An Approach to Developing a Habitat Assessment Procedure for Stormwater Ponds

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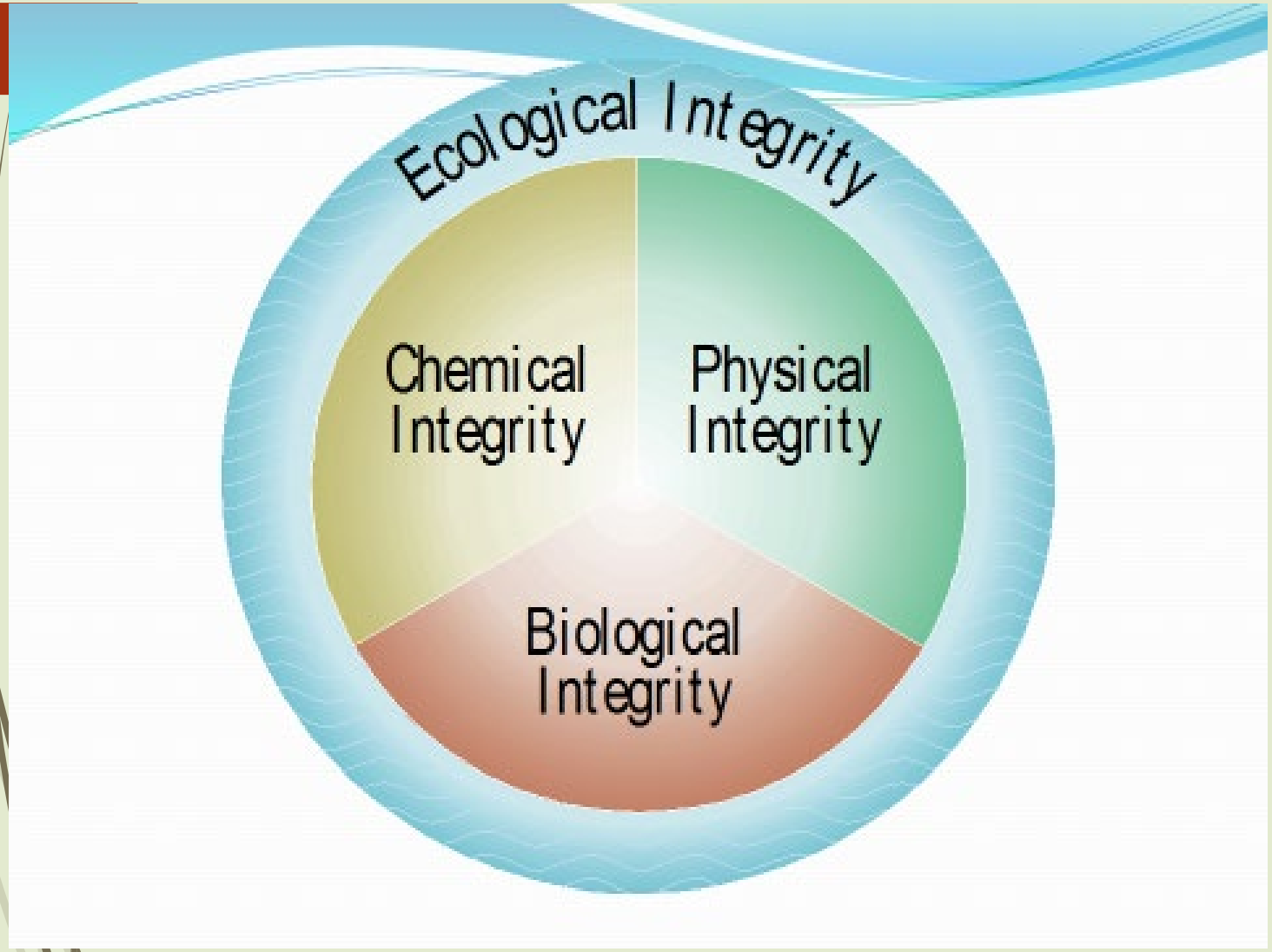
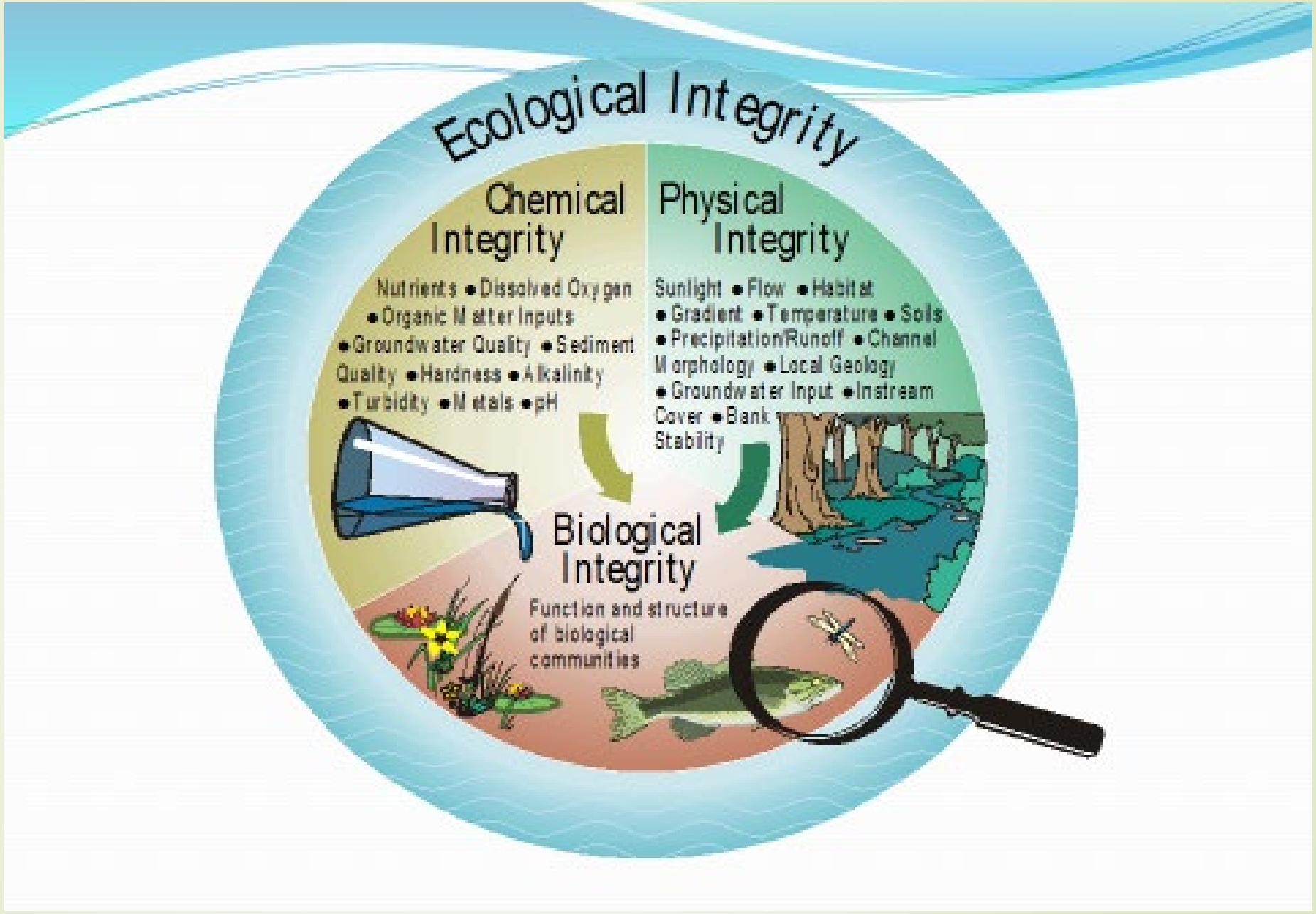


