

# **Aquatic Life Designated Uses and Use Attainability Analyses**

**Stream Classification Committee  
June 28, 2012**

- Thank you for this opportunity
- Some of this information supported by US EPA Grant X-98746601-6, or 'EWRAP'
- For More Information about EWRAP, please visit <http://www.erc-env.org/EWRAP.htm>

- **UAA Procedures and Corresponding Use(s)**  
A 'Missing Piece' of the 2012 Rulemaking Puzzle?
- **Accurate Water Quality Standards are Needed**  
Unachievable expectations can drive:
  - ✓ unnecessary TMDLs
  - ✓ unaffordable permit limits
  - ✓ misallocated study or restoration funding
  - ✓ distraction from more important issues
  - ✓ inflexible standards – risk of under and overprotection

# Where Do We Go From Here?



- Uses that consider natural and/or anthropogenic differences
- Use Attainability Protocols
- Criteria reflecting inherent differences

# Aquatic Life Use Classification

- Recognition of Natural or Induced Differences
  - Differences could include:
    - habitat diversity and abundance
    - frequency and duration of flow
    - temperature regime
    - large-scale physiogeographic characteristics
    - biological condition relative to natural

(Biological Condition Gradient, Tiered Aquatic Life Use)
  - Differences form Basis for Categorization/Classification
- Determines Biologic Potential?

# Missouri Ecoregional Differences



- Oklahoma

- statewide, fishery/temperature-based, one UAA 'bin'

Level 1	Level 2	Use Description
Fish and Wildlife Propagation	<b>Habitat Limited Aquatic Community Subcategory</b>	Habitat limited aquatic community means a subcategory of the beneficial use "Fish and Wildlife Propagation" where the water chemistry and habitat are not adequate to support a "Warm Water Aquatic Community" because of UAA Factors (lists 40 CFR 131.10g rationale....).
	<b>Warm Water Aquatic Community Subcategory</b>	Warm Water Aquatic Community means a subcategory of the beneficial use category "Fish and Wildlife Propagation" where the water quality and habitat are adequate to support climax fish communities.
	<b>Cool Water Aquatic Community Subcategory</b>	Cool Water Aquatic Community means a subcategory of the beneficial use category "Fish and Wildlife Propagation" where the water quality, water temperature and habitat are adequate to support cool water climax fish.
	<b>Trout Fishery Subcategory</b>	Trout Fishery (Put and Take) means a subcategory of the beneficial use category "Fish and Wildlife Propagation" where the water quality, water temperature and habitat are adequate to support a seasonal put and take trout fishery. Typical species may include trout.

# Examples of ALU Frameworks

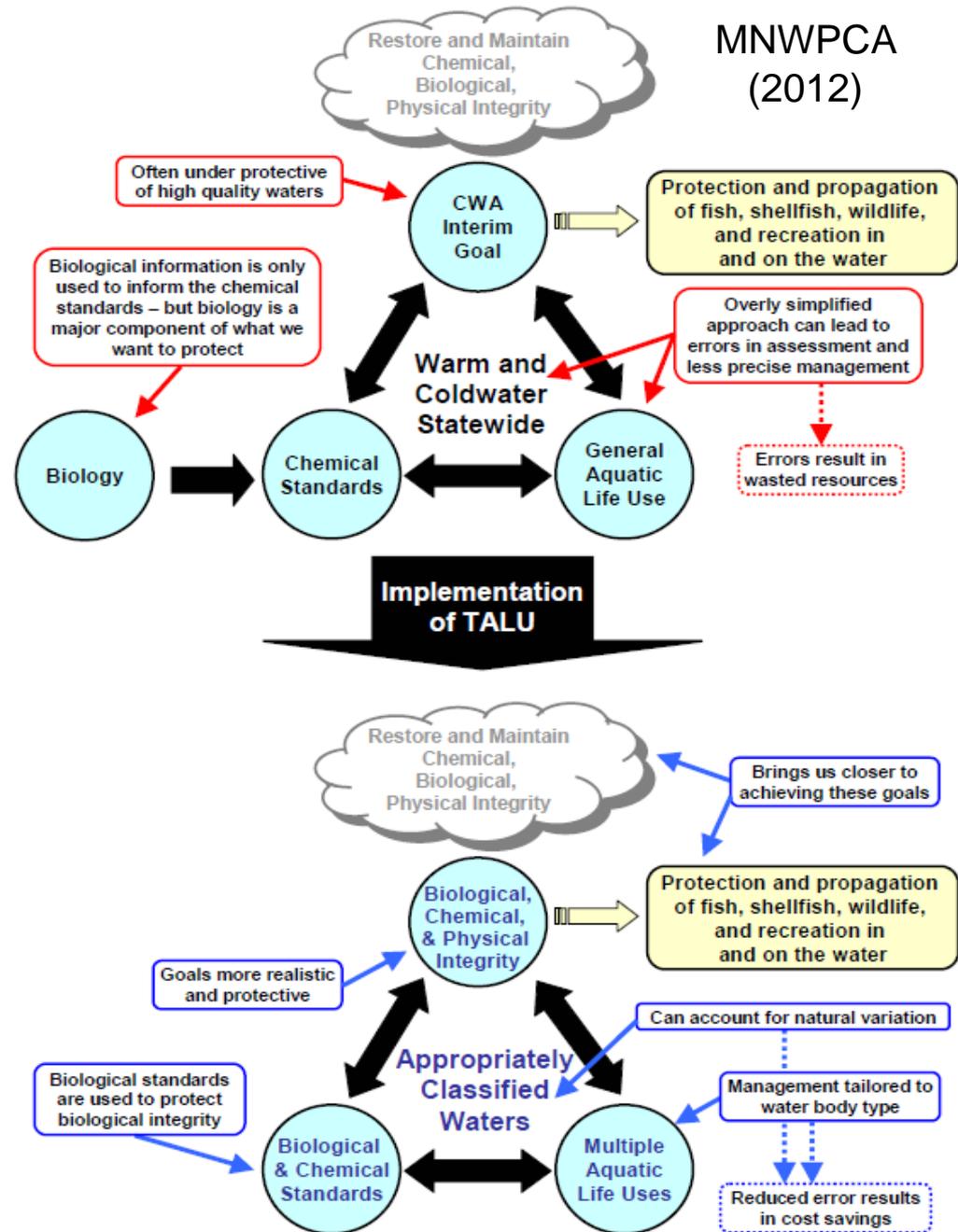
- Iowa - statewide, fishery/temperature-based, WW-1 default, thus UAAs have sought WW-2 and WW-3

