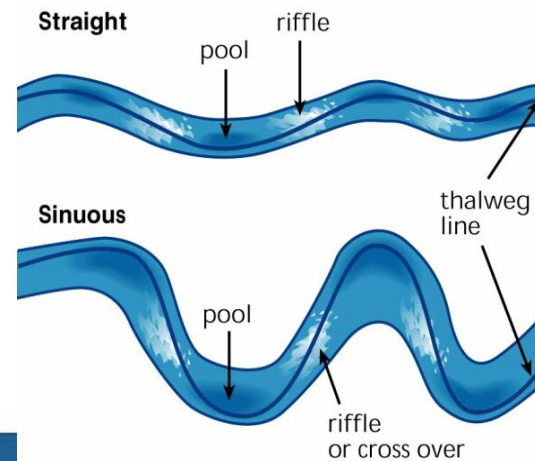
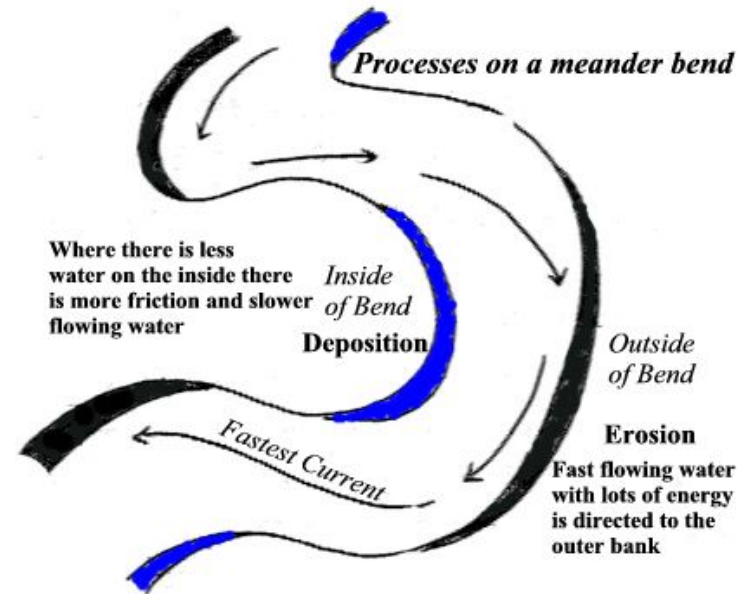


- How to determine prevailing depth?
- If prevailing depth is 0.5m, so pools have to be 1m deep?



Stream Geomorphology (2 min. class 😊)

- Erosion, transport, and deposition always occurring
- A natural system is “dynamically stable”:
 - Outer banks erode
 - Inner banks deposit
 - Meanders move down valley
 - Bars move





Habitat Smothering

Determine if pools are present:

- None scores in the “poor” category
- A minimal number and/or poor quality pools score in the “marginal” category
- When an adequate number of **stable** pools are present, determine percent smothering and score in “suboptimal” or “optimal” as appropriate

Pools Present										Minimal					None					
Habitat Smothering _____ -----	Adequate number of stable pools (1-2 per 12 times width) and <25% of habitats affected by sand, silt, or algae.					Adequate number of stable pools (1-2 per 12 times width) and >25% of habitats affected by sand, silt, or algae.					Does not have required number of stable pools (1-2 per 12 x width) and/or has shallow pools (<2 x prevailing depth).					Stable pools are absent. Most habitats affected by sand, silt, or algae accumulation.				
Primary Score _____	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Optimal					Suboptimal					Marginal					Poor					



Clarification about Pools

- Deeper low gradient systems may have stable pools that are not quite 2x depth
- Use your judgement along with SOP rules





Habitat Smothering

- Q: What if silt or algae are visibly covering >50% of habitats, but stable pools are present?
- A: Still have to score in Suboptimal





Insufficient Reach for SCI

- Q: Can I still do the SCI and HA if I have less than 100m stretch at my site?
- A: It would be better to find a full 100m stretch that's representative of the waterbody, but if you cannot, it is ok to use less than 100m. Make sure the habitat in the stretch is not limited due to the shorter length. Document the deviation from the SOP in your records.



