



Environmental
Protection Agency

2010 Compliance Assistance Conference



Session Overview

- ★ Part I: Why this is Important
- ★ Part II: Brief Overview of Laws and Rules
- ★ Part III: Stream and Wetland Assessment Methods
- ★ Part IV: 401/Isolated Wetland Permitting Processes
- ★ Part V: What's New/What's Next



Part I:

Why this is Important



Federal Clean Water Act Goals

National water quality objective, as contained in the Federal Clean Water Act, is:

"... to restore and maintain the *chemical, physical,* and *biological* integrity of the Nation's waters."

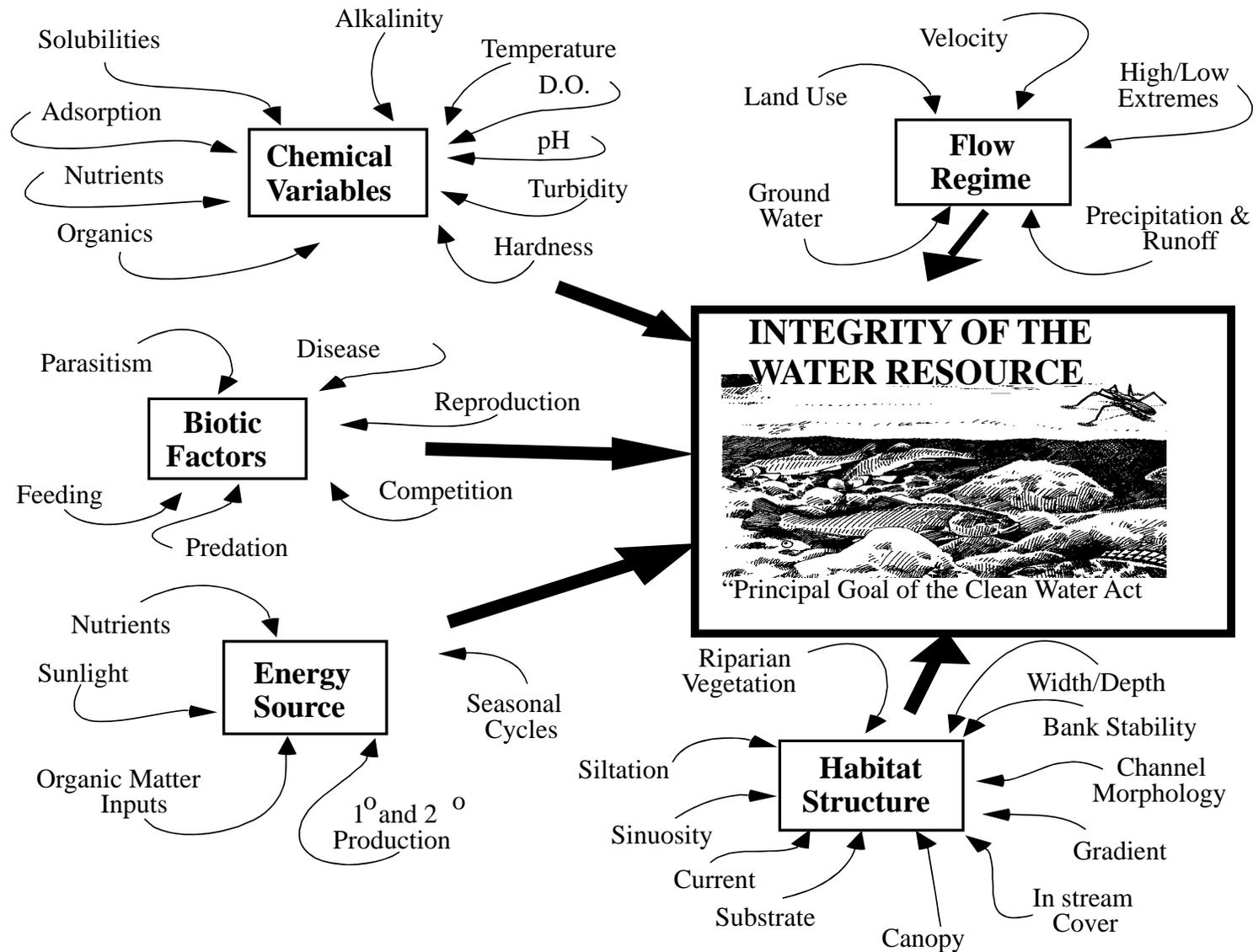


Reference Reaches

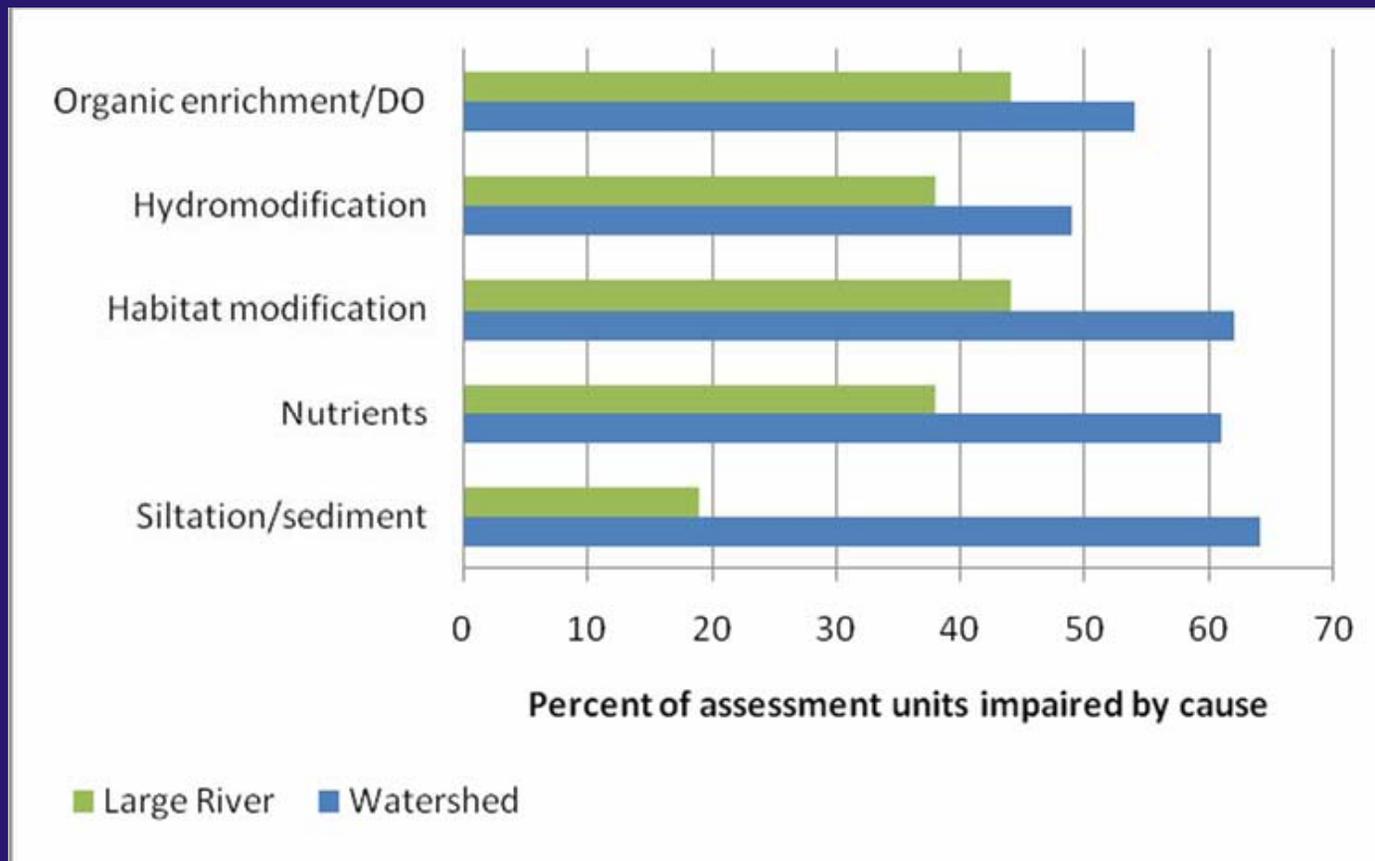
- ★ Water Quality criteria is based on reference reaches defined as the “best attainable condition” for a region of the state.
- ★ “Reference condition” does not reflect pristine pre-European settlement.
- ★ Ohio EPA has identified reference reaches in various locations of the state.



Factors that Determine Stream Quality



Five Most Common Causes of Stream Impairment