The Clean Water Act

- The Three Components of Ecological Integrity
- Pertinent to all waterbodies
- Incorporated in all State Water Quality Standards
- Foundation for also managing Stormwater Ponds


Ecological Integrity
Chemical Integrity
Nutrients • Dissolved Oxygen • Organic Matter Inputs • Groundwater Quality • Sediment Quality • Hardness • Alkalinity • Turbidity • Metals • pH
Physical Integrity
Sunlight • Flow • Habitat • Gradient • Temperature • Soils • Precipitation/Runoff • Channel Morphology • Local Geology • Groundwater Input • Instream Cover • Bank Stability
Biological Integrity
Function and structure of biological communities


Chemical Contamination
Toxics • Low pH • High Turbidity • Excess Sediment • Excess Nutrients/Organics • Depleted Alkalinity
Physical Degradation
Soil Erosion • Damaged Habitat • High Temperature • Too Much Sunlight • Too Little/Too Much Flow • Stream Bank Erosion • Loss of Groundwater • Hydromodification
Altered Biological Condition

http://www.epa.gov/OWOW/MONITORING/rbp/html

United States Environmental Protection Agency
Office of Water 4503F Washington, DC 20460
EPA 841-B-98-010 May 1999

EPA

Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers

Periphyton, Benthic Macroinvertebrates, and Fish

Second Edition

HABITAT METRICS FOR VISUAL-BASED ASSESSMENT OF STREAMS

	OPTIMAL	POOR
1. Epifaunal Sub.	Abundant, Diverse ⟷	Uniform, Unstable
2. Embeddedness	No/Little Fine Sed. ⟷	Abundant Fine Sed.
3. Velocity - Depth	Diverse, Shallow & Deep ⟷	Uniform, Lacking
4. Sediment Dep.	No Sediment Depo. ⟷	High Deposition
5. Flow Status	Channel Filled ⟷	Low Wetted Width
6. Channel Alt.	Not Channelized ⟷	Extensively Channelized
7. Channel Sin.	Freq. Riffle/Run Seq. ⟷	Infrequent Riffles
8. Bank Stability	Low Erosion ⟷	High Erosion
9. Bank Veg. Pro.	Well-Armored Banks ⟷	No Bank Protection
10. Rip. Veg. Zone	> 18m Width ⟷	< 6m Width

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6.Channel Alteration **(high and low gradient)**	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

6a. Channel Alteration — High Gradient

A Habitat Parameter taken from EPA's RBP Protocols

Optimal Range

Poor Range

Habitat Parameters for a Lake

(from EPA's Lake Assessment Protocol)

- Human Disturbance
- Riparian Vegetation Complexity
- Littoral-Riparian Habitat Complexity
- Aquatic Macrophytes
- Littoral Fish Cover
- Littoral Bottom Substrate
- Lake Shoreline Substrate
- Bank Stability

A Habitat Parameter taken from FDEP's Lake Habitat Assessment

Vegetation Quality	Diverse, expected native vegetation (emergent or submersed), less than 5% nuisance taxa					Mostly expected native plants, but moderate growths (6%-20% of lake) of nuisance macrophytes, or more than 50% of lake covered with plants					Large masses (21%- 40%) of nuisance macrophytes (e.g., Hydrilla, hyacinth, cattail, etc.) or algal mats					Lake choked (>40%) with nuisance macrophytes (duck-weed, hyacinth, etc.) or algal mats, or few plants present at all (e.g., plants removed)				
	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Plausible Parameters to Consider for Stormwater Ponds

1. **Shoreline buffers (biofilters)**
2. **Presence/absence of bank failure**
3. **Quality of littoral zones (sediment, slope)**
4. **Aquatic plants in littoral zones (extent and type, that is Florida-friendly or invasive)**
5. **Presence of Floating or in-pond wetlands**
6. **Presence of noxious algae at certain times of the year**
7. **Perimeter upland Florida-friendly landscaping (vegetation, rain gardens, etc. to retard runoff)**
8. **Pesticide/herbicide use (type, amount, frequency)**
9. **Impervious surface runoff (extent, drainage system)**
10. **Landscaping maintenance (mowing, trimming, etc.)**

Buffer Zone Scorecard

Buffer Zone Vegetation Quality

Optimal: Buffer Zone vegetation includes native trees, shrubs, bunch grasses, native ground cover, or other native emergent plants excluding turfgrass; most plants grow to a natural height; not mowed.

Sub-optimal: Native bunch grasses and ground cover are the dominant plant types within the buffer zone; not mowed.

Marginal: Turfgrass is the dominant plant type in the buffer zone and is allowed to grow to height of 8 – 12 inches; not mowed.