“N” vs. “X” in RPS

- “N” means there is no algae present (or at $< 1\text{mm}$)
- “X” means you could not assess the point, even to provide an estimate
- If substrate cannot be reached and substrate depth is greater than Secchi depth (photic zone), record “N”. DEP study showed that no algae occurred below Secchi (photic) depth.
- If substrate cannot be reached or seen but depth is less than Secchi depth, record “X.”
- If you can see but not reach substrate, estimate rank based on similar reachable areas.
- Do NOT leave any box blank.



RPS – Estimated Ranks

- Check the “Estimated” column when you did not feel the substrate to make the assessment
 - Deeper than Secchi depth – estimated “N”
 - Too deep to reach or otherwise inaccessible, but visually estimated (with or without viewscope)

DEP FORM FD 9000-25 Rapid Periphyton Survey Field Sheet										
Site:					County:		Date:		Investigators:	
Transect t (m)	Point 1=right 9=left	Algal Thickness Rank (N-6, X)	Estimated	Canopy Cover	Transect t (m)	Point 1=right 9=left	Algal Thickness Rank (N-6, X)	Estimated	Canopy Cover	STORET Station Number:
0	1				60	1				Secchi depth
	2					2				Estimated?
	3					3				
	4					4				# points ranked 4-6
	5			5				total points assessed		
	6			6				% points ranked 4-6		
	7			7						
	8			8						
	9			9						
1				1					Check accompanying data collected at same site/date	



“N” vs. “X” in RPS

- Q: What if you assumed N for deep spots, but then Secchi is deeper than expected?
- A: If system is deep, measure Secchi as deep as possible at the sites. If you cannot determine depth, use best judgement.



Index Period for LVS

- Q: Is there an index period for the LVS like there is for the LVI, or should we do it year-round?
- A: There are no restrictions on when to conduct the LVS. It is a good idea to sample during different times of the year to determine if there are any persistent vegetation problems.



Ok to Sample LVS in Feb?





Large River SCI

- Difficult to do method
- Often not true rheophyllic conditions
- Tidal conditions
- Do not conduct the SCI if water flow or salinity are influenced by the tide
- May need to develop alternative method for large rivers
- *SCI is appropriate* in some non-wadeable rivers



Large River HA

- How to count total area for % habitat calculation?
 - SOP SOP FT 3001, section 2.4, “If you cannot observe portions of the system (e.g., due to dark color and depth), include only the number of grids where observations were possible as the denominator in this calculation.”
 - This caveat was intended to prevent underestimating habitat in natural rivers, but consequence is that we are overestimating habitat in canals (and rivers, too)
 - **Use of full area of stretch for calculation** will give more accurate estimate of % habitat
 - Proposed change for upcoming QA Rule revisions
 - Note methods on field sheet