Common Wetland Functions

- ★ Wildlife Habitat
- ★ Flood water retention
- ★ Pollutant filtering and treatment
- ★ Groundwater recharge
- ★ Recreation – hunting
- ★ Education

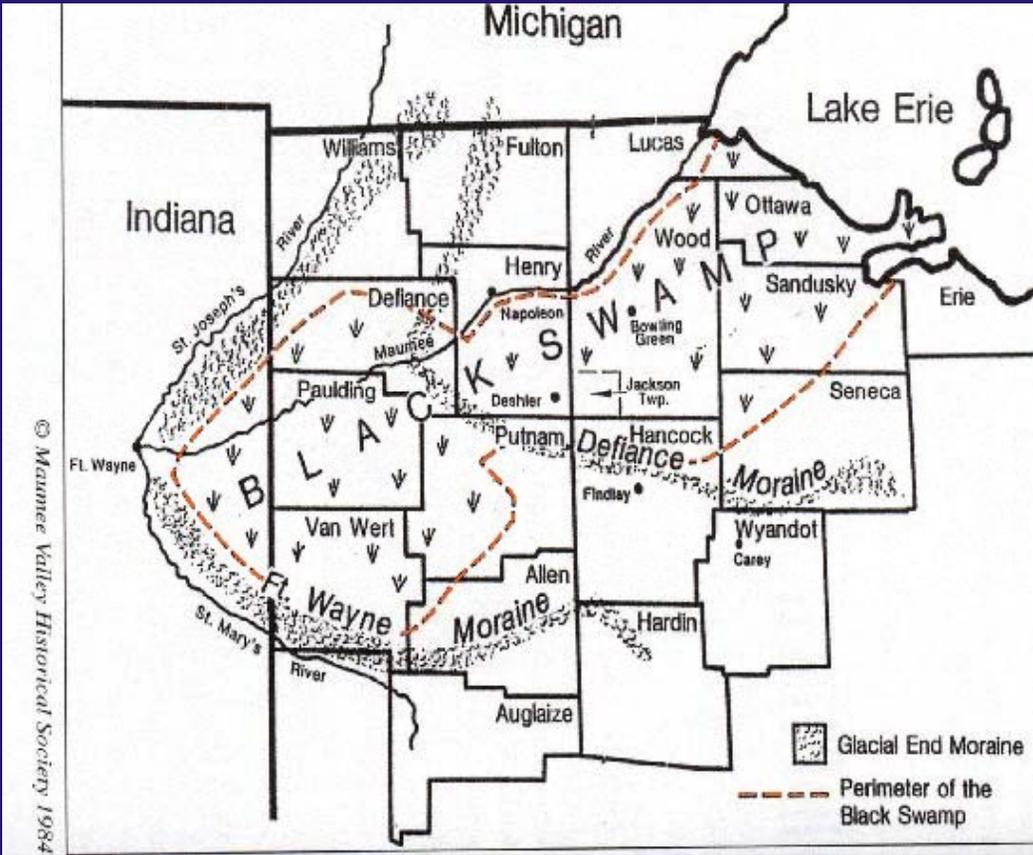


Wetlands Loss in Ohio

- ★ 90% loss of wetlands in Ohio since 1700s
- ★ 5,000,000 acres to approximately 482,000 acres remaining today
- ★ Most loss occurred in the Black Swamp in NW Ohio for agricultural purposes



Great Black Swamp



Part II:

★ Federal and State Statutes and Regulations



Federal and State Law

- ★ Federal Law – Clean Water Act Sections 404 and 401
- ★ Ohio Revised Code 6111 (for both wetlands regulated under the CWA and isolated wetlands regulated only under state law)



Federal Clean Water Act

CWA Section 404 – US Army Corps of Engineers

- Issue jurisdictional determinations to determine water regulated under the CWA
- Conduct 21 point general public interest review including streams, wetlands, floodplains, historic properties, navigation, recreation, food and fiber production, shore line erosion.....

