Standardized Mitigation Monitoring and Performance Standards for Ohio: the "Part 6" Approach

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Functions, Values and Wetlands

- The terms “function” and “value” have become embedded in the language of wetland protection
- And this occurred despite the fact the Clean Water Act goal is maintenance and restoration of the chemical, physical and biological *integrity* (i.e. condition) of wetlands.
- For example, we don’t talk about the functions and values of streams....
  - the “fishery” function of streams,
  - the “pollutant dilution” function of streams
  - the “macroinvertebrate habitat” function of streams
  - the “water conveyance” function of streams

Defining Functions, Values

- “Functions”: value-neutral ecosystem processes, like decomposition rates, or nutrient cycling
- “Values”: ecological services a wetland provides to human society
- Most wetland “functions” in everyday language actually “values”

Measuring “structure” versus “function”

- A common misunderstanding is that wetland assessment methods actually measure wetland “functions” directly
- Very impractical to expect measurement of all functions for each wetland pre- and post-impact during the permitting process
- Instead, “structural” attributes (flora, fauna, physical features, etc.) of wetland are almost always measured
- “Functional capacity” inferred from the *condition* of these structural attributes in comparison to “reference standard” conditions

Example of directly measuring a function: wetland decomposition processes

- 15 sites
- 516 litter bags
- a minimum of 6 visits per site over 13 months (90 total site visits)
- 100s of hours of sample processing
- $1000s of dollars of lab costs

Elements of A Condition-Based Approach to Wetland Mitigation

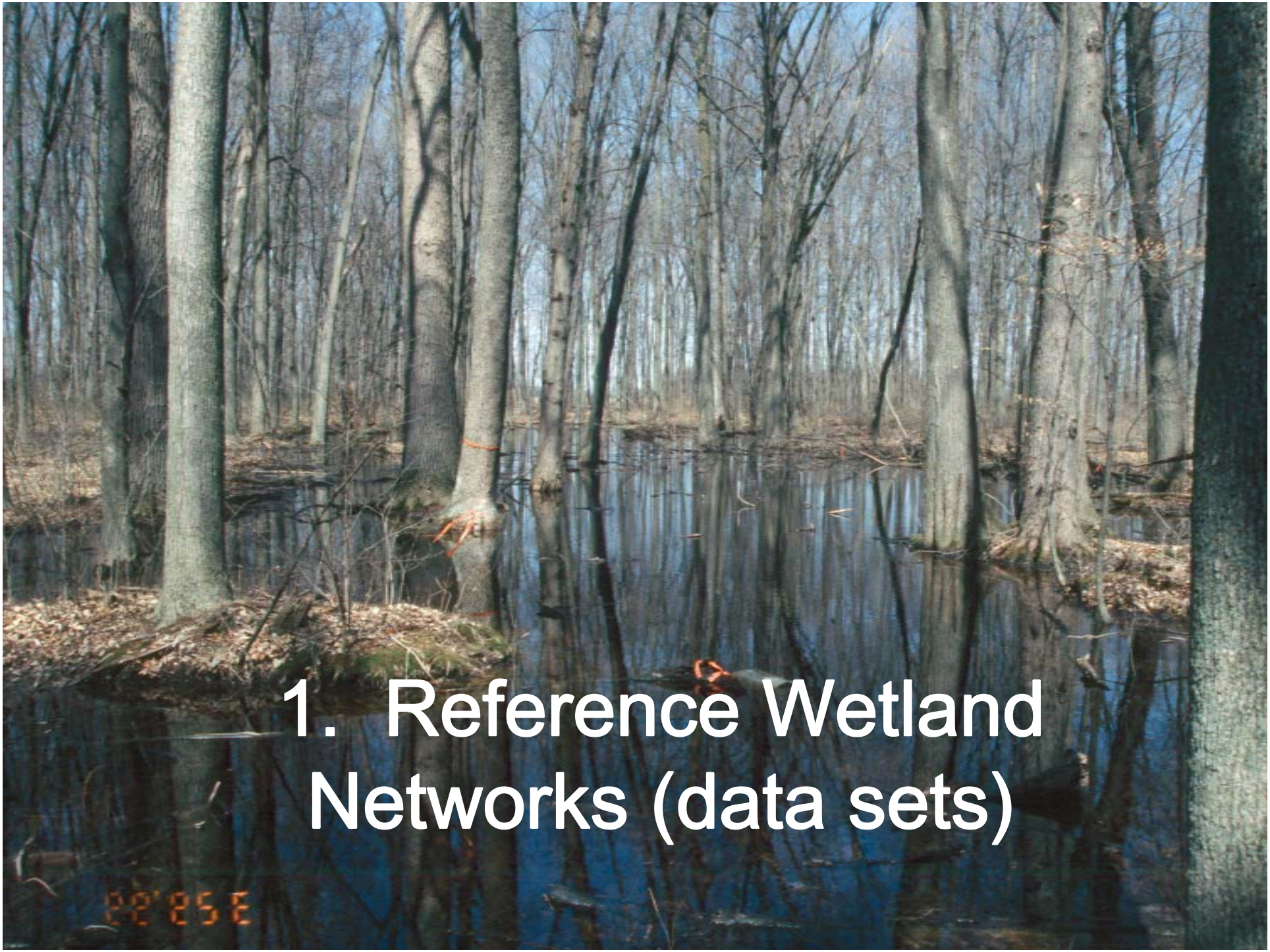
- 1) A reference wetland data set of major wetland types and disturbance regimes
- 2) A detailed wetland classification scheme that incorporates landscape position (i.e. HGM class) and dominant plant community
- 3) A “rapid” condition-based wetland assessment method
- 4) Intensive biological, chemical, hydrological measures of wetland condition
- 5) Standardized mitigation monitoring protocols and performance standards