Level 1	Level 2	Use Description
Warm Water Aquatic Life Use	<b>Type 1 (Class "B(WW-1)")</b>	Waters in which temperature, flow and other habitat characteristics are suitable to maintain warm water game fish populations along with a resident aquatic community that includes a variety of native fish and invertebrate species. These waters generally include border rivers, large interior rivers, and the lower segments of medium-size tributary streams.
	<b>Type 2 (Class "B(WW-2)")</b>	Waters in which flow or other physical characteristics are capable of supporting a resident aquatic community that includes a variety of native non-game fish and invertebrate species. The flow and other physical characteristics limit the maintenance of warm water game fish populations. These waters generally consist of small perennially flowing streams.
	<b>Type 3 (Class "B(WW-3)")</b>	Waters in which flow persists during periods when antecedent soil moisture and ground water discharge levels are adequate; however, aquatic habitat typically consists of non-flowing pools during dry periods of the year. These waters generally include small streams of marginally perennial aquatic habitat status. Such waters support a limited variety of native fish and invertebrate species that are adapted to survive in relatively harsh aquatic conditions.
Cold Water Aquatic Life Use	<b>Type 1 (Class "B(CW1)")</b>	Waters in which the temperature and flow are suitable for the maintenance of a variety of cold water species, including reproducing and nonreproducing populations of trout (Salmonidae family) and associated aquatic communities.
	<b>Type 2 (Class "B(CW2)")</b>	Waters that include small, channeled streams, headwaters, and spring runs that possess natural cold water attributes of temperature and flow. These waters usually do not support consistent populations of trout (Salmonidae family), but may support associated vertebrate and invertebrate organisms.

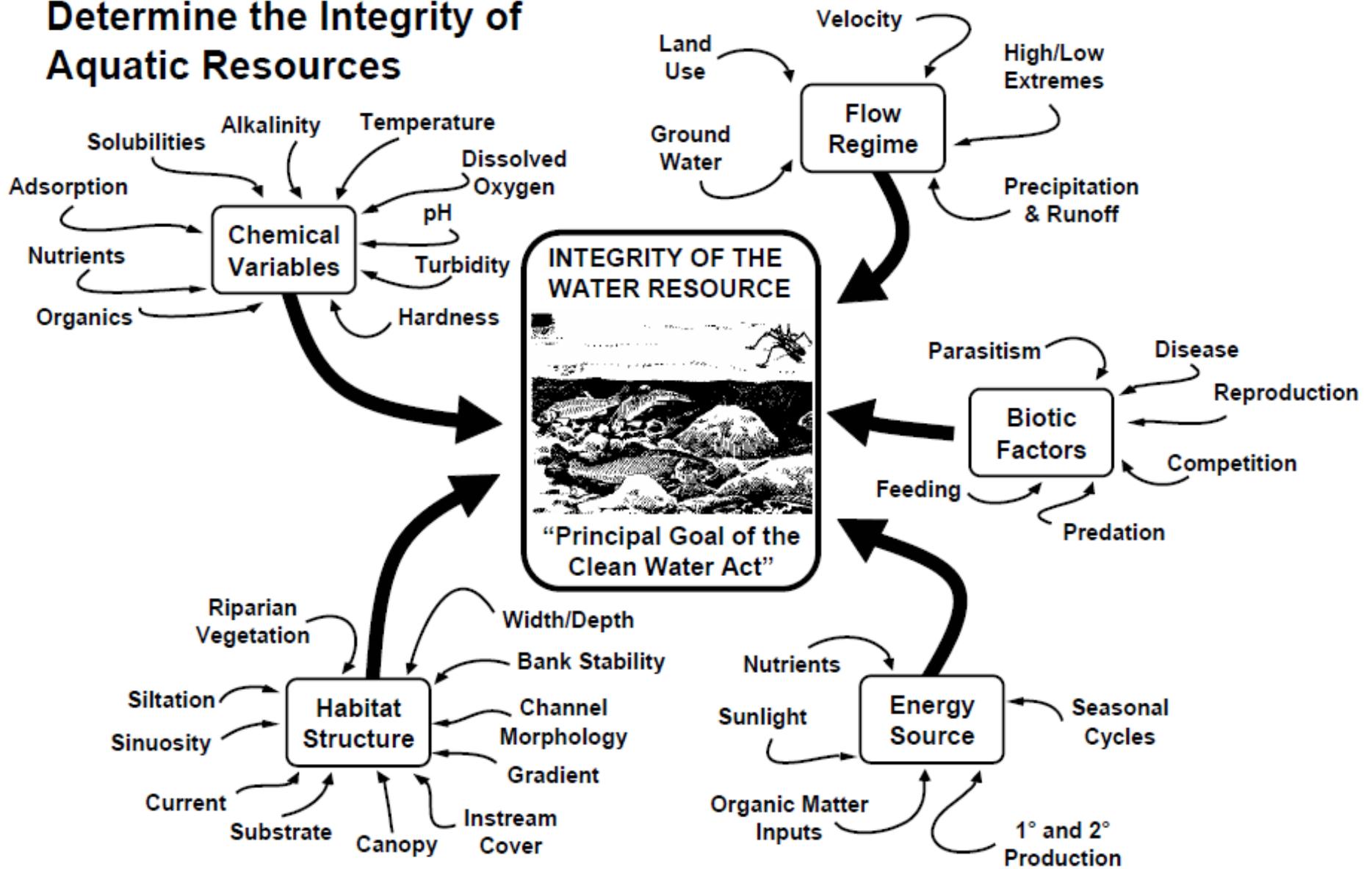
# Tiered Aquatic Life Uses

- natural variation
- realistic & sustainable condition
- 'Existing Uses'
- Antidegradation
- biocriteria (data driven)
- stressors limiting potential

MNWPCA (2012)