CWA Section 401 – State Water Quality Certification Agencies (in Ohio – Ohio EPA)

Certify that proposed action does not interfere with state designated water quality standards

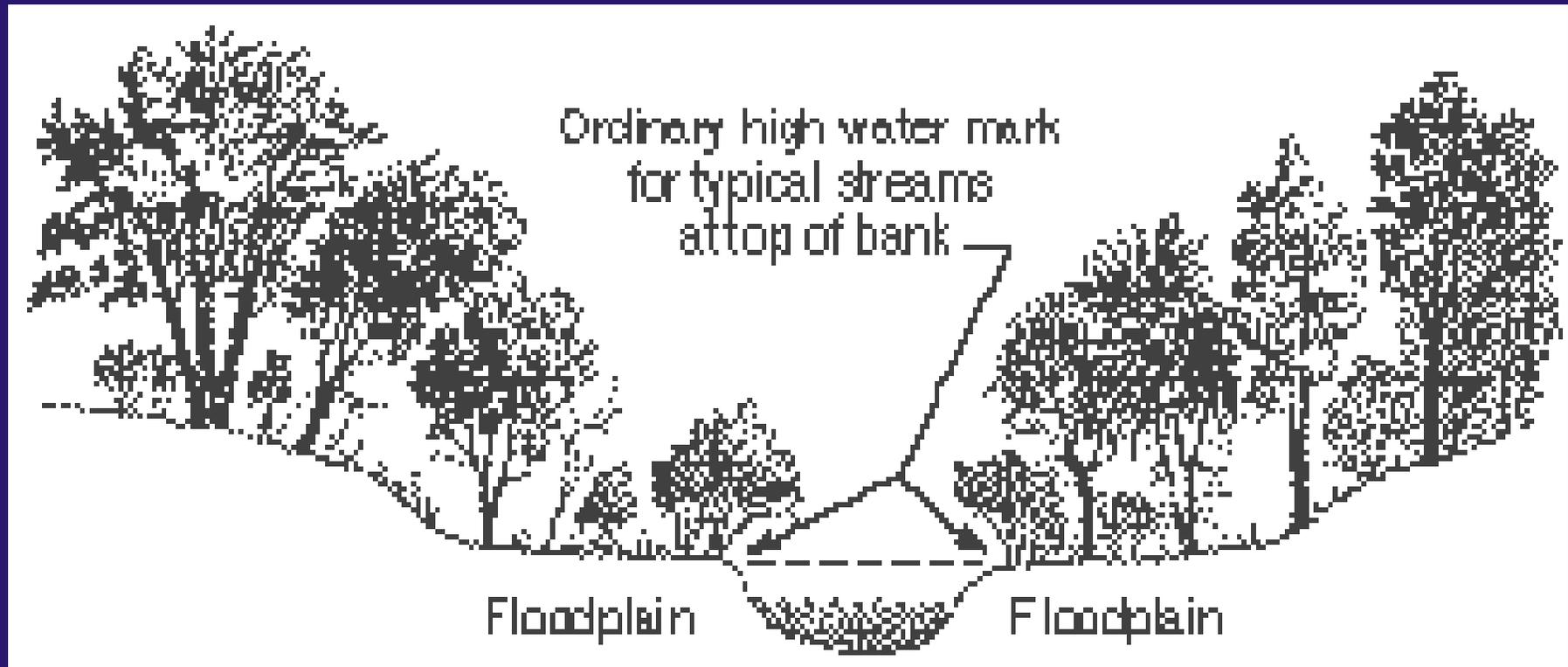


Regulated Activities

- 404/401 permits required for activities involving the discharge of dredged or fill material into waters of the US below the Ordinary High Water mark (OHWM)



Ordinary High Water Mark – Streams



Ordinary High Water Mark – Wetlands see wetland boundary



Non-404/401 Regulated Activities

- ★ Ditch maintenance – not regulated if there is no “discharge “ of dredge or fill material
- ★ Tree clearing not regulated if no mechanized land clearing
- ★ Normal farming and silviculture activities not regulated



Isolated Wetlands Not Regulated Under the Federal Clean Water Act

- ★ Solid Waste Authority of Northern Cook County – 2001 (SWANCC)
 - ★ Wetlands that are “isolated” for navigable waters are not regulated under the Federal CWA, and cannot be considered jurisdictional based solely on the presence of migratory birds



Rapanos

- ★ 2006 US Supreme Court ruling in response to legal challenge to federal jurisdiction to regulate certain streams
- ★ US Army Corps of Engineers develops a new procedure to determine jurisdictional status of streams and wetlands



Types of Federal Permits

- **General Permits** (for project with minimal impacts)
 - Nationwide permits (activity based)
 - Letter of Permission
 - Regional Permits
- **Individual Permits** (requires a rigorous analysis)
 - Section 404 permit (USACE)
 - Section 401 WQC (Ohio EPA)



Ohio EPA Nationwide Permits

★ Wetlands

- ★ Must be under ½ acres of Cat 1 or 2 wetlands
- ★ No impacts to Cat 3 wetlands authorized

★ Streams

- ★ Must be < 500 linear feet of total impact
- ★ < 200 lf of impacts to intermittent or perennial streams
- ★ <300 lf. of impacts to ephemeral streams

See 7/6/07 WQC of Nationwide Permit for exceptions

Permitting Scenarios - CWA

- ★ If less than 0.1 acres and no Cat 3 wetlands – then no notification
- ★ Activity could qualify for coverage under NWP for both 404 and 401 WQC
- ★ Activity could qualify for coverage under NWP for 404 but require individual 401 WQC
- ★ Activity could require both individual 404 permit and 401 WQC

List of Key State Statutes

- ★ 6111.02 – .029 Isolated Wetlands
- ★ 6111.12 - Antideg
- ★ 6111.3 – Application for water quality cert.



List of Key Rules

- ★ OAC 3745-1 – Water Quality Standards
- ★ OAC 3745-1- 50-54: Wetland Antidegradation
- ★ OAC – 3745-32: 401 Water Quality Certification:
 - ★ Proposed rules
 - ★ 401/Wetland/Stream Mitigation (OAC 3745-1, 3745-32 and 3745-45):
http://www.epa.ohio.gov/dsw/rules/draft_401wetland_feb06.aspx
 - ★ Water Quality Standards (OAC 3745-1):
http://www.epa.ohio.gov/dsw/rules/draft_wqs_aug08.aspx
 - ★ Section 401 Water Quality Certifications (OAC 3745-32 and 45):
http://www.epa.ohio.gov/dsw/rules/draft_401_sep08.aspx



Part III:

★ Stream and Wetland Assessment Tools



Wetland Definition

- ★ “Those areas that are inundated or saturated by surface or ground water at a frequency and duration that are sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.”