Part 6 Report

- Implements this approach
- Includes
  - Standardized
    - performance standards
    - monitoring protocols
    - reporting formats
- Document intended to be technical underpinnings of compensatory mitigation program

Key Rule Changes Supporting this Approach

- Expanding definition of “in-kind” to include HGM class and dominant vegetation
- Flattening of mitigation ratios and allowing part of ratio >1:1 to be satisfied with upland buffer and preservation
  - since higher confidence of success with quantitative performance standards, rationale for ratios (uncertainty, deterrence) no longer apply
- Adoption of numeric biocriteria and equating wetland aquatic life categories to antidegradation categories



1. Reference Wetland Networks (data sets)

Reference Wetland Data Sets

- A condition-based approach to functional replacement has, as its foundation:
  - a reference wetland data set of natural wetlands that includes data from the major wetland types and from wetlands that span a gradient of human disturbance
  - Note: this is true for HGM models also.

Summary of numbers of Data Points by major hydrogeomorphic and plant community classes 1996-2004

Hydrogeomorphic Classes	N
Depressions	78
Riparian mainstem depression	35
Riparian headwater depression	11
Slope	32
Impoundment (beaver, human)	10
Coastal	20
Mitigation - Restoration	51
TOTAL	**237**

Plant Community Classes not including mitigations	N
Swamp forests	53
Marshes	73
Wet meadows - Fens	18
Wet meadows - Other	11
Shrub swamps	33
Bogs	7