# The Five Major Factors That Determine the Integrity of Aquatic Resources



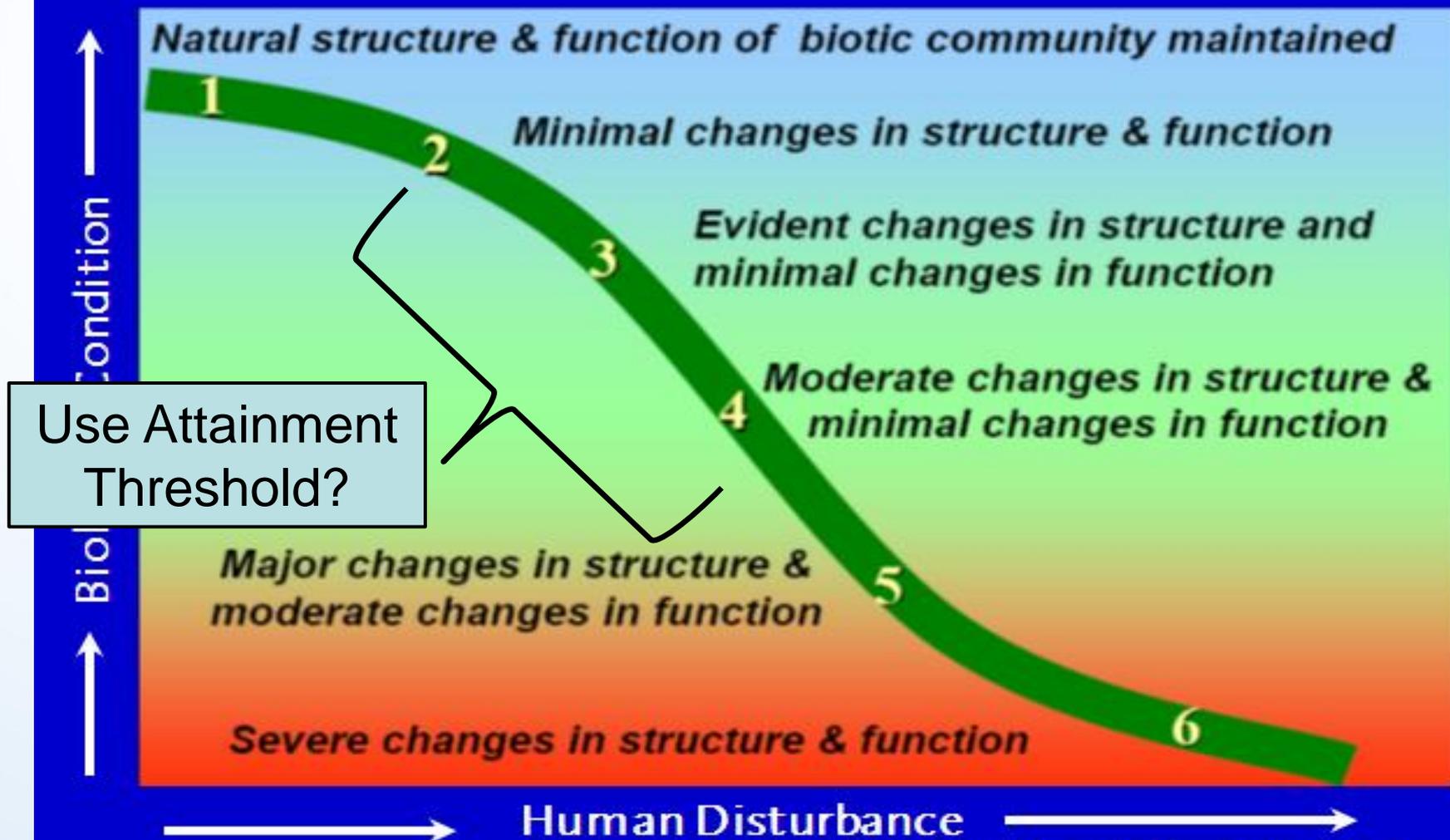
## **Definition of Aquatic Life Use** (Chris Yoder, 2009)

A designation (classification) assigned to a waterbody based on the potential aquatic assemblage that can realistically be sustained given the regional reference condition and the level of protection afforded by the applicable criteria.

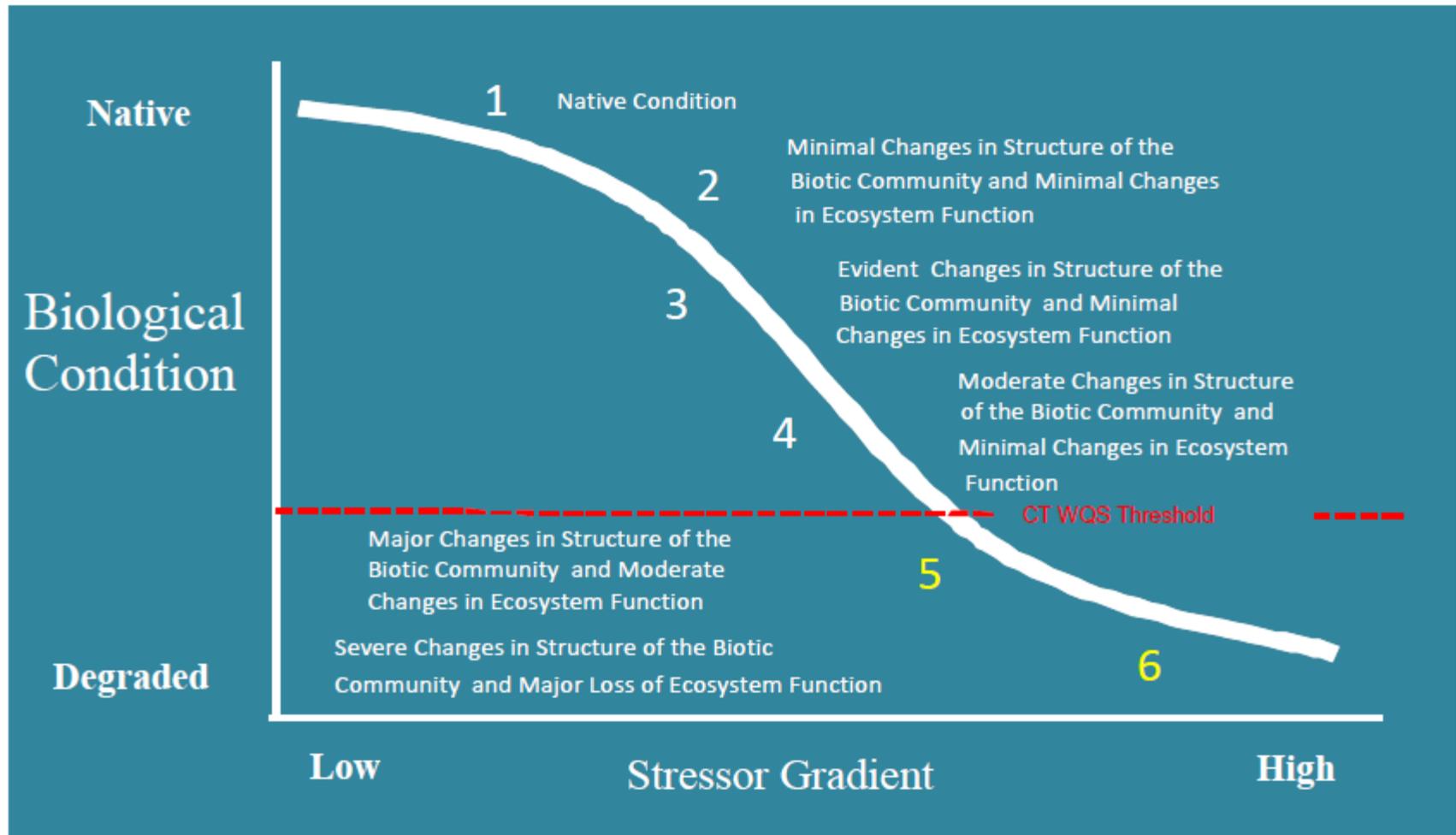
## **Definition of Reference Sites** (Chris Yoder, 2001)