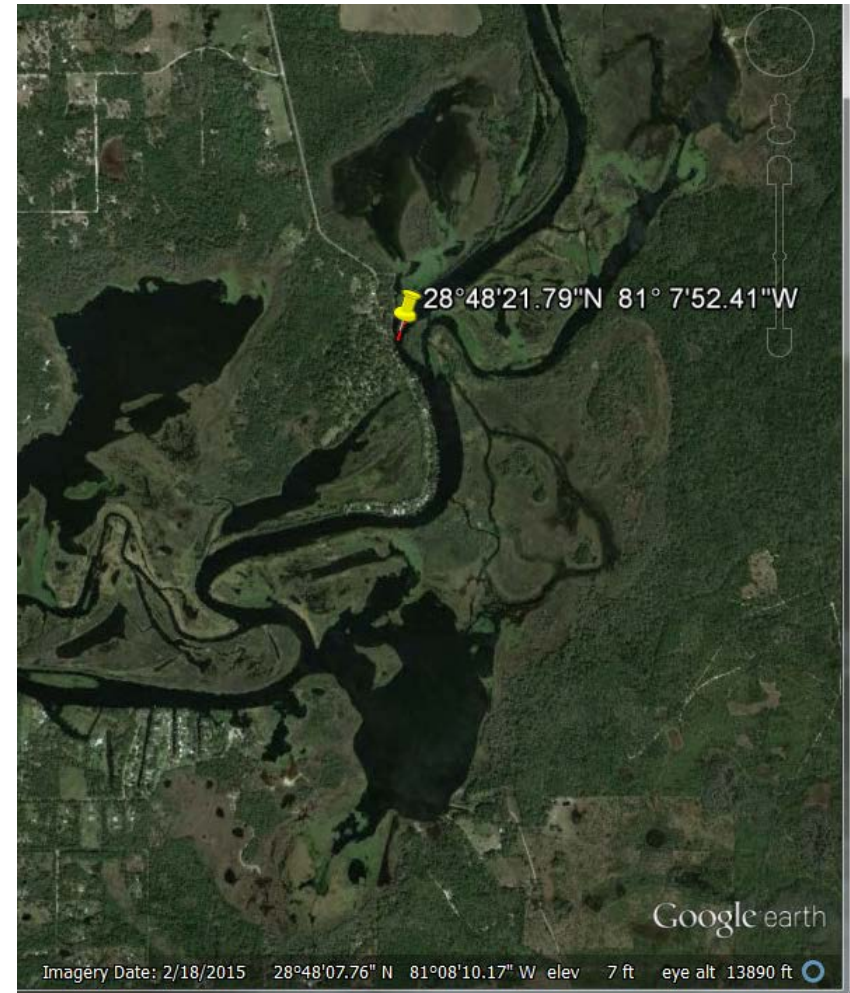
Large River HA Examples

- Scenario 1- Clear spring run (e.g., Rainbow River), 10 m wide, you can see to the bottom for the full 10 m width and 100 m length (total 1,000 m²). You estimate 600 m² habitat (mostly submersed veg). Substrate availability (SA) calculation – $600/1,000 = 60\%$, SA score 20. This scenario is consistent with the current SOP.
- Scenario 2- Large dark river (e.g., Suwannee River), 12 m wide, you can only see to the bottom for 1 m on each bank and 100m length (total 200 m²). You estimate 40 m² habitat (mostly roots and some snag), and that includes a couple large snags sticking out of the water mid-channel. Substrate availability (SA) calculation – $40/1,200 = 3.3\%$, SA score 3. The current SOP directs you to calculate it as $40/200$, but that would lead to an overestimate of habitat. Please note on your field sheet that you could not see bottom for most of the reach.
- Scenario 3- Deep box-cut canal, 15 m wide, you can't see to the bottom at all, but can see 0.5 m wetted bank on each side, mostly rock, and some floating vegetation (total 150 m²). You estimate 100 m² habitat (mostly bank rock and floating veg). Substrate availability (SA) calculation – $100/1,500 = 6.7\%$, SA score 6. The current SOP directs you to calculate it as $100/150$, but that would lead to an overestimate of habitat. Please note on your field sheet that you could not see bottom for most of the reach.



Islands in Large River HA

- For streams, you can assess multiple channels divided by islands, but what about large rivers?
- Include island fringes in HA?
- How to include island banks in HA?
- Example: St. Johns River





Island HA, cont'd

- Be sure to represent the 100 m stretch of river.
- Would inclusion of island change your score?





Hydrologic Limitations

- Antecedent conditions for SCl:
 - Velocity ≥ 0.05 m/sec on sampling day and for at least 28 days prior to sampling
 - If stream went *completely* dry, wait 3-6 months.
 - If water levels came up 0.5m (preventing access to colonized habitats), don't sample until it either goes back down or stays up for 28 days to allow new colonization.
- Q: What if I can never achieve those conditions?
 - Insufficient flow in system (maybe non-perennial)
 - Frequent scouring (not specifically mentioned in SOP)
- A: It depends on the objectives of your study.