2. Classification of Wetlands by Landscape Position (HGM class) and Plant Community

Ohio HGM Classification

	class	class modifiers
I	Depression (incl. areas that could be considered flats, e.g. "wetwoods"	(A) Surface water (sheet flow, precipitation) (B) Groundwater (seasonal to permanent input)
II	Impoundment	(A) Beaver (B) Human
III	Riverine	(A) Headwater depression (1st or 2nd) (B) Mainstem depression (3rd order or >) (C) Channel
IV	Slope (incl. hillside fens, mound fens, and lacustrine fens)	(A) Headwater (1st or 2nd order) (B) Mainstem (3rd order or larger) (C) Isolated (D) Fringing
V	Fringing (does not include lacustrine fens)	(A) Reservoir (B) Natural lake
VI	Coastal	(A) Open embayment (B) Closed embayment (C) Barrier-protected (D) River mouth (E) Diked - managed (F) Diked - unmanaged (G) Diked - failed
VII	Bog	(A) Strongly ombrotrophic (B) Moderately ombrotrophic (C) Weakly ombrotrophic
add code	Mitigation	Add appropriate pre-code to HGM class: mr - mitigation, restoration mc - mitigation, creation e.g. "mrII" = mitigation, restoration, impoundment

Ohio Plant Community Classification

(1) Forest

(a) Swamp forest

(i) oak-maple
(ii) oak -maple-ash
(iii) maple-ash
(iv) pin oak
(v) pumpkin ash
(vi) mixed forest
(vii) red maple
(viii) white pine
(ix) cottonwood
(x) river birch
(xi) other (specify)

(b) Bog Forest

(i) tamarack bog
(ii) tamarack-hardwood bog

(c) Forest seep

(i) skunk cabbage seep
(ii) sedge seep
(iii) skunk cabbage-sedge seep
(iv) other (specify)

(2) Emergent

(a) Marsh

(i) submergent marsh
(ii) floating-leaved marsh
(iii) mixed emergent marsh
(iv) cattail marsh

(b) Wet meadow

(i) wet prairie
(ii) oak openings sand prairie
(iii) prairie sedge meadow
(iv) fen
(v) reed canary grass meadow
(vi) other (specify)

(c) Sphagnum bog (incl. open kettle bogs with scattered shrubs, classic ringed bogs with open water centers and perimeters of shrubs and tamarack)

(3) Shrub

(a) Shrub Swamp

(i) buttonbush swamp
(ii) alder swamp
(iii) mixed shrub swamp
(iv) other (specify)