A collection of sites within a homogenous regional area which represent the best attainable conditions (unimpaired) for all waters with similar physical dimensions and attributes for that particular region

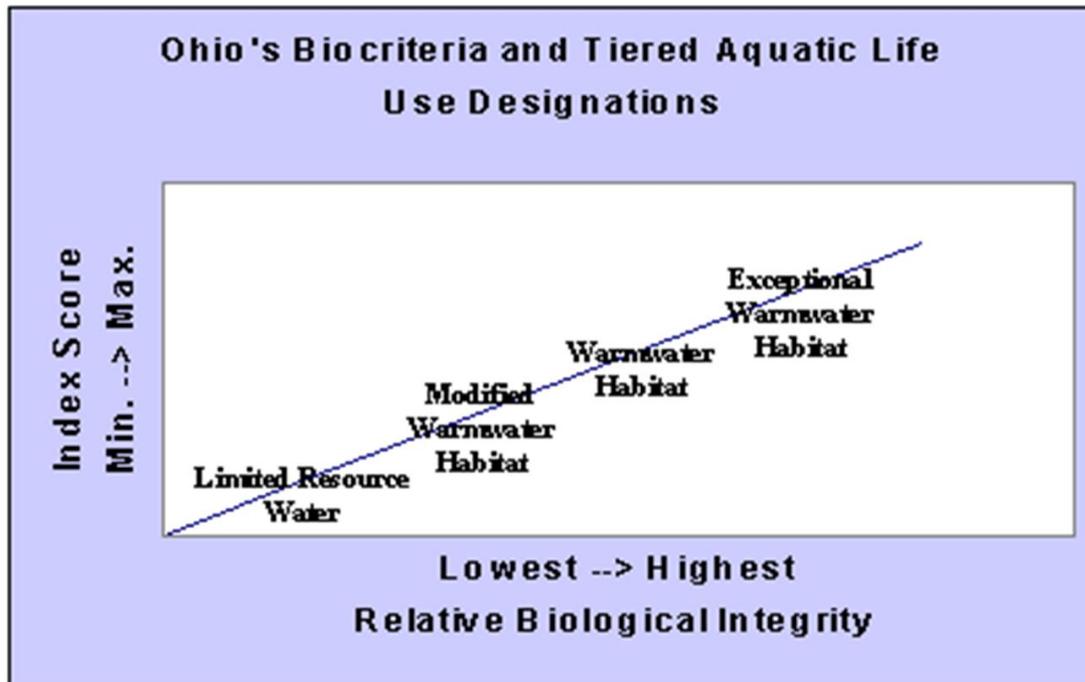
## Tiered ALU Rationale - Disturbance Gradient



## APPENDIX F: CONNECTICUT BIOLOGICAL CONDITION GRADIENT MODEL



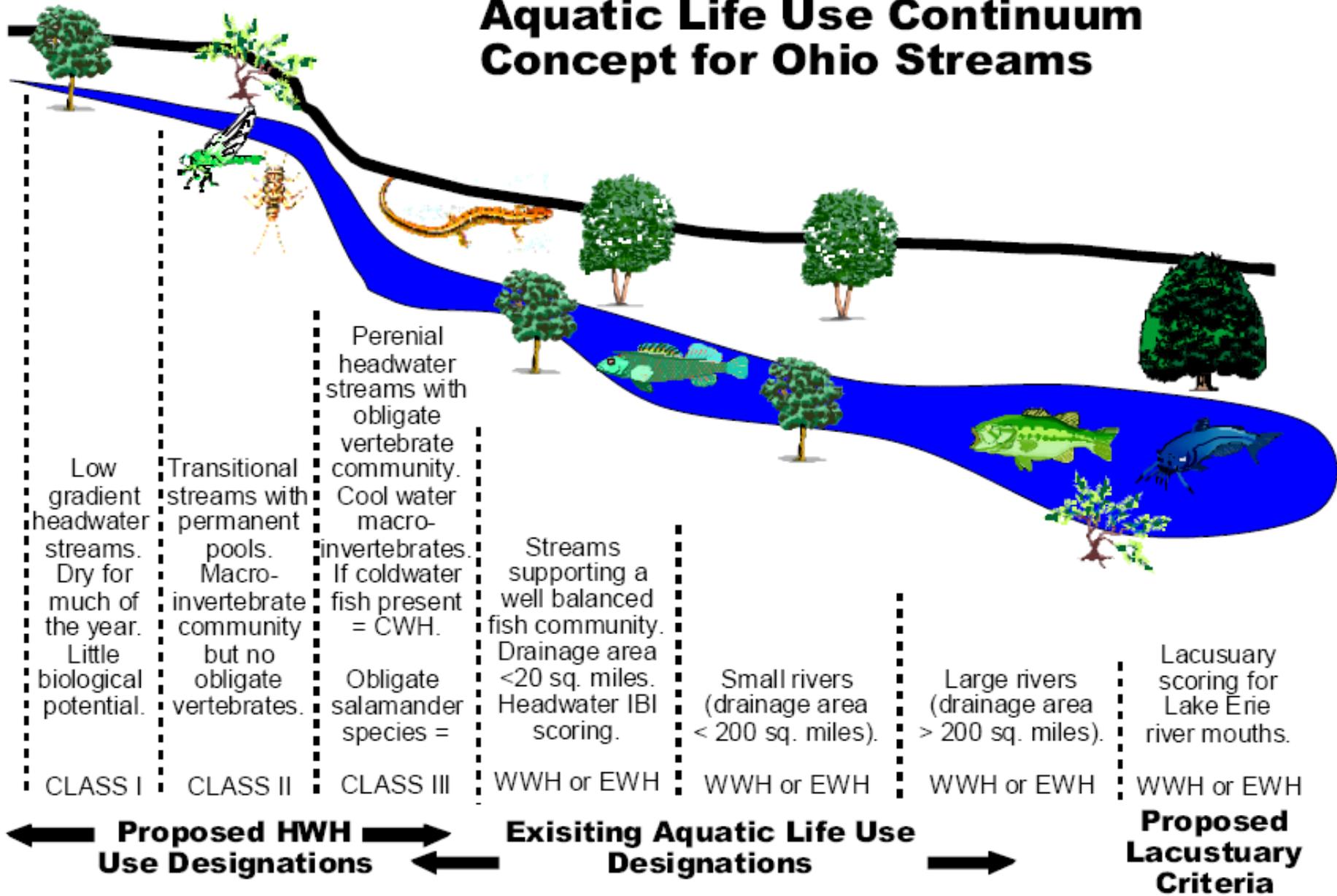
- Robust and long-standing biomonitoring program
- Have developed TALUs for multiple ecoregions
- Have recently developed TALU guidance tailored to headwater streams (more on that later...)



