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Biological Criteria Development for the  
Missouri Department of Natural Resources  
Water Quality Standards



Division of Environmental Quality  
Environmental Services Program  
Water Quality Monitoring Unit

# Stream Habitat Assessment

- Riffle/Pool

Same as latest revision of EPA Rapid Bioassessment Habitat parameters for High Gradient streams

- Glide/Pool

Same as latest revision of EPA Rapid Bioassessment Habitat parameters for Low Gradient streams

# Riffle/Pool Streams

- Epifaunal substrate/available cover
- Embeddedness
- Velocity/depth regime
- Sediment deposition
- Channel flow status
- Channel alteration
- Riffle quality
- Bank stability
- Vegetative protection
- Riparian vegetative zone width

# Glide/Pool Streams

- Epifaunal substrate/available cover\*
- Pool substrate characterization
- Pool variability
- Sediment deposition\*
- Channel flow status\*
- Channel alteration\*
- Channel sinuosity
- Bank stability\*
- Vegetative protection\*
- Riparian vegetative zone width\*

\* same parameters as Riffle/Pool

# Additional Forms

- Physical Characterization/Water Quality Data Form
- Worksheet for Riffle/Pool or Glide/Pool Habitat assessment Forms

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## Modifications to EPA Rapid Bioassessment Habitat Protocol

- Stream reach length = 20x lower bank width (not 100 meter reach)
- Stream reach is broken down into 10 segments for scoring (each segment = 2x average width)

The Worksheet for Riffle/Pool or Glide/Pool Habitat Assessment Forms is used to score segments.

# Order of Events

- Five random widths are measured along a stream reach encompassing two riffle/pool or two meander sequences
- The average width is calculated
- Average width is multiplied  $\times 2 =$  stream length of each of ten segments
- Each segment is measured off and pertinent parameters are immediately evaluated at the end of each segment
- When all segments are measured and recorded, average or predominant category is calculated and scores are interpolated on appropriate assessment form
- Parameters that were not broken down to segments are scored





# Riffle/Pool Streams

- Segment parameters
  - Epifaunal substrate/available cover
  - Sediment deposition
  - Bank stability
  - Vegetative protection
  - Riparian vegetative zone width
- Riffles only
  - Embeddedness
- Reach parameters
  - Velocity/depth regime
  - Channel flow status
  - Channel alteration
  - Riffle quality