(b) Bog shrub swamp

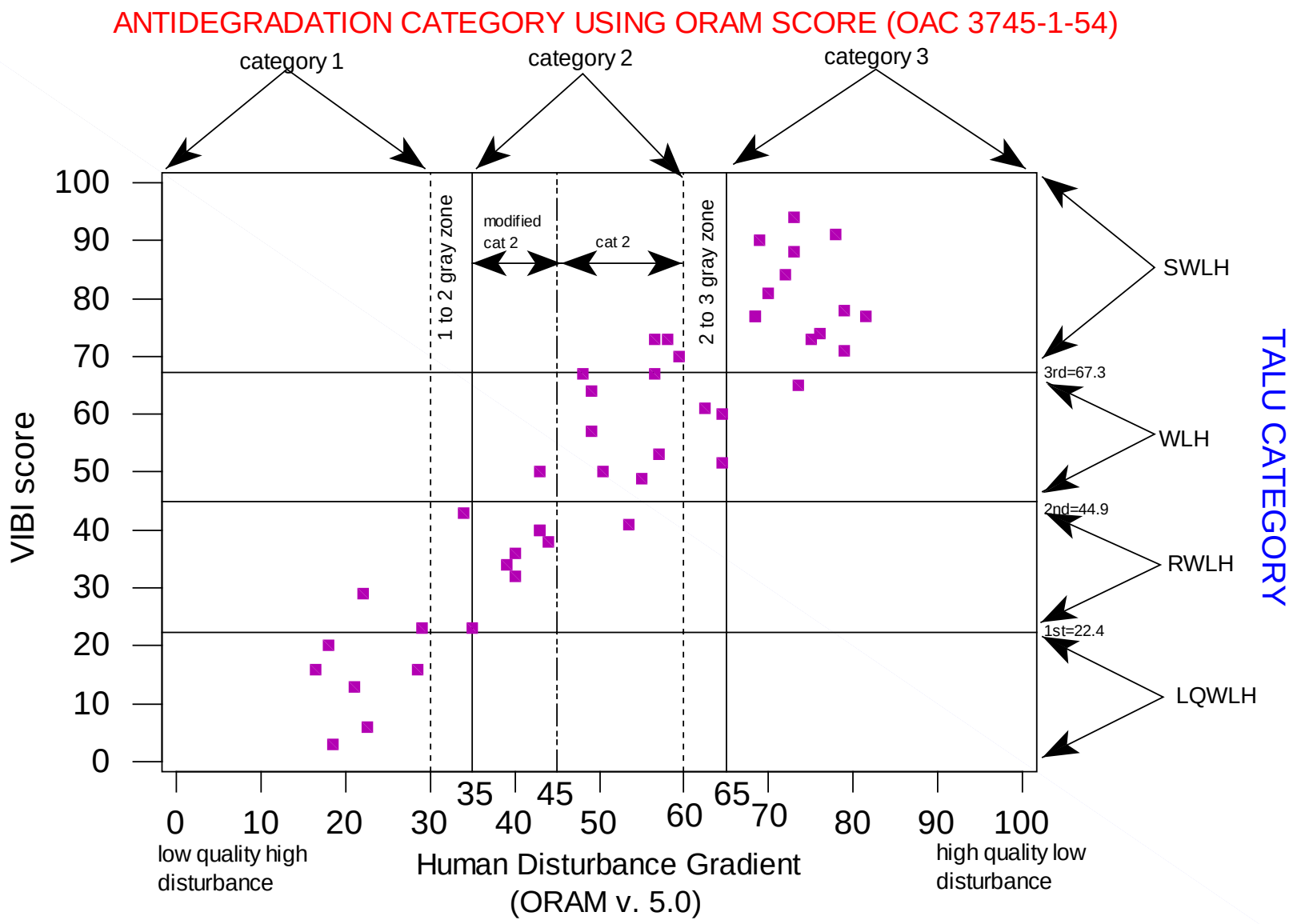
(i) tall shrub bog
(ii) leatherleaf bog

(c) Tall shrub fen

Classification

- Classification system accounts for different ecosystem processes (functions) and ecological services (values) of different wetland types
- Avoids having to develop a comprehensive list of those functions and values for every wetland assessed
- “In-kind” mitigation is then equated to classes to ensure “functional replacement”

3. Rapid Assessment Method (ORAM v. 5.0)



4. Developing quantitative, multimetric biological assessment methods

5. A condition-based approach to mitigation performance and monitoring

Steps to ensure “functional replacement”

- STEP 1.
  - As part of permit application, the HGM class and dominant plant community of the impacted wetland(s) must be determined.
  - Specifying the type of wetland will account for different ecosystem processes (functions) and ecological services (values) of different wetland types without the necessity of developing a comprehensive list of those functions and values.

Steps to ensure functional replacement

- STEP 2.
  - The condition of the impacted wetland is assessed with the rapid condition tool (ORAM v. 5.0) or a wetland IBI.
  - This provides a measure of "functional capacity" since "good" condition equates to "good" functioning, etc.

Steps to ensure functional replacement

- STEP 3.
  - The size of the wetland to be impacted is determined.
  - Mitigation ratios are then used to determine the *amount* of mitigation required.

Steps to ensure functional replacement

- STEP 4.
  - Any residual moderate to high ecological services the impacted wetland(s) may still be providing, despite moderate to severe degradation, can be evaluated
  - A checklist approach can be used with a narrative discussion
  - If necessary, a more detailed quantification of residual services can be performed