Wetland Delineation

- ★ In order for an area to be a legally defined wetland (jurisdictional and isolated) it must meet all three of the following criteria:
 1. > 50% hydrophytic vegetation
 2. Have hydric soils
 3. Presence, or indicators, of hydrology



Wetland in Summer



Same Wetland in Late Winter



Wetland Assessment Tools

- ★ Ohio Rapid Assessment Method (ORAM)
 - ★ Measures “intactness” of a wetland
- ★ Vegetative Index of Biotic Integrity (VIBI)
 - ★ Based on plant species diversity
- ★ Amphibian Index of Biotic Integrity (AIBI)
 - ★ Based on amphibian species



ORAM Form

ORAM v. 5.0 Field Form Quantitative Rating

Site: _____ Rater(s): _____ Date: _____

Metric 1. Wetland Area (size).

- max 6 pts. subtotal
- Select one size class and assign score.
- >50 acres (>20.2ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2ha) (5 pts)
 - 10 to <25 acres (4 to <10.1ha) (4 pts)
 - 3 to <10 acres (1.2 to <4ha) (3 pts)
 - 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
 - 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
 - <0.1 acres (0.04ha) (0 pts)

Metric 2. Upland buffers and surrounding land use.

- max 14 pts. subtotal
- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
 - NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young second growth forest. (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
 - HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

Metric 3. Hydrology.

- max 30 pts. subtotal
- 3a. Sources of Water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3)
 - Precipitation (1)
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Maximum water depth. Select only one and assign score.
- >0.7 (27.8in) (3)
 - 0.4 to 0.7m (15.7 to 27.8in) (2)
 - <0.4m (<15.7in) (1)
- 3c. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)
- 3d. Connectivity. Score all that apply.
- 100 year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g. forest), complex (1)
 - Part of riparian or upland corridor (1)
 - Duration inundation/saturation. Score one or dbl check.
 - Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3)
 - Seasonally inundated (2)
 - Seasonally saturated in upper 30cm (12in) (1)
- 3e. Check all disturbances observed
- | | |
|---|---|
| <input type="checkbox"/> ditch | <input type="checkbox"/> point source (nonstormwater) |
| <input type="checkbox"/> tile | <input type="checkbox"/> filling/grading |
| <input type="checkbox"/> dike | <input type="checkbox"/> road bed/RR track |
| <input type="checkbox"/> well | <input type="checkbox"/> dredging |
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> other |

Metric 4. Habitat Alteration and Development.

- max 20 pts. subtotal
- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (5)
 - Good (3)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)
- 4d. Check all disturbances observed
- | | |
|---|---|
| <input type="checkbox"/> mowing | <input type="checkbox"/> shrub/sapling removal |
| <input type="checkbox"/> grazing | <input type="checkbox"/> herbaceous/aquatic bed removal |
| <input type="checkbox"/> clearcutting | <input type="checkbox"/> sedimentation |
| <input type="checkbox"/> selective cutting | <input type="checkbox"/> dredging |
| <input type="checkbox"/> woody debris removal | <input type="checkbox"/> farming |
| <input type="checkbox"/> toxic pollutants | <input type="checkbox"/> nutrient enrichment |

last revised 1 February 2001 jjm

ORAM v. 5.0 Field Form Quantitative Rating

Site: _____ Rater(s): _____ Date: _____

Metric 5. Special Wetlands.

- max 10 pts. subtotal
- Check all that apply and score as indicated.
- Bog (10)
 - Fen (10)
 - Old growth forest (10)
 - Mature forested wetland (5)
 - Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
 - Lake Erie coastal/tributary wetland-restricted hydrology (5)
 - Lake Plain Sand Prairies (Oak Openings) (10)
 - Rialto Wet Prairies (10)
 - Known occurrence state/federal threatened or endangered species (10)
 - Significant migratory songbird/water fowl habitat or usage (10)
 - Category 1 Wetland. See Question 1 Qualitative Rating (-10)

Metric 6. Plant communities, interspersions, microtopography.

- max 20 pts. subtotal
- 6a. Wetland Vegetation Communities. Score all present using 0 to 3 scale.
- Aquatic bed
 - Emergent
 - Shrub
 - Forest
 - Mudflats
 - Open water
 - Other
- 6b. Horizontal (plan view) Interspersion. Select only one.
- High (5)
 - Moderately high(4)
 - Moderate (3)
 - Moderately low (2)
 - Low (1)
 - None (0)
- 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage
- Extensive >75% cover (-5)
 - Moderate 25-75% cover (-3)
 - Sparse 5-25% cover (-1)
 - Nearly absent <5% cover (0)
 - Absent (1)
- 6d. Microtopography. Score all present using 0 to 3 scale.
- Vegetated hummocks/tussocks
 - Coarse woody debris >15cm (6in)
 - Standing dead >25cm (10in) dbh
 - Amphibian breeding pools
- Vegetation Community Cover Scale**
- | Score | Description |
|-------|---|
| 0 | Absent or comprises <0.1ha (0.2471 acres) contiguous area |
| 1 | Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality |
| 2 | Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality |
| 3 | Present and comprises significant part, or more, of wetland's vegetation and is of high quality |
- Narrative Description of Vegetation Quality**
- | Quality | Description |
|---------|--|
| low | Low spp diversity and/or predominance of nonnative or disturbance tolerant native species |
| mod | Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp |
| high | A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp |
- Mudflat and Open Water Class Quality**
- | Score | Description |
|-------|---|
| 0 | Absent <0.1ha (0.247 acres) |
| 1 | Low 0.1 to <1ha (0.247 to 2.47 acres) |
| 2 | Moderate 1 to <4ha (2.47 to 9.88 acres) |
| 3 | High 4ha (9.88 acres) or more |
- Microtopography Cover Scale**
- | Score | Description |
|-------|--|
| 0 | Absent |
| 1 | Present very small amounts or if more common of marginal quality |
| 2 | Present in moderate amounts, but not of highest quality or in small amounts of highest quality |
| 3 | Present in moderate or greater amounts and of highest quality |

GRAND TOTAL (max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: <http://www.epa.state.oh.us/dsw/401/401.html>
last revised 4 February 2004 jjm

Vegetative Index of Biotic Integrity (VIBI)

- ★ Intensive survey of all plant species and communities within a wetland
- ★ Must be conducted in growing season June 15-September 15 in order to identify plants



Amphibian Index of Biotic Integrity (AIBI)