## Summary of Ohio's Beneficial Use Designations (OAC 3745-1-07) - April 2004

Beneficial Use Designation	Key Attributes, or why a water would be designated the beneficial use	Practical Impacts (comparisons to Warmwater Habitat baseline)
Exceptional Warmwater Habitat 386 waterbodies	unique and diverse assemblage of fish and invertebrates	more stringent temperature, dissolved oxygen, and ammonia criteria; may result in additional wastewater treatment requirements
Warmwater Habitat 2,930 waterbodies	typical assemblages of fish and invertebrates, similar to least impacted reference conditions	baseline regulatory requirements in line with Clean Water Act "fishable goal" expectations
Limited Warmwater Habitat 72 waterbodies	temporary designations based on 1978 WQS and not subjected to use attainability analysis; being phased out	exempt from TDS criteria and may also be exempt from pH, iron and zinc criteria as well
Modified Warmwater Habitat 143 waterbodies	tolerant assemblages of fish and macro-invertebrates, but otherwise similar to WWH; irretrievable condition precludes complete recovery to reference condition	less restrictive requirements for dissolved oxygen and ammonia; may result in less restrictive wastewater treatment requirements
Limited Resource Waters 163 waterbodies	fish and macroinvertebrates severely limited by physical habitat or other irretrievable condition	less restrictive aquatic life criteria for majority of pollutants; may result in less restrictive wastewater treatment requirements

# Aquatic Life Use Continuum Concept for Ohio Streams



- Cold Water Fishery – Most Stringent, Salmonids Present
- Cool-water Fishery – Similar to General Warmwater (Temperature)
- General Warmwater Fishery  
“allow the maintenance of a wide variety of warm-water biota, including natural reproducing populations of recreationally important fish species”
- Limited Warmwater Fishery  
“prevent the maintenance of naturally reproducing populations of recreationally important fish species”
- Similar Criteria for Warmwater Uses

# Missouri ALUs

## Where Do We Go from Here?

- **A Few Questions to Consider:**

(1) TALU – do we have the data?

(2) Spatial scales – where are metrics significantly different and predictable?

(3) How do we distribute newly designated waters into a revised framework?

(4) Are Use Attainability Analyses the ‘on/off ramp’ process?



# Aquatic Life Use Attainability Analyses

- UAA Basics
- Summary of Selected States
- What might work in Missouri ?

# What are UAAs?

- **Definition:** *Structured scientific assessment of the chemical, physical, biological, and economic factors affecting the use.*
- Uses deemed attainable if achievable through implementation of technology-based control measures and ‘reasonable’ and ‘cost-effective’ best management practices.

# Factors for Changing Designated Uses

- 1. Naturally Occurring Pollutants Prevent Attainment**
- 2. Low Flow Conditions Prevent Attainment**
- 3. Non-Remedial, Human Caused Conditions**
- 4. Hydrologic Modifications (dams, diversions, etc.)**
- 5. Natural Physical Features**
- 6. Controls Cause Widespread Economic and Social Impact**

- **Appropriateness of Initial Designated Use**

- many States adopted default uses in the 1970's to be eligible for Federal funding, with the expectation that uses could be refined later...
- UAAs can be a consequence of misclassification

- **Appropriateness of Existing Criteria**

- UAAs may be the only means to adjust unrealistic criteria to a group of waters, e.g., dissolved oxygen in some small streams

- **Concept of Existing Use**

- cannot remove or downgrade existing uses (40 CFR 131.10(g))

# State Aquatic Life UAAs Preliminary Summary

## ■ A Few Themes

- ✓ Approved procedures are the exception, not the rule
- ✓ Success of UAAs mixed
- ✓ Typically pursued to achieve alternate chemical criteria
- ✓ Several successful UAAs emphasized correct classification
- ✓ New Mexico and Ohio feature detailed set of small stream and ephemeral water methods

### State AQL UAAs Reviewed

Colorado	Oklahoma
Idaho	Oregon
Iowa	New Mexico
Kansas	South Dakota
Louisiana	Washington
Ohio	Wyoming

Component	Description	Example
<b>Aquatic Life Subcategory</b>	At least one subcategory needed for alternative designation.	HLAC in Oklahoma considers UAA Factors
<b>Application Tree</b>	Facilitates understanding of procedures, decision thresholds, and regulatory process.	See Oklahoma (next few slides)
<b>Decision Guidelines or Metrics</b>	Conditions describing the chemical, physical, and/or biological thresholds reflecting classification boundaries.	Ohio Headwater Streams (HHEI, pool depth, drainage area). Iowa warm-water classifications
<b>Assessment Procedures</b>	Methods to measure or determine metrics used as decision thresholds.	QHEI (Habitat, Ohio) Rap. Bio. (Biol., several)
<b>Review Process</b>	In addition to decision metrics, how will UAAs be evaluated and by what group or groups?	Missouri UAA Review Committee

# UAA Component : ALU Subcategory

- **Could have several, but need to have at least one**
- **Example Oklahoma's Habitat Limited Aquatic Community**