Performance Standards

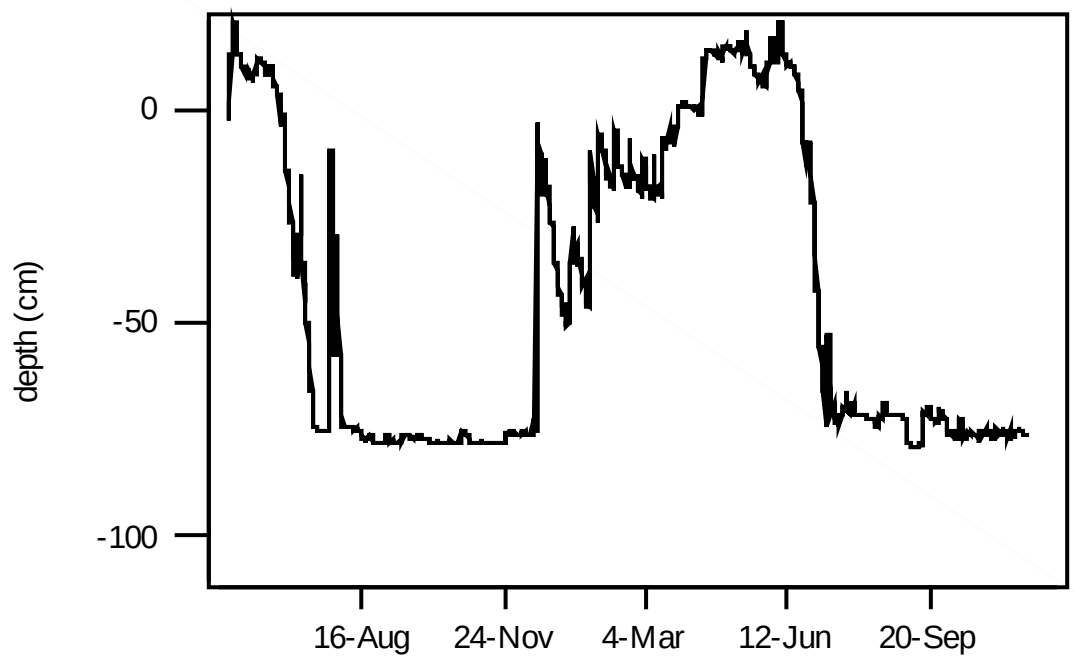
- STEP 5.
- Quantitative performance standards for wetland mitigation based on ecologic condition and key biogeochemical indicators are required:
  - Hydrology
  - Soils
  - Ecologic Condition
  - Morphometry
  - Perimeter:Area ratio
  - Basic vegetation establishment
  - Invasive species
  - unvegetated open water

An example:

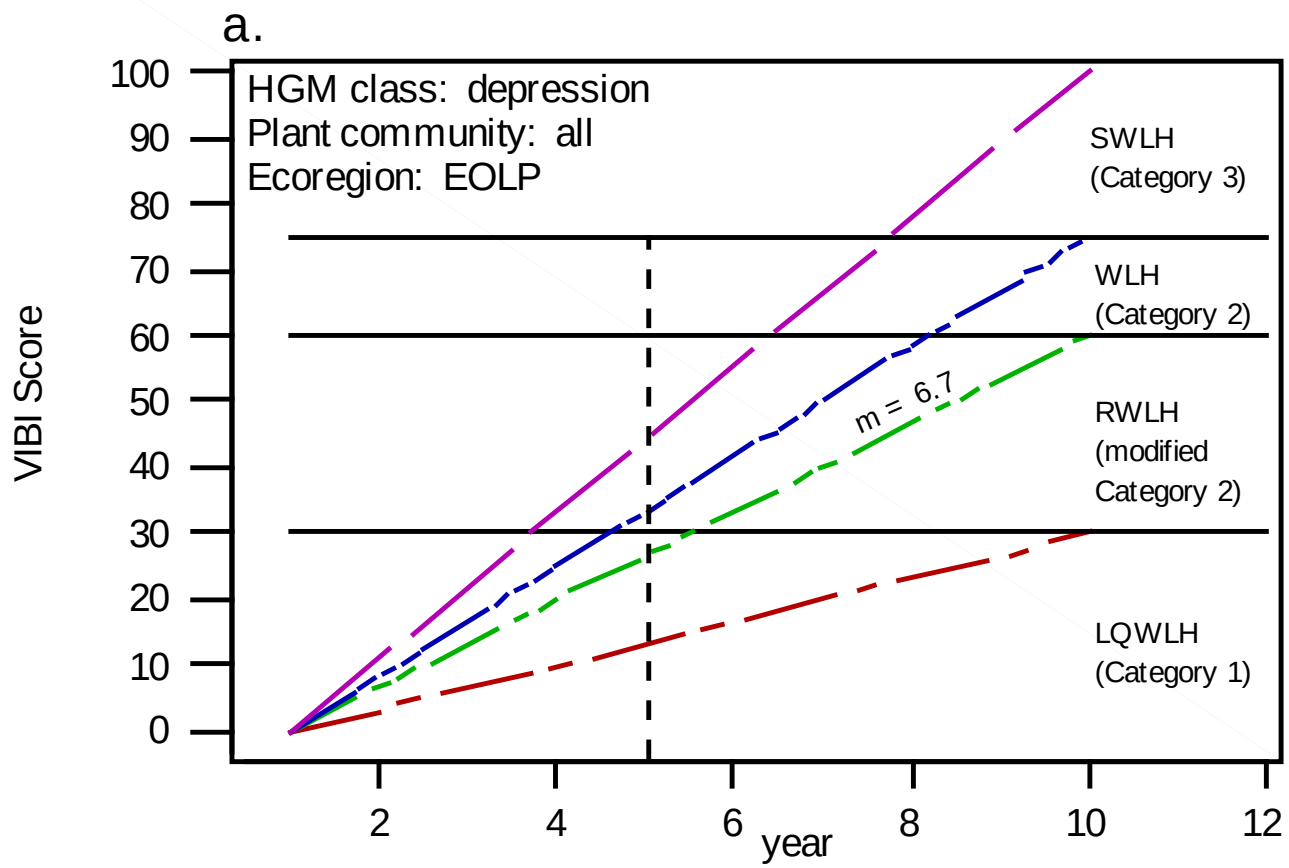
- The impacted wetland is a
  - Depression
  - Forested
  - Seasonally inundated
  - Good ecologic condition (Category 2) ORAM v. 5.0 score = 57
  - 0.5 acres
  - Northeast Ohio (Erie-Ontario Lake Plains Ecoregion)