- ★ Assess amphibian populations residing within a wetland



Wetland Categorization

ORAM score in parenthesis

- ★ Category 1: (0-29) lowest quality
- ★ Gray Zone: (30-34.9)
- ★ Modified Category 2: (35-44.9) disturbed Cat 2
- ★ Category 2: (45-59.9) score medium quality, most common
- ★ Gray Zone: (60-64.9)
- ★ Category 3: (65-100) high quality, not as frequent
- ★ High correlation between ORAM, VIBI and AIBI scores
- ★ *Gray zone: assume next highest category unless determined otherwise thru VIBI or AIBI*

Category 1 Wetland



Category 2 Wetland



Category 3 Wetland



Stream Classification

- ★ Existing Stream Use Designations listed in the Water Quality Standards
- ★ Exceptional Warmwater Habitat - < 10% of all streams in Ohio
- ★ Warmwater Habitat – most common
- ★ Modified WWH (AMD, ditch maintenance)
- ★ Limited Resource Water – degraded
- ★ Cold Water Habitat – fish adapted to cooler temperatures
- ★ Season Salmonid

Stream Assessment Tools

- ★ Undesignated streams require a use attainability analysis (UAA)
- ★ Qualitative Habitat Evaluation Index (QHEI)
 - ★ Describes potential to support fish based on habitat
- ★ Index of Biotic Integrity (IBI)
 - ★ Evaluates fish populations
- ★ Invertebrate Community Index (ICI)
 - ★ Evaluates benthic macroinvertebrates

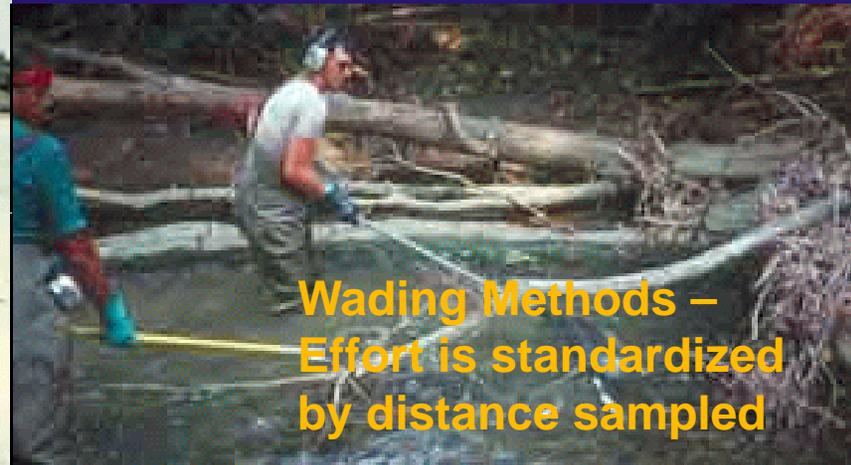
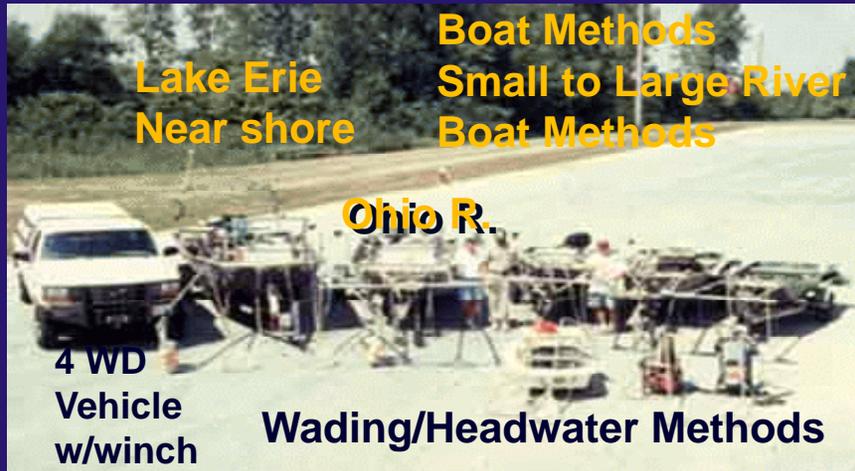


Fish Sampling



Fish Sampling

Ohio EPA Fish Assemblage Methods: Field Procedures

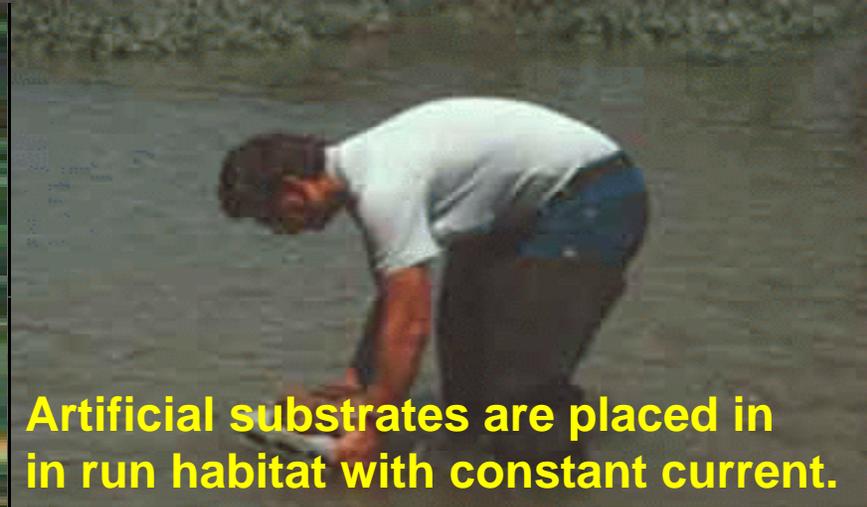


Macroinvertebrate Sampling

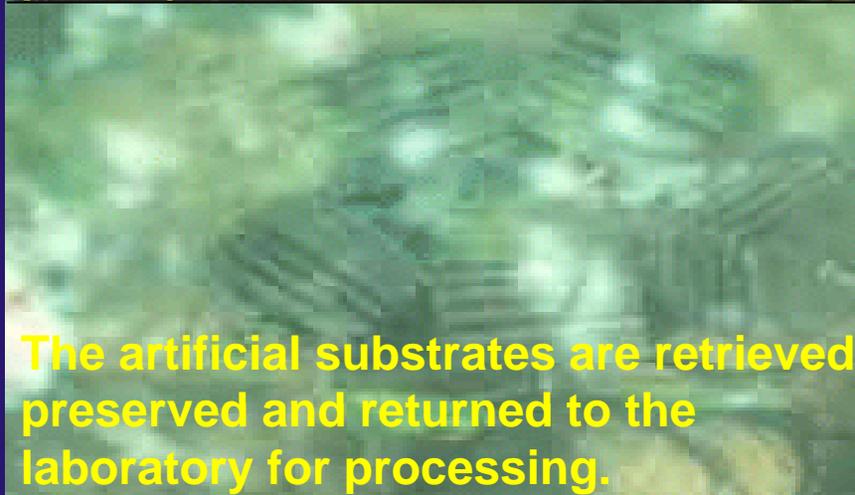
Ohio EPA Macroinvertebrate Methods: Field Procedures