## **Habitat Limited Aquatic Community subcategory.**

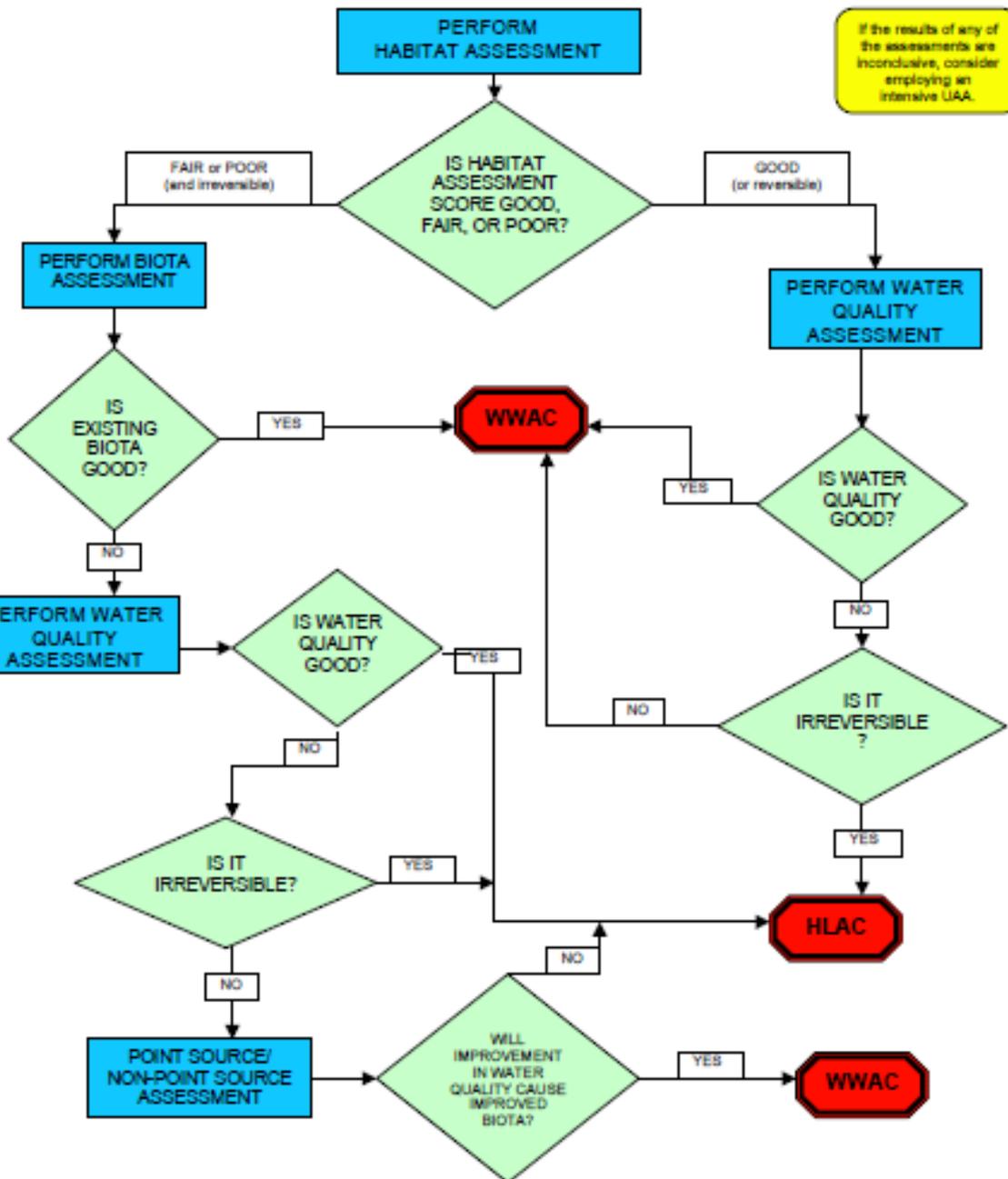
Habitat limited aquatic community means a subcategory of the beneficial use "Fish and Wildlife Propagation" where the water chemistry and habitat are not adequate to support a "Warm Water Aquatic Community" because: ....

'Factors listed at 40 CFR 131.10(g)'

- **The 'one-bin' approach may require development of alternative criteria for new entries**