Hydrologic equivalence

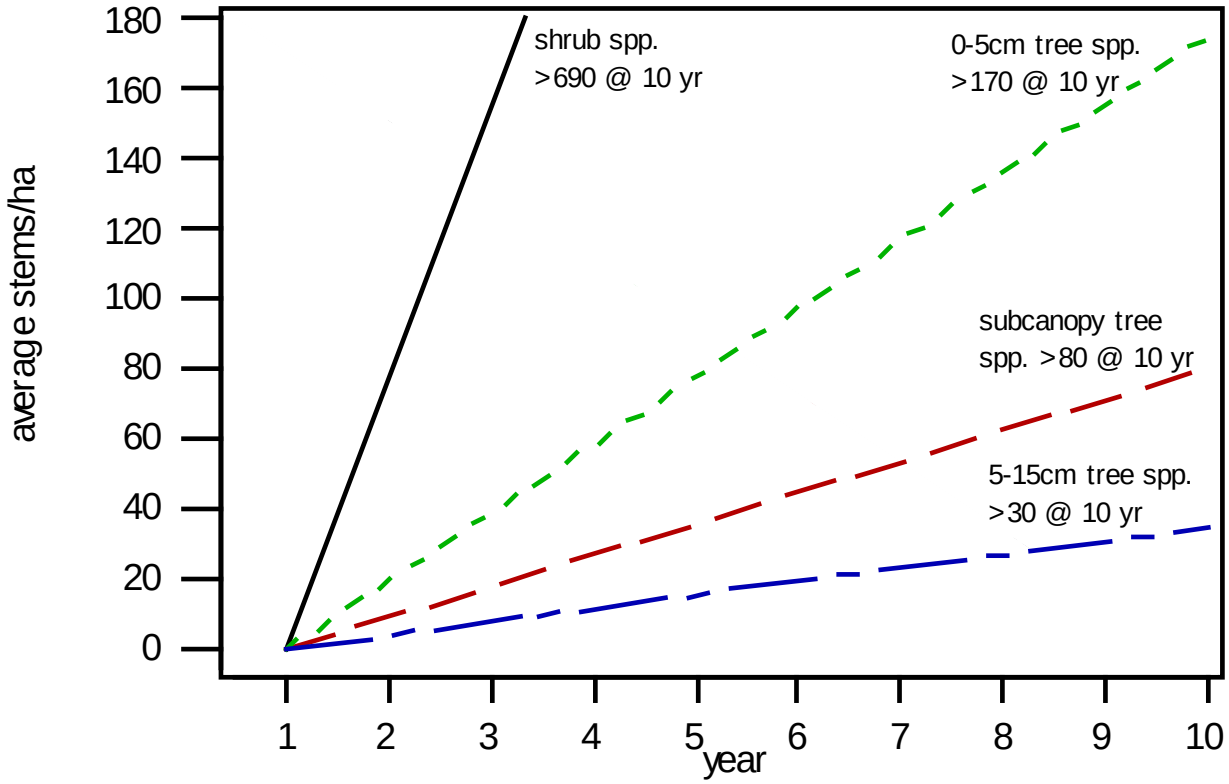
- Indicators: %time root zone saturated, average depth, typical hydrographs