Hydrologic Scouring

- From SCI Primer: “In streams with natural geomorphology and sinuosity, the habitats targeted for SCI sampling act as refugia from scouring during flood events, and sampling may be conducted when inundated substrates are reachable. However, in channelized systems there may be significant scouring after routine rain events. Depending on the study objectives, sampling may be conducted after a rain event in a channelized system to demonstrate the adverse effects of hydrological modification on the system.”



Study Objectives

- Impacts of Water Quality – Need to meet antecedent conditions
- Determination of Perenniality – Target sampling date after longest degree of inundation and flow, but you can sample even if stream does not meet antecedent conditions. (document hydrology!)



SCI/RPS/LVS Implementation

- SCI as support for NNC (Standards and IWR)
- SCI as Biological Assessment (IWR)



Interpretation of Scores

- Interpretation of scores was previously in SOPs
 - BioRecon (LT 7100)
 - SCI (LT 7200)
 - LVI (LT 7500)
 - Shannon-Weaver criteria always in 62-302 (Standards)
- Now the interpretation is only in Rules
 - 62-302 – SCI supports NNC, LVI only supports SSACs
 - 62-303 – Waters can be put on Planning and Verified Lists for non-attainment of Biological Assessments
 - Shannon-Weaver still included in 62-302 and 62-303



62-303.330 – Planning List

(3) A water segment shall be included on the Planning List if it meets any of the following conditions, given a minimum sample size of one bioassessment:

(a) One of the two most recent Shannon-Weaver Diversity Index (subsection 62-302.530(10), F.A.C.) scores is less than 75 percent of the value from an appropriate control site.

(b) One of the two most recent SCI scores is:

1. A score of < 35 ; or
2. A 20 point reduction from the historic maximum value if the historic maximum value SCI is above 64.

(c) One of the two most recent BioRecon has a score < 4 .

(d) One of the two most recent Lake Vegetation Index scores is:

1. A score < 43 ; or
2. A 20 point reduction from the historic maximum value if the historic maximum value LVI is above 78.

- One (of the two most recent) sample below the threshold will place water segment on Planning List, to be included in the Strategic Monitoring Plan. If there is only 1 sample, that's enough to place on the Planning List.



62-303.330, cont'd

- (4) The “historic maximum value” shall be the **highest mean of any three consecutive, temporally independent** Stream Condition Index (SCI) scores or Lake Vegetation Index (LVI) scores **at the same location** that are collected prior to the most recent sample being considered for evaluation with this provision. For the purposes of setting historic maximum values, **the “same location” for a stream shall be defined as being within 200 meters.**
- (5) To qualify as temporally independent samples, each Biological Health Assessment shall be conducted at least three months apart. Biological Health Assessments conducted within 200 meters in a stream or within the same lake less than three months apart shall be considered one sample, with the mean value used to represent the sampling period. Biological Health Assessments conducted at locations greater than 200 meters apart in a stream shall be assessed as independent scores regardless of temporal separation of samples.
- (6) Other information relevant to the biological health of the water segment, including toxicity tests and information about alterations in the type, nature, or function of a waterbody, shall also be considered when assessing aquatic life use support.



62-303.430 – Verified List

(2) If the water met the requirements for placement on the Planning List based on Biological Health Assessment results, the water shall be determined to be biologically impaired if any of the following conditions occur, given a minimum sample size of two temporally independent bioassessments:

(a) **The average score of all the SCIs is below 40, or either of the two most recent temporally independent SCI scores is less than 35.** If there are only two SCIs and the difference between the two scores is greater than 20 points, then an additional SCI shall be required and the average of all three scores shall be used.

(b) **The average score of all the temporally independent LVIs is below 43 for a lake segment.** If there are only two LVIs for a lake segment and the difference between the two scores is greater than 20 points, then an additional LVI shall be required and the average of all three scores shall be used.

(c) The historic maximum SCI value, as defined in subsection 62-303.330(4), F.A.C., is above 64 and the average of the two most recent temporally independent SCI scores is 20 or more points below the historic maximum value.