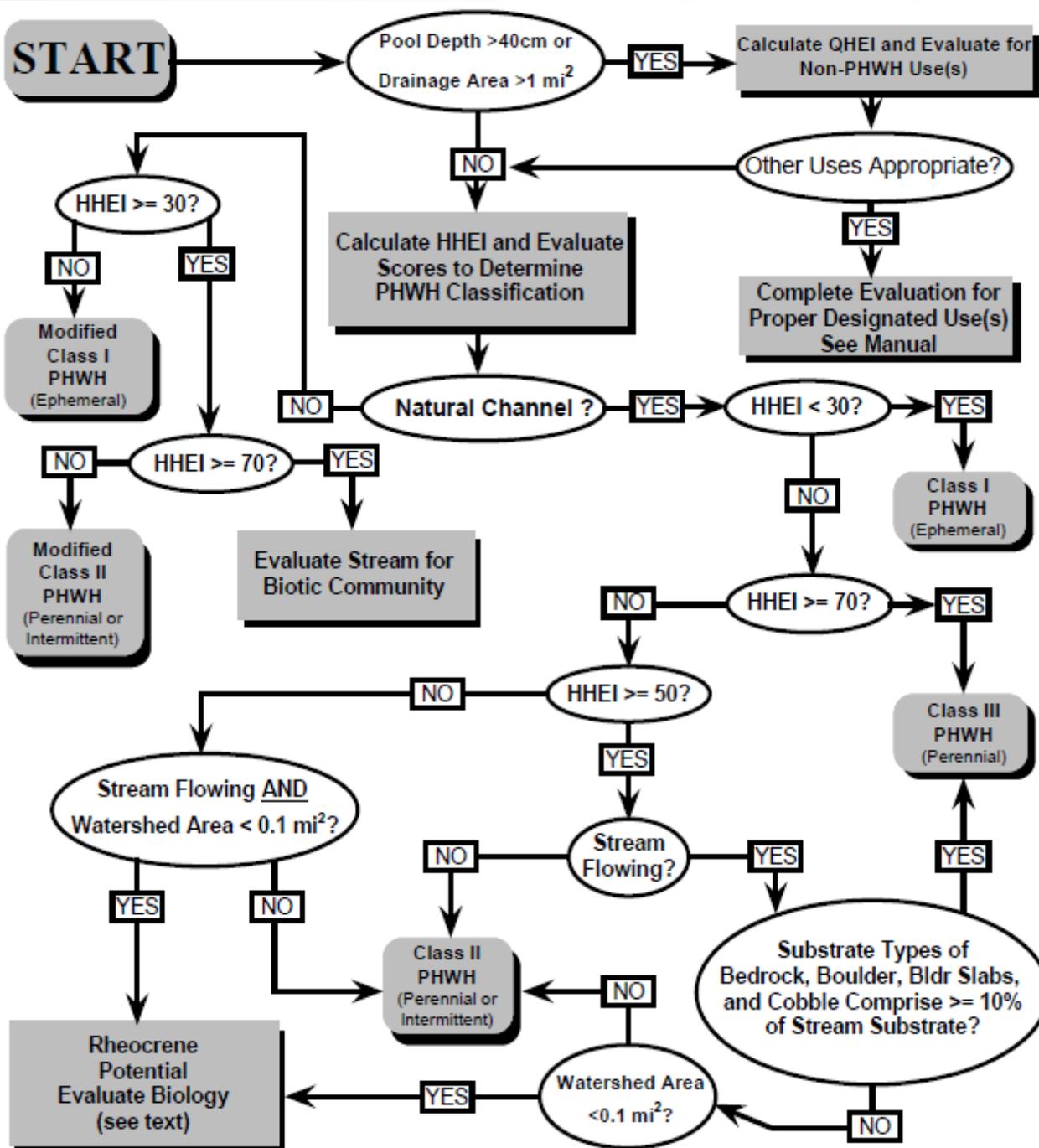
# UAA Component: Application Tree

## Oklahoma



# UAA Component: Application Tree

## Ohio Headwater Streams



# UAA Component : Decision Guidelines

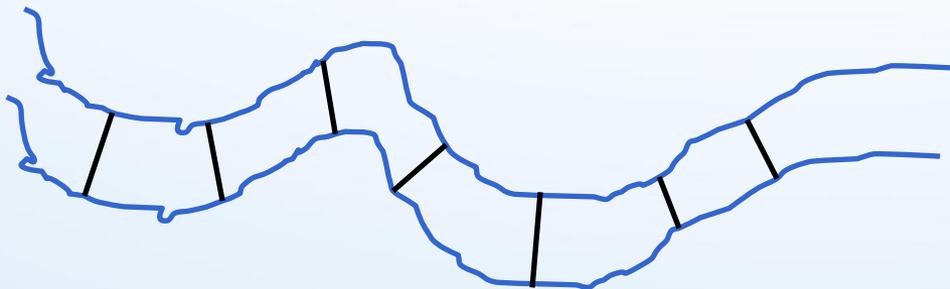
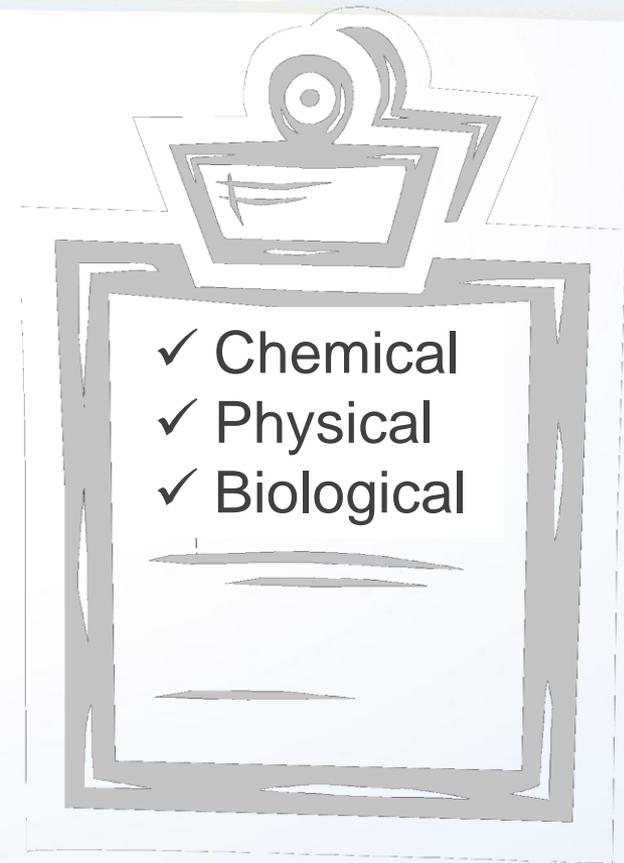
- **Habitat Parameters**
  - pool depth > 40 cm, HHEI < 30, etc.
- **Biological Parameters**
  - presence of indicator or key species
  - Index of Biotic Integrity > 38, ICI > 46 etc.
- **Narrative Guidelines**

## **D. Guidelines for Class B(WW-3) Warm Water streams (Iowa)**

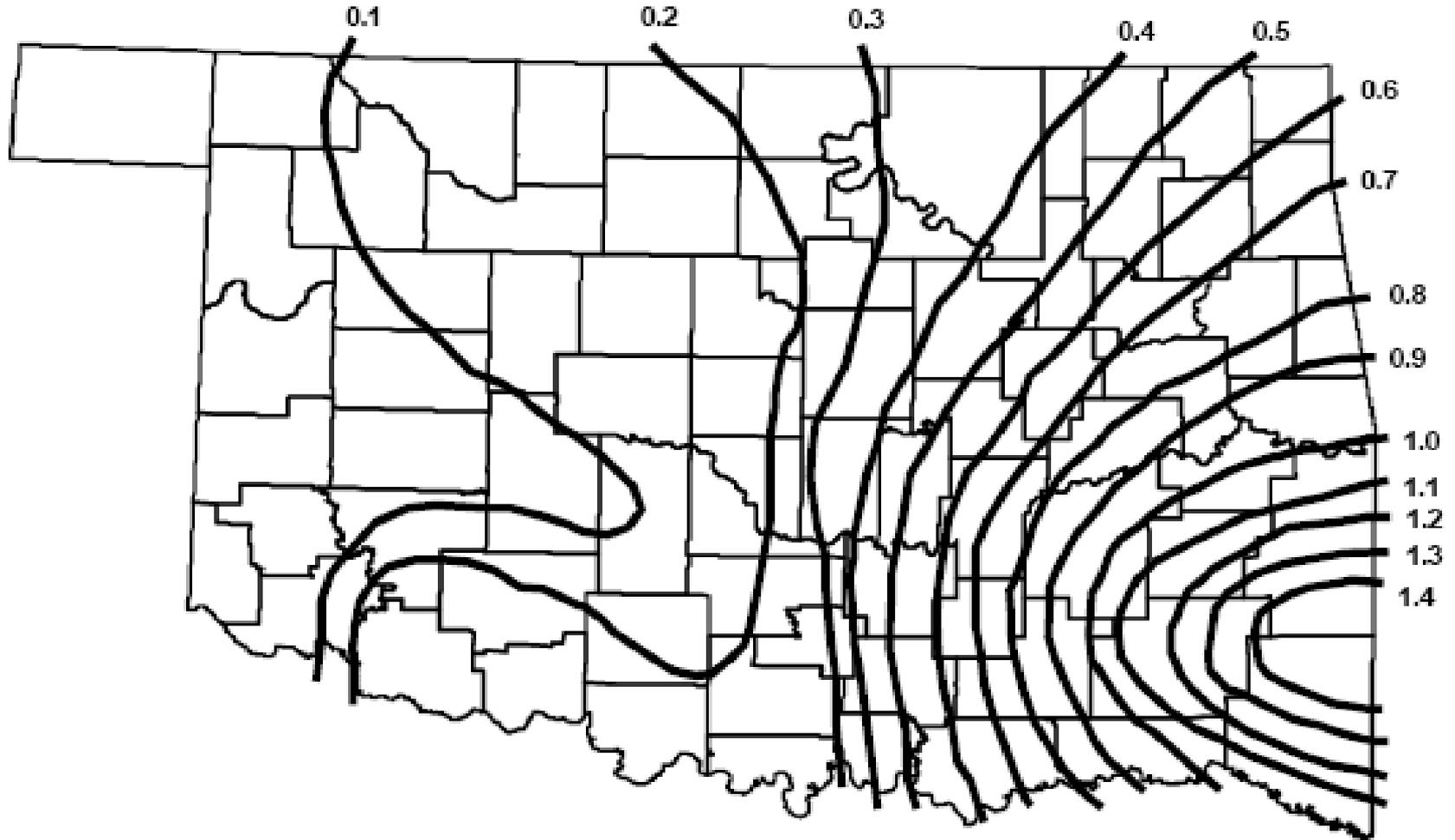
1. These waters have very limited flow in the stream, if any, at base flow conditions with pooled conditions persisting throughout the stream reach.
2. These waters have adequate habitat to support an aquatic community throughout the year but do not have adequate flow and habitat to support sustainable populations of game fish.
3. The thalweg distance of each 0.5 mile segment evaluated should be either at least 20% pooled or the pooled frequency should exceed 5 pools.