Poor: Turfgrass is the dominant plant type in the buffer zone, is mowed to a stubble height no more than surrounding land

Amount of Vegetation	Poor		Marginal		Sub-optimal		Optimal
Score	1	1.5	2	2.5	3	3.5	4
							
Vegetative Quality of Buffer Zone	○	○	○	○	○	○	○

Bank Stability and Erosion

Optimal: Evidence of erosion or bank failure absent or minimal (less than 10% of bank affected); bank gently slopes to littoral zone.

Sub-optimal: Infrequent, small areas of erosion with drops to water no greater than 6-12 inches.

Marginal: Shoreline has areas of erosion; drops to water average 1-2 feet.

Poor: "Raw" areas frequent; drop to water greater than 2 feet.

Examine slope of bank and amount of exposed soil and roots.

Slope of Bank	> 2 feet		1-2 feet		6-12 inches		> 10%
Score	1	1.5	2	2.5	3	3.5	4
							
Bank Stability/Erosion	○	○	○	○	○	○	○

Total score _____

Poor condition (< or = 6 points) suggests the need to enhance your buffer zone by installing a variety of Florida native plants.

Marginal condition (6.5 - 9.5 points) suggests there are many opportunities for improvement by installing a variety of Florida native plants in between homes and in other areas around the pond.

Suboptimal condition (10 - 13 points) suggests fair condition and modest improvements would likely enrich the pond ecosystem and enhance the production of environmental benefits.

Optimal condition (13.5 - 16) suggests that the pond is producing peak environmental benefits that lend to healthy and abundant wildlife, shoreline stabilization, and the removal of stormwater pollutants.

Littoral Zone Scorecard

Littoral Zone Invasive Species Plant Abundance

For this parameter, if you are not familiar with Florida aquatic plants and common invaders, consult with your pond contractor or your local Extension office. Visit https://plants.ifas.ufl.edu/ for more information.

Optimal: No invasive plant species (emergent, floating, submersed) coverage.

Sub-optimal: No more than 15% coverage by invasive plant species.

Marginal: Invasive plant species coverage is greater than 15%, but less than 33%.

Poor: Invasive species coverage is greater than 33%.

Examine the coverage of invasive species in the littoral zone.

Nonnative species cover	> 33%		> 15% but < 33%		≤ 15%		< 0%
Score	1	1.5	2	2.5	3	3.5	4
Plant Abundance - Invasive Species	○	○	○	○	○	○	○

Littoral Zone Native Plant Diversity

For this parameter, if you are not familiar with Florida aquatic plants, consult with your pond contractor or your local Extension office. Visit https://plants.ifas.ufl.edu/ for more information.

Optimal: Native vegetation (emergent, floating, submersed) includes more than 5 different species.

Sub-optimal: Native vegetation (emergent, floating, submersed) includes 3 - 5 different species.

Marginal: Native vegetation (emergent, floating, submersed) includes at least 2 different species.

Poor: There is only 1 native plant species (emergent, floating, submersed).

Examine the number of different plant species in the littoral zone. Littoral zone plantings should consist of at least

Plant Diversity	1 species		At least 2 species		3-5 species		5+ species
Score	1	1.5	2	2.5	3	3.5	4
Plant Diversity	○	○	○	○	○	○	○

Littoral Zone Native Species Relative Abundance

Optimal: A single native plant species does not represent more than 33% of all plant coverage.

Sub-optimal: A single native plant species does not represent more than 50% of all plant coverage.

Marginal: A single native plant species does not represent more than 66% of all plant coverage.

Poor: One native plant represents more than 66% coverage by all plants.

Plant Abundance	> 66%		≤ 66%		< 50%		< 33%
Score	1	1.5	2	2.5	3	3.5	4
							
Plant Abundance	○	○	○	○	○	○	○

Purpose of Using the Scorecards

- Provide an informative approach to assessing physical habitat & structure
- To identify weaknesses in overall pond management
- Enable a prioritization of elements to restore
- To measure success as the "Healthy Pond Initiative" is implemented

Ultimate Goal is to obtain Ecologically Sustainable Ponds and reduce discharge of excess

Nutrients and Chemical Herbicides to the Watershed