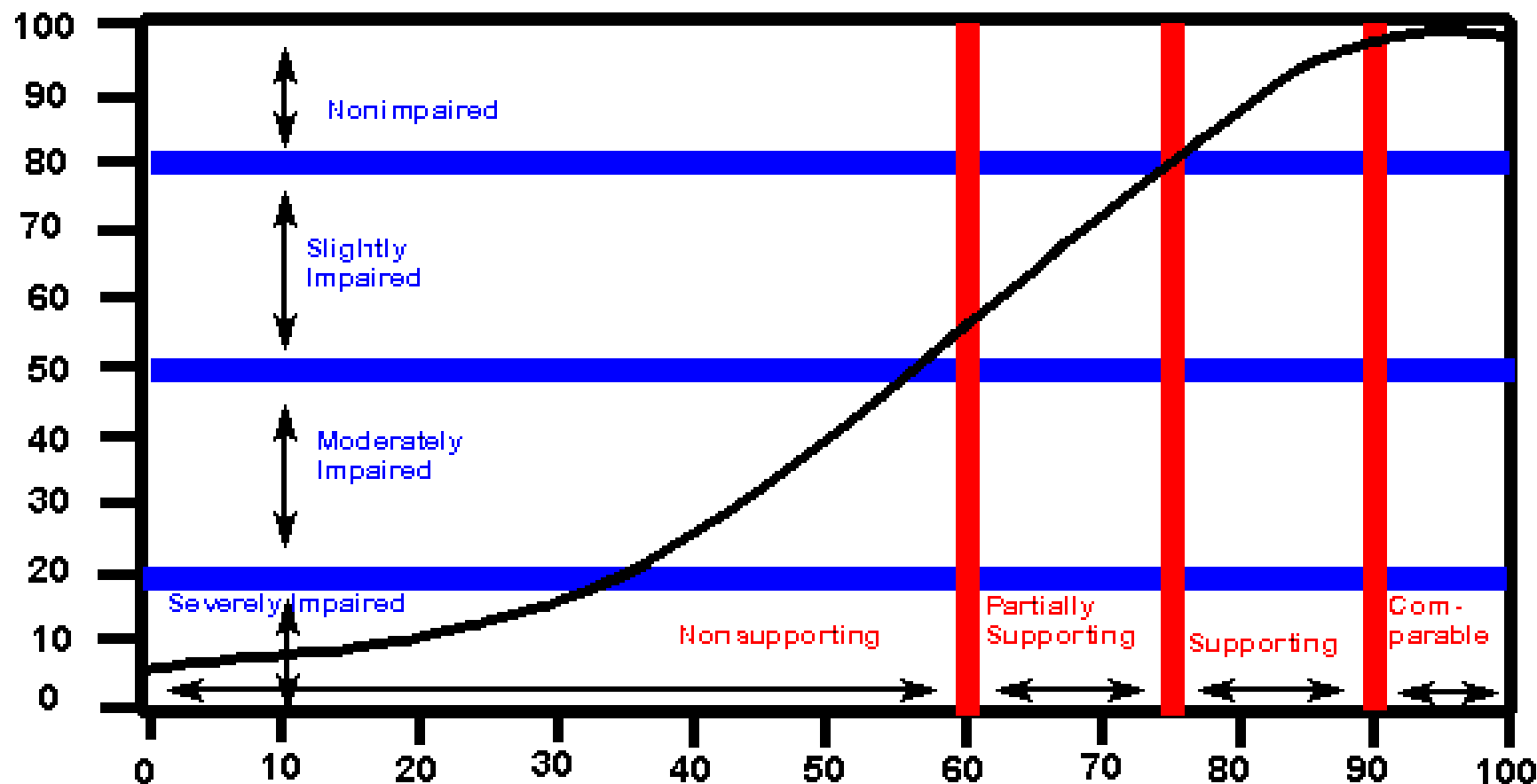
# Glide/Pool Streams

- Segment parameters
  - Epifaunal substrate/available cover
  - Sediment deposition
  - Bank stability
  - Vegetative protection
  - Riparian vegetative zone width
- Reach parameters
  - Pool substrate characterization
  - Pool variability
  - Channel flow status
  - Channel alteration
  - Channel sinuosity

# Intended Uses

- Support Biological Surveys
  - within Ecological Region
  - within season
  - assessments by same biologists
  - team of two has input into scoring