(d) The historic maximum value LVI, as defined in subsection 62-303.330(4), F.A.C., is above 78 and the average of the two most recent temporally independent LVI scores is 20 or more points below the historic maximum value.

(e) The average score of at least two temporally independent Shannon-Weaver Diversity Indices is less than 75 percent of the average score from an appropriate control site, pursuant to subsection 62-302.530(10), F.A.C.

(3) If the water was listed on the Planning List based on BioRecon data, two or more temporally independent SCIs shall be conducted.

- Minimum sample size for verified list is TWO SCIs or LVIs



62-303.430 – Verified List

... If the water segment was listed on the Planning List based on other information specified in subsection 62-303.330(6), F.A.C., indicating biological impairment, two or more temporally independent Biological Health Assessments appropriate for the waterbody type shall be conducted in the waterbody segment to verify whether the water is impaired. If available, the Department shall consider other scientifically credible biological assessment methods in predominantly marine waters to verify that the water is biologically impaired. Results from these biological assessments shall be evaluated in accordance with subsection 62-303.430(2), F.A.C., as applicable.

(4) If a waterbody was listed on the Planning List based on failure of the Shannon-Weaver Diversity Index under subsection 62-302.530(10), F.A.C., a minimum of two Biological Health Assessments shall be conducted in accordance with the methodology in Rule 62-303.330, F.A.C., to verify whether the water is impaired. If an SCI or LVI is not applicable for the waterbody type, then the Biological Health Assessment shall be the Shannon-Weaver Diversity Index or other scientifically credible method.



62-303.430 – Verified List

(5) Following verification that a waterbody is biologically impaired, a waterbody shall be included on the Verified List for biological impairment if:

(a) There are water quality data reasonably demonstrating the particular pollutant(s) causing the impairment and the concentration of the pollutant(s); and,

(b) One of the following demonstrations is made:

1. If there is a numeric criterion for the specified pollutant(s) in Chapter 62-302, F.A.C., but the criterion is met, an identification of the specific factors that reasonably demonstrate why the numeric criterion is not adequate to protect water quality and how the specific pollutant is causing the impairment, or

2. If there is not a numeric criterion for the specified pollutant(s) in Chapter 62-302, F.A.C., an identification of the specific factors that reasonably demonstrate how the particular pollutant(s) are associated with the observed biological effect. **If the numeric interpretation of the narrative nutrient criterion in paragraph 62-302.531(2)(c), F.A.C., is exceeded, then nutrients shall be identified as the causative pollutant unless a stressor identification study links the adverse biological effects to causal factor(s) other than nutrients.**

(6) **If a waterbody is verified as biologically impaired, but a causative pollutant has not been identified, the waterbody shall be included on the Study List.**

- Must have causative pollutant for Verified List; otherwise it goes to Study List
- If exceedance of numeric nutrient thresholds, default causative pollutants will be nutrients.



Bioassessment Report Tracker

- <https://fldep.dep.state.fl.us/bcreport/newreport.asp>



New Report

Please enter the information requested below to create a new report.

District: Author: County/Region:

Please keep the following things in mind when choosing a report type:

(Click the report type below for an example, or [download the appropriate template](#) *new stream and lake ecosummary templates now available*)

- **Basin Assessment:** These reports feature biological and chemical results from multiple sites within a particular basin.
- **Biological Assessment:** A report that summarizes biological and chemical data from point-source discharges as part of the NPDES permitting process.
- **Ecological Assessment:** A report that summarizes biological and chemical data from one or more stations from a particular water body; often includes water body.
- **Stream or Lake Ecosummary:** A brief report, typically no more than 2 pages, that summarizes biological and chemical data from a single water body. Bioassessment (Biorecon), Stream Condition Index, or Lake Vegetation Index results.

Type of Report:

Report Title (120 characters):

File Location:



Report Tracker Process

- Choose template
- Draft report once you have 2 bio site visits
- Submit through system
 - Report will be delivered to approvers via email
 - Supervisor review (author edits) and approval
 - AEQA review (author edits)
- AEQA posts report
- Public can read your report!