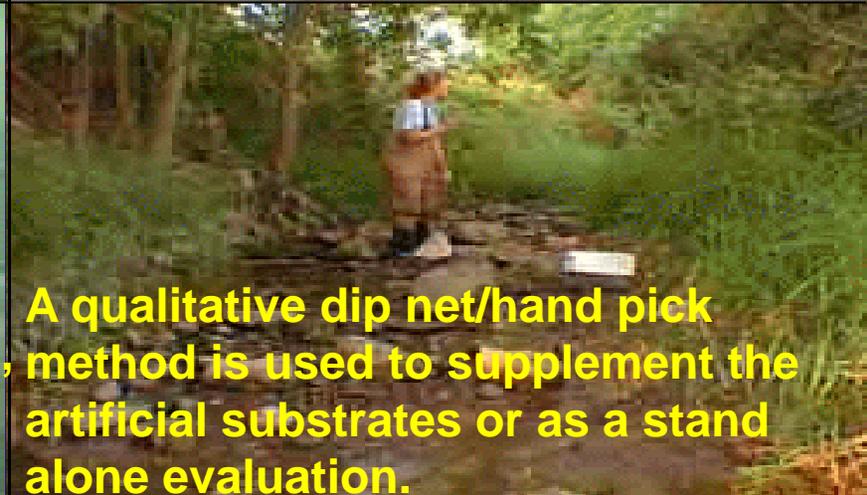
Artificial substrates are set for a six-week exposure (July-Sept. index period)



Artificial substrates are placed in in run habitat with constant current.



The artificial substrates are retrieved, preserved and returned to the laboratory for processing.



A qualitative dip net/hand pick method is used to supplement the artificial substrates or as a stand alone evaluation.

EW, WW, MW



Primary Headwater Habitat (PHWH) Streams <1 Sq mile

- Class I – Ephemeral flow
 - Little or no biota, process nutrients, store flood water, source of organic material
- Class II – Seasonal flow regime
 - Support amphibians and aquatic insects
- Class III – Permanent cold water flow regime
 - Support cool water adapted amphibians and aquatic insects

Class 1



Class 2



Class 3



Northern dusky/Long-tailed



Cautionary Note – Biology Trumps Habitat

Spring Feed Class 3 Stream Shown Below



Part IV:

- ★ The Individual 401 Water Quality Certification and Isolated Wetlands Permit Review Processes



Scope of 401/Isolated Wetlands Reviews

- ★ Housing, power plants, roads, industrial sites, shopping malls, warehouses, landfills, fleeting facilities, power lines and gas lines, sewers, coal mining, subdivisions, etc...
- ★ Anything built in stream or wetlands below the OHWM



401 Water Quality Certification Major Steps

- Pre-application coordination – not required but usually helpful)
- Submit 401 application to Ohio EPA
 - Requires jurisdictional determination and Corps public notice)
- 15 day Completeness Review of application
- Once complete* - Public Notice and Comment (30 days)
- Site visit as necessary (>90 % of sites require a site visit)
- Public Hearing (if requested or deemed necessary by Ohio EPA - 45 days)
- Prepare Response to Comments
- Act on application for WQC
- Post certification follow-up (Compliance and mitigation)



401 Water Quality Certification Major Considerations

- ★ Ohio EPA is *neither* for or against a Project (our decision is based on water quality impacts)
- ★ Project popularity is not a factor in our decision
- ★ Ohio EPA is not a land use planning agency and doesn't get involved in local zoning issues
- ★ Use of labor/non-labor workers is not considered

401 Water Quality Certification Major Considerations

- ★ What is the quality of streams and wetlands?
- ★ What is the nature/extent of the proposed impacts?
- ★ Are there direct/indirect impacts?
- ★ Have impacts been avoided or minimized?
- ★ What is the justification for proposed impacts?
- ★ What is the proposed mitigation?



Antidegradation Review

Allows the director to authorize a lowering of water quality after :

- ★ an alternatives analysis
- ★ intergovernmental review
- ★ public involvement

- ★ *And* director determines the project will not result in violation of aquatic life use designation

Wetlands Criteria

- ★ No impacts to Category 3 wetlands may be authorized unless the applicant demonstrates the project satisfies a “public need”