Ecologic Condition



Woody Species Establishment

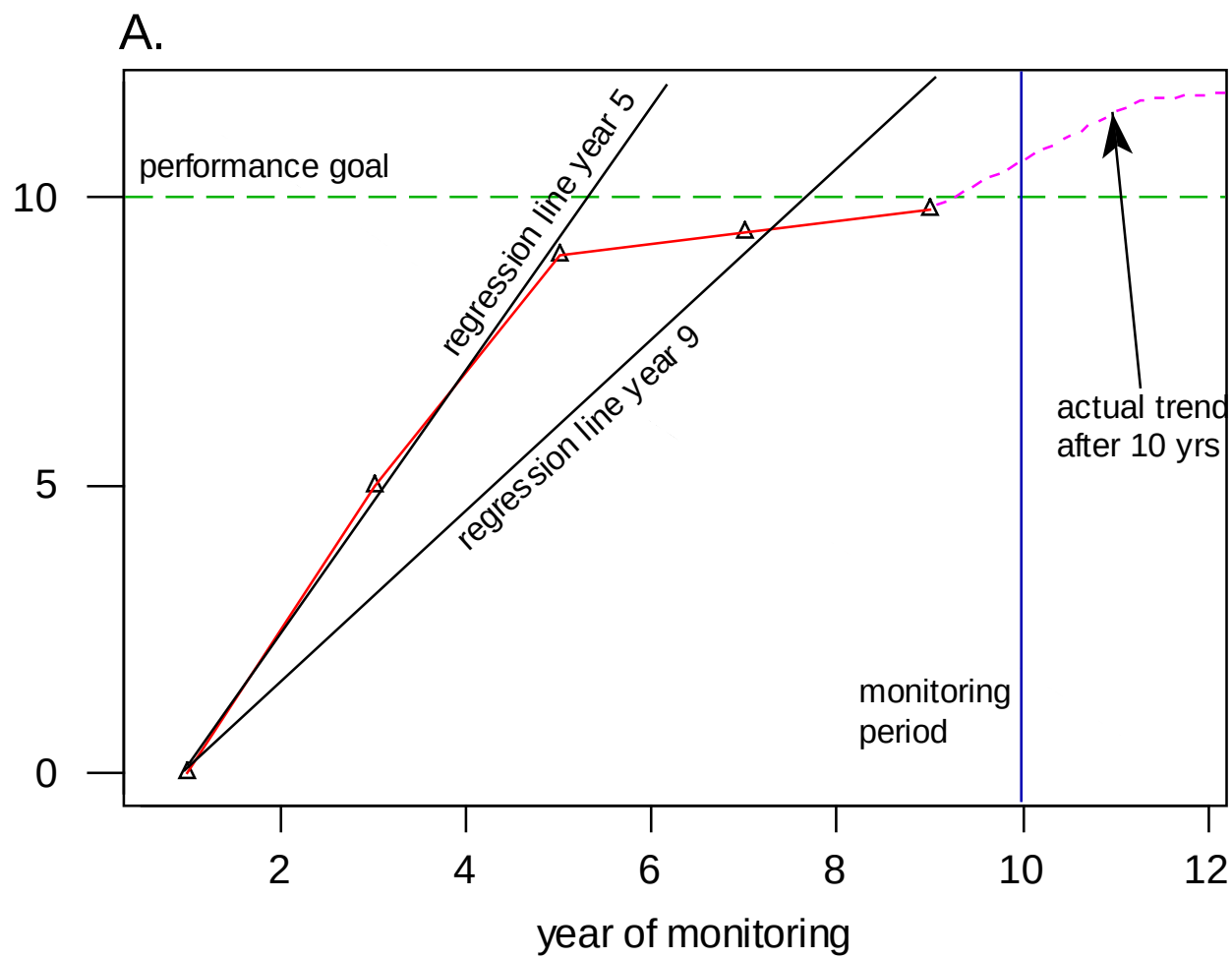


Other Standards

- Invasive species - <5% cover
- Open Water - <10% unvegetated open water
- Morphometry - >50% of perimeter with slopes shallower than 15:1
- Perimeter length – perimeter:area of mitigation wetland 75% of impacted site (limits consolidation)

Data-driven approach

- Fundamentally, the above approach is strongly data-driven
- It follows then that meaningful and adequate mitigation monitoring is absolutely necessary to determine whether the mitigation wetland has "succeeded" or "failed."


A.
performance goal
regression line year 5
regression line year 9
actual trend
after 10 yrs
monitoring
period
10
5
0
2
4
6
8
10
12
year of monitoring

Has “Functional” Replacement occurred?

- Yes, because…
  - 1) there was “no net loss” of wetland acreage,
  - 2) a mitigation wetland of same HGM class and dominant plant community was created with functions and ecological services equivalent to the impact wetland, and
  - 3) a mitigation wetland was created of equivalent “quality” as measured by biological, hydrological, and biogeochemical indicators (and therefore of equivalent functional performance).

Or to put it another way...

- IF there is...
  - 1) replacement by size of the impacted wetland,
  - 2) replacement of the type of wetland impacted (same landscape position and dominant plant community,
  - 3) and replacement of the quality of the impacted wetland as measured by quantitative, condition-based ecological performance targets,
- THEN there is very strong assurance that functional replacement is occurring

Conclusions

- Reference wetland networks are the foundational element for a comprehensive wetland program
- Fundamentally, allows you to
  - 1. quantify what is “good”;
  - 2. quantify the characteristics of natural wetlands;
  - 3. develop a detailed classification system that accounts for natural functions and services of different wetland types
  - 3. and finally, derive meaningful ecologic performance standards for wetland mitigation

Conclusions cont.

- A condition-based approach has multiple advantages:
  - avoids need to quantify each function or ecological service
  - allows for “rapid” assessment of “impact” wetlands in most situations
  - makes the permit process more predictable and simplified
    - Note: out-of-kind mitigation addressed explicitly and case-by-case
  - decisions highly defensible scientifically

Conclusions cont.

- Decision-making and evaluation of mitigation performance is
  - Data-driven,
  - Encourages adaptive management,
  - Rewards the “best” mitigation sites, applicants, and consultants by raising the floor of what is the minimum required to be a successful mitigation