**Biological Condition (% of Reference)**



**Habitat Quality (% of Reference)**

# MDNR Biological Criteria S96

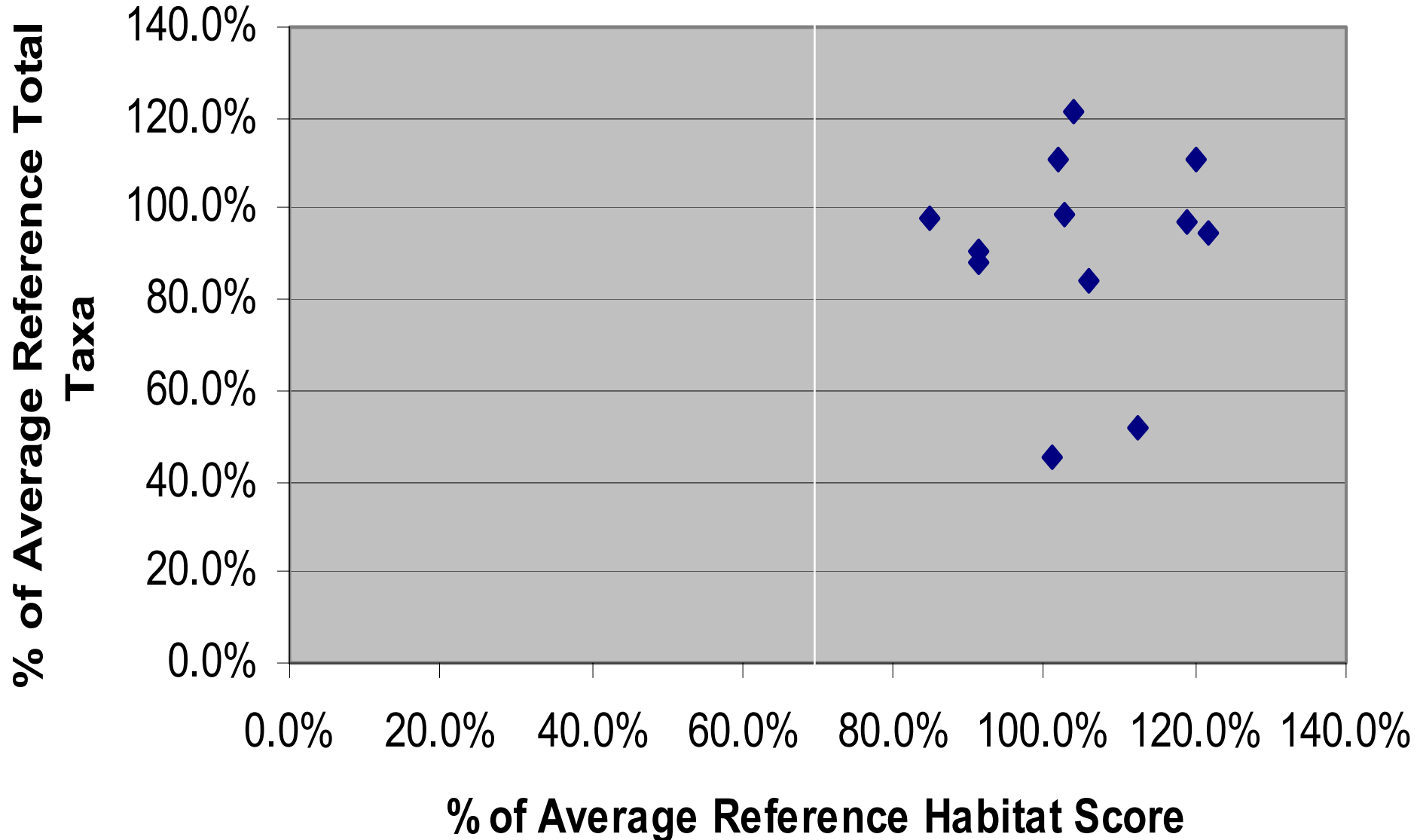
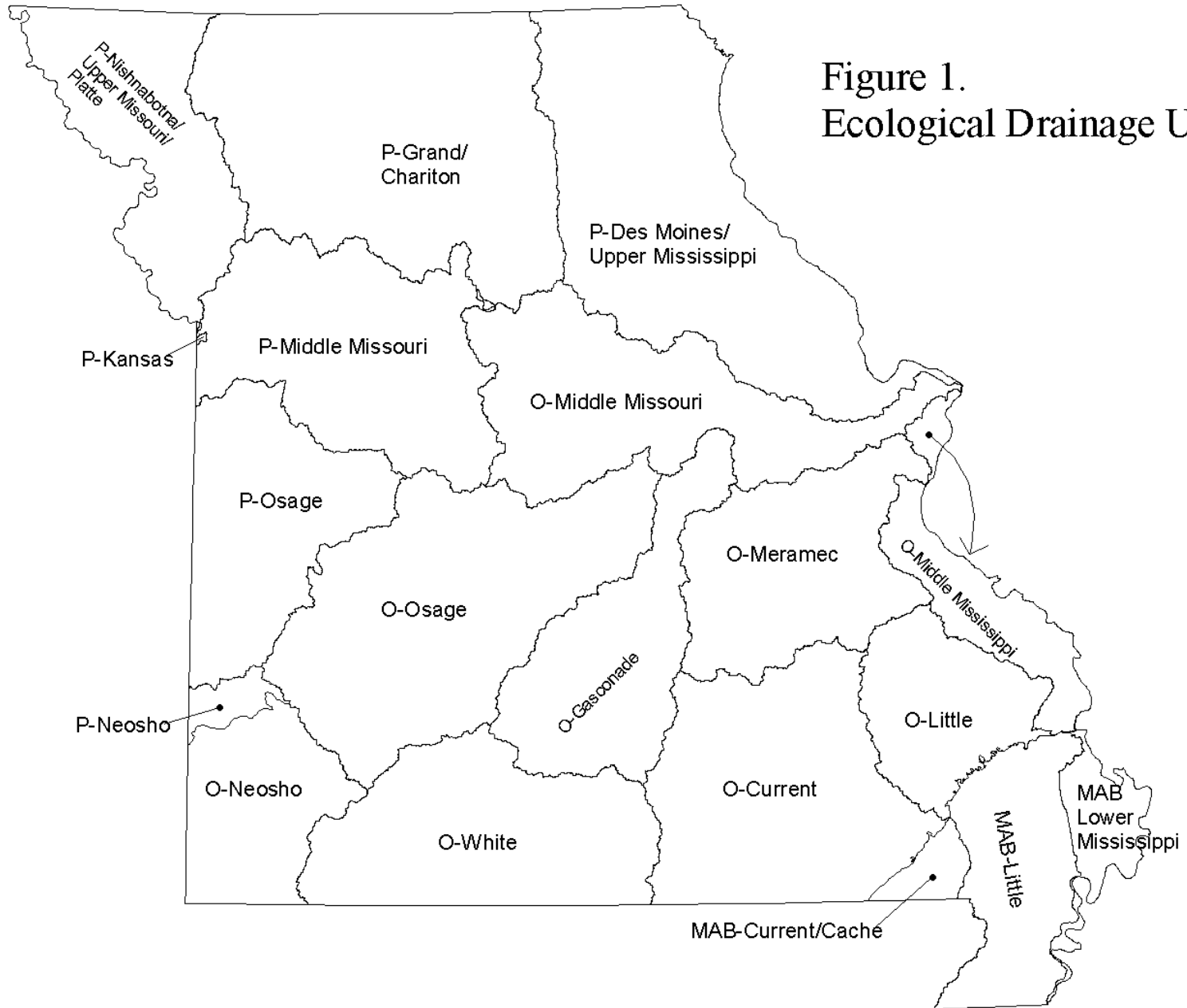


Figure 1.  
Ecological Drainage Units



# Limitations

- Not intended for scores to be recorded and mined from database
  - that's fortunate because the EPA habitat assessment protocol has changed at least three times since the original in 1989
- Reference conditions needed
- Precision between assessment teams not as tight as quantitative habitat measures

# Goals

- To come to a consensus with the Missouri Department of Conservation on a more quantitative based habitat procedure that will be used by both agencies for fish and macroinvertebrate bioassessments.
  - Modified EMAP Procedure
  - Replacement of some ground based measurements with GIS based measurements





# Questions