Antidegradation Review Alternative Analysis

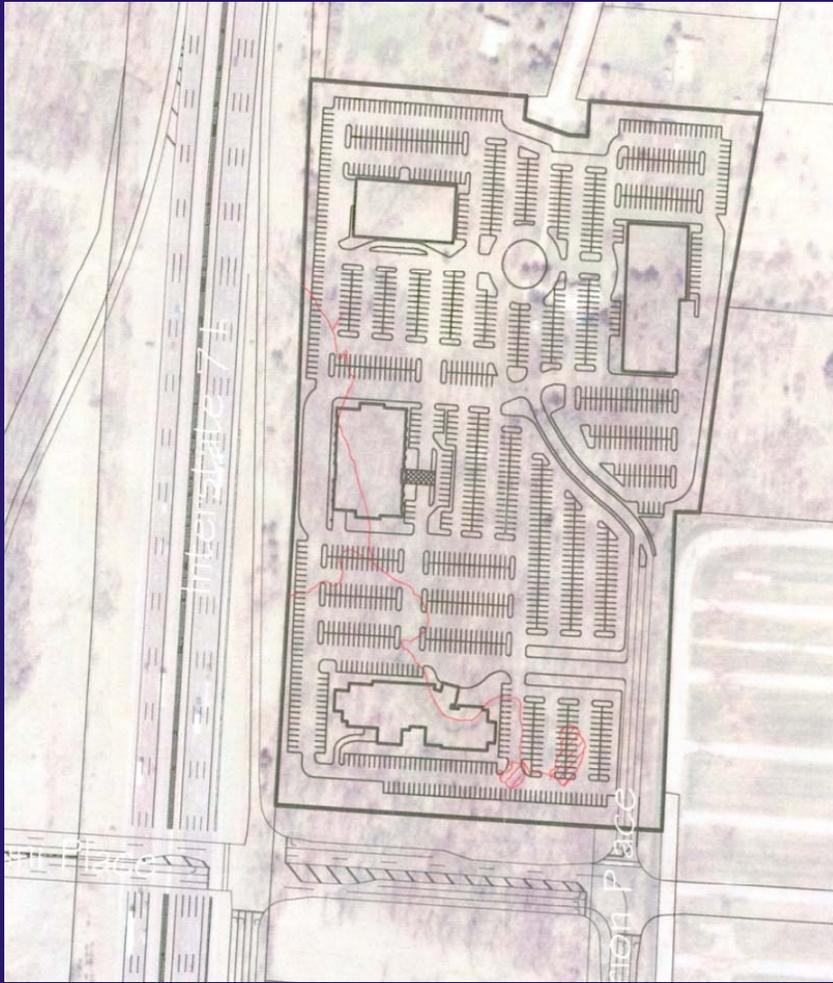
- 1) Preferred Alternative – greatest impact
- 2) Minimal Degradation Alternative – reduce impacts from preferred alternative (may offer more than one min-deg alternative)
- 3) Non-degradation Alternative – no impact
- 4) Mitigative technique – to offset unavoidable impacts

Alternatives Analysis

- ★ Alternatives will vary from project to project and project type to project type
- ★ Example – pipeline
- ★ Preferred – open cut all water bodies
- ★ Minimal Degradation – some open cut some trenchless crossings
- ★ Non-degradation – all trenchless crossings



Alternatives Analysis



- ★ Example Preferred Alternative

Alternatives Analysis



- ★ Example Minimal Deg. Alternative

Alternatives Analysis



- ★ Example Non-Deg Alternative

Intergovernmental Review

- ★ A copy of the 401 application is shared with the Ohio Department of Natural Resources, the US Fish and Wildlife Service, and OEPA, Division of Drinking and Ground Water



Public Participation

- ★ An announcement is published in the Legal Notices in the newspaper with the widest circulation in the county in which the project is located.
- ★ Copies of the public notice sent to established mailing lists for a county or region.
- ★ Public has thirty days to submit comments from day the public notice appears in the newspaper.
- ★ Public may request a formal public hearing



Mitigation

- ★ Can only be considered after determination that impacts are allowable
- ★ Mitigation cannot be used to justify impacts
- ★ If impacts are too severe, no amount of mitigation can be used to allow the impacts



Antidegradation Review Wetland Mitigation

- Mitigation Techniques
 - On-Site (on the property or within one mile from the site in the same watershed)
 - Off-Site not at a bank (greater than one mile from the site)
 - Banks
- Monitoring for at least 5 years (10 years for forested mitigation wetlands)
- Require mitigation wetlands be of equal or higher quality than impacted wetlands

Antidegradation Review Stream Mitigation

- ★ Consider on-site restoration or relocation
- ★ Off-site 1.5:1 Mitigation Ratio
 - ★ Restoration
 - ★ Preservation
- ★ New stream mitigation rules are under consideration



401 Water Quality Certification

Possible Outcomes of 401 Review

- ★ Project approved as is (any alternative presented in the application)
- ★ Project approved with modifications
- ★ Project denied
- ★ Project withdrawn



Isolated Wetlands



Significant Legal Cases

- ★ January 2001 – US Supreme Court ruling in the Solid Waste Agency of North Cook County (SWANCC) case removes “isolated” wetlands from jurisdiction under the CWA
- ★ July 2001 - Governor Taft signs HB 231 into law granting Ohio EPA authority to regulate activities in “isolated” wetlands

Isolated Wetlands

★ 3 levels of review for isolated wetlands

Level 1	Level 2	Level 3
<= 1/2 acre of CAT 1 or 2 wetlands	>1/2 acre of CAT1 wetlands or >1/2 and <= 3 acres of CAT 2 wetlands	>3 acres of CAT 2 wetlands or any CAT 3 wetlands
30 day review	90 day review	180 day review

Level 1 Review

- ★ Requires a Pre-Activity Notification (PAN)
- ★ Still requires JD from the Corps
- ★ Automatically approved with in 30 days
- ★ Must submit level 2 application if notified that project does not qualify for Level 1
- ★ Applicant can mitigate at a bank without objection of the Director



Level 2 Review

- ★ Requires PAN/ JD letter from the Corps
- ★ Requires an alternatives analysis and avoidance of high quality wetlands
- ★ Review within 90 days



Level 3 Review

- ★ Essentially identical to an individual 401 review under Antidegradation Rules
- ★ Review within 180 days



Part V What's New/What's Next



401 is constantly evolving

- ★ 1996 Antidegradation Rule revisions
- ★ Wetland Antidegradation
- ★ 2001 SWANCC Ruling– isolated wetlands
- ★ 2005 Budget Bill and Process Revisions
- ★ 2006 Rapanos Ruling
- ★ 2007 Tulloch Ruling
- ★ Corps/USEPA Wetland Mitigation Rule



401 is constantly evolving

- ★ Primary Headwater Stream Assessments
- ★ Current Stream/Wetland Rule Workgroups
- ★ Stream Mitigation rules
- ★ Discussion with the AG community regarding ditch maintenance
- ★ Cumulative Impacts
- ★ Seek better integration with storm water, TMDLs

Major Program Development Initiative Underway

- ★ Formal pre-application
- ★ Revised 401 application form and guidance document
- ★ Possible electronic application form
- ★ Tiered reviews
- ★ Technical Review Criteria
- ★ Web Page redesign
- ★ External Training