# UAA Component : Assessment Procedures

- **Field Methods**
- **Literature Review**
- **Interviews**
- **Level of Effort**
  - Screening isopleth
  - One-day survey
  - Intensive evaluations



# Oklahoma UAA Isopleth Map

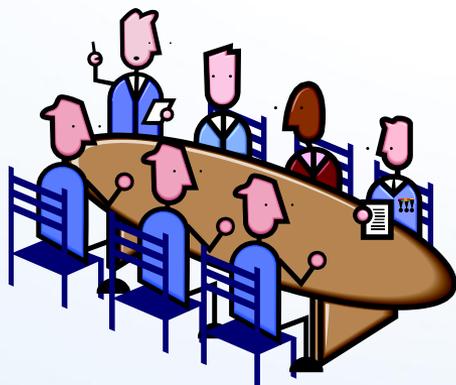


**Isopleth map of instream flow per area -  $Q_u/A_d$  (cfs/mi<sup>2</sup>)**

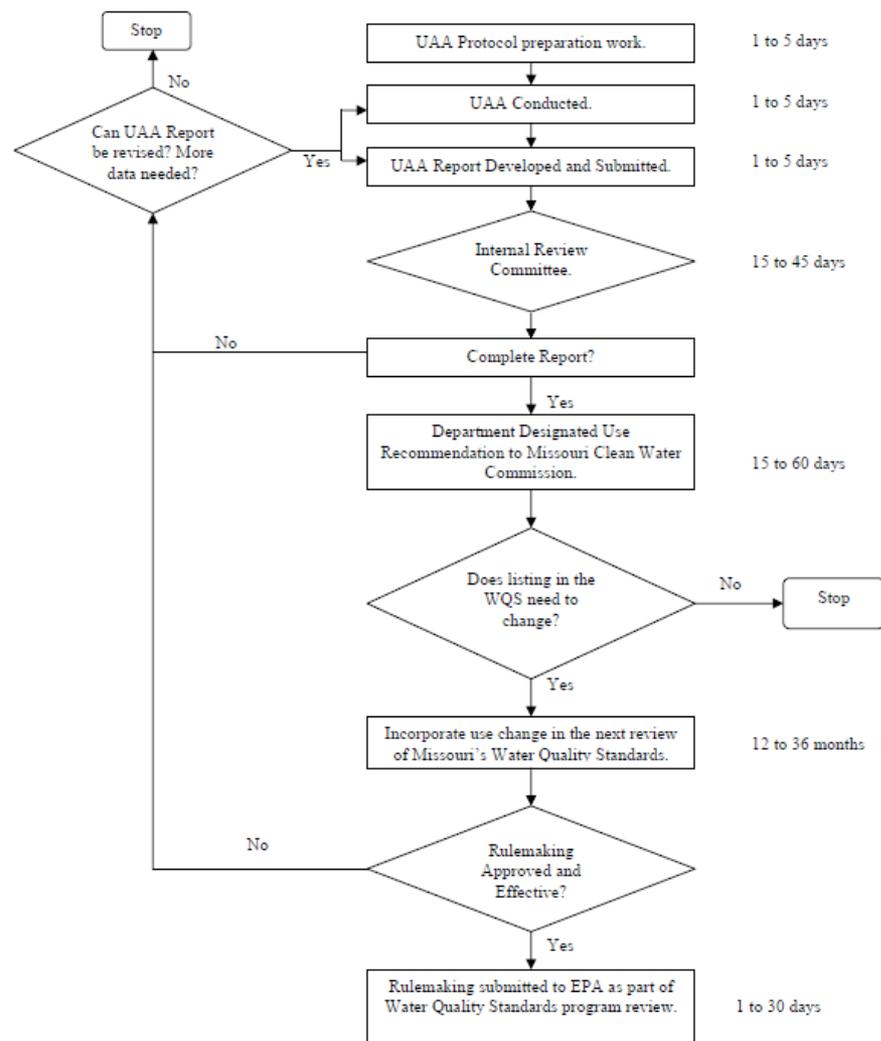
Source: Unified Protocols for Beneficial Use Assignment for Oklahoma Wadeable Streams 2001

# UAA Component: Review Process

- Field report submittals
- Submittal checklists
- Inter-Agency Committees
- Review timelines



Appendix 2  
Use Attainability Analysis Regulatory Process



- **ALU Subcategory**
  - Does the limited warm-water fishery use provide enough flexibility?
  - Should all new waters be placed into separate transitional category. On ramp to GWWF, off ramp to LWWF?
- **ALU Criteria** – dissolved oxygen, temperature, biocriteria for smaller streams?
- **Residual pool volume** as indicator of biologic potential and UAA decision threshold?
- **Modified Stream Channels** – how do we deal with habitat limitations?

**Questions?**