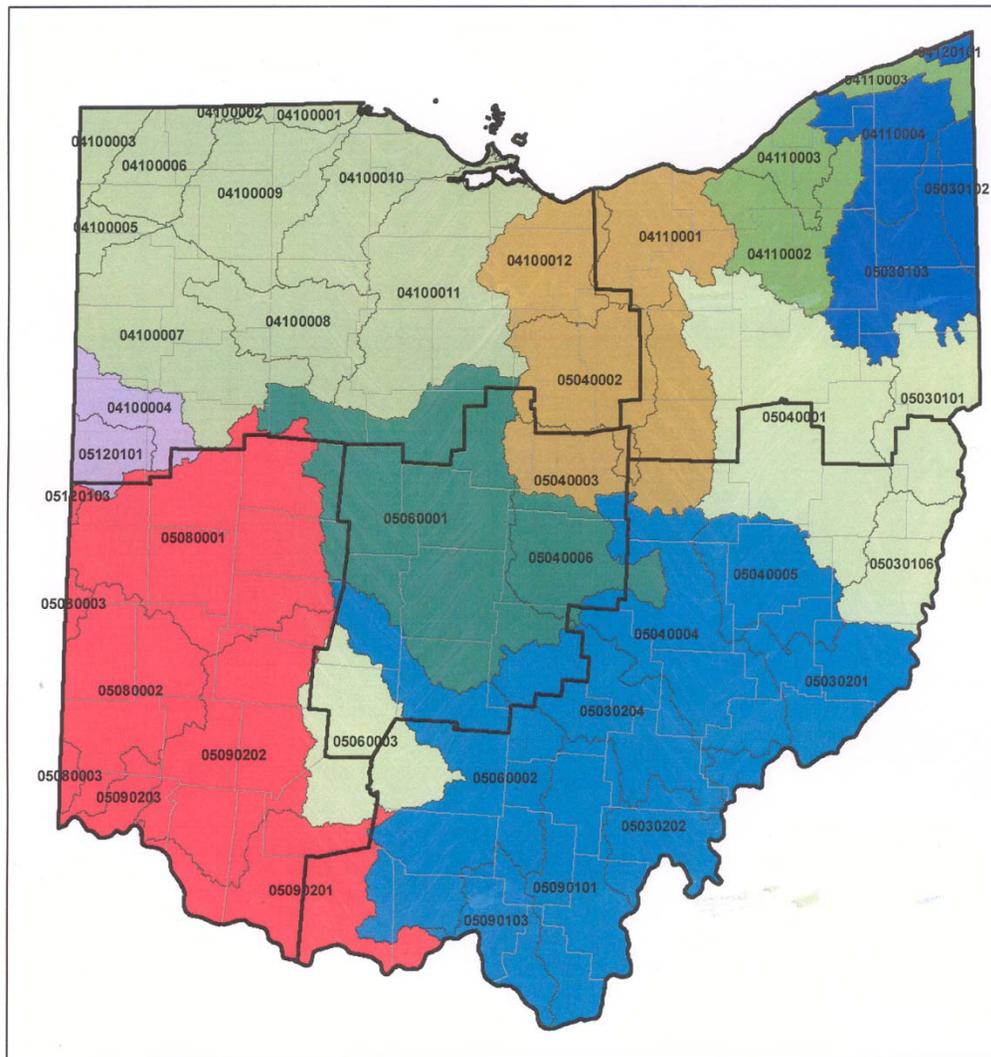


How can you expedite the review

- ★ Complete application first time
- ★ Complete, accurate stream and wetland assessment done during proper season
- ★ Meaningful alternatives analysis
- ★ Appropriate mitigation plans
- ★ Notify agency of changes to design



Watershed Contacts for 401 Water Quality Certifications & Isolated Wetland Permits

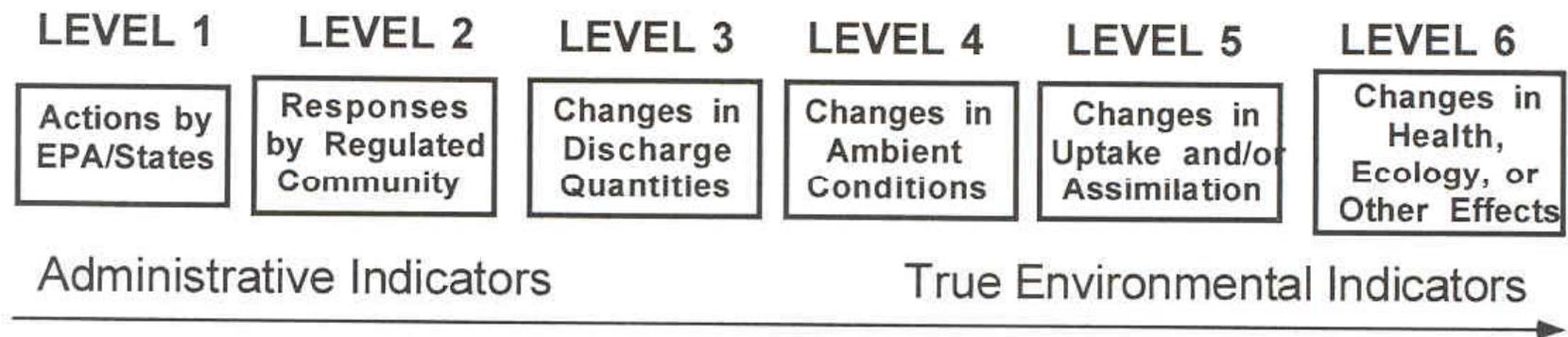


- | | | | |
|---------------|-----------------|--------------|-------------------|
| Dan Osterfeld | Joe Loucek | Rahel Babb | Ohio EPA Disticts |
| Ed Wilk | Lauren McElaney | Rose McLean | |
| Jeff Boyles | Ben Smith | Tom Harcarik | |

OhioEPA
October 14, 2009



HIERARCHY OF INDICATORS USED BY OHIO EPA



INFORMATION CURRENTLY AVAILABLE TO OHIO EPA

- | | | | | | |
|---|--|---|---|--|--|
| <ul style="list-style-type: none"> • NPDES • Funding • NPS (319) • CSOs • Stormwater • 404/401 • Stream Protection | <ul style="list-style-type: none"> • POTW Const. • CSO Controls • Local ordinances • Stormwater controls • NPS BMPs | <ul style="list-style-type: none"> • Loadings • WET/TRE • NPDES viol. • Spills, kills • Other releases | <ul style="list-style-type: none"> • Water column • Sediment • Habitat • Land use | <ul style="list-style-type: none"> • Tissue contaminants • TMDL • Biomarkers • Habitat | <ul style="list-style-type: none"> • Biota (Biocriteria) • Bacterial • Target assemblages |
|---|--|---|---|--|--|

Figure 1. Hierarchy of indicators used by Ohio EPA. Administrative indicators are those that are used to manage the regulated community. True environmental indicators are those that are used to assess the health of the environment.

My Contact Information

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