



Influences of Basin Size in Determining Nutrient Criteria for Streams in the Eastern Corn Belt Plains Ecoregion

Brian J. Caskey and Jeffrey W. Frey

Presentation Overview

- **Introduction**
 - **Presentation Objectives**
 - **Proposed Nutrient Criteria**
 - **U.S. Geological Survey Nutrient Studies**
- **Case Study: White River and Great and Little Miami River Basins (WHMI) Study**
- **Management Implications**
- **Questions**

Introduction

- **Presentation Objectives**
 - Relation of chlorophyll *a* to nutrients
 - Relation of fish and invertebrate communities to nutrients
 - How the nutrient relations can be strengthened

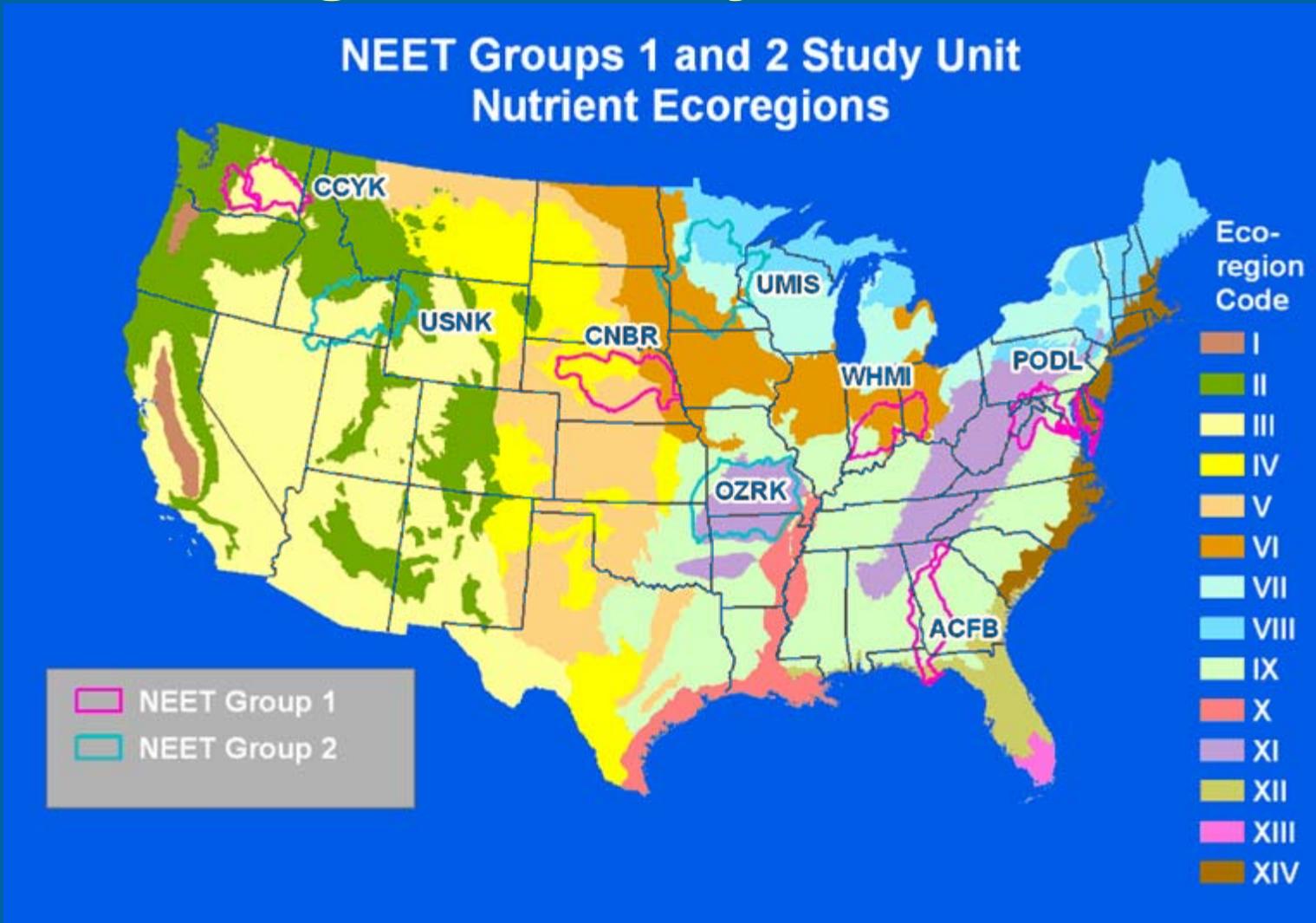


Introduction—Continued

- **Proposed Nutrient Criteria**
 - **Ecoregion Scale**
 - Causal parameters
 - Response parameters
 - **Nutrient Relations**
 - Chlorophyll *a*
 - Fish and invertebrate community attributes



U.S. Geological Survey Nutrient Studies



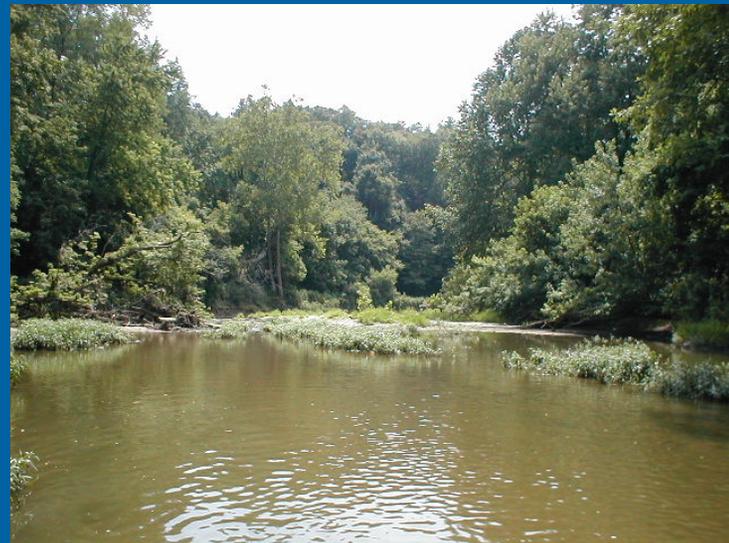
Introduction—Continued

- U.S. Geological Survey Nutrient Studies—Continued
 - Study was designed to determine how biological communities respond to nutrients
 - Nutrient relations
 - Chlorophyll *a*
 - Biological communities



Case Study: WHMI Nutrient Study—Continued

- **Nutrient Relations**
 - Response of a biological community can be masked by naturally occurring variation
 - For example: The fish-community composition
 - Variation in fish-communities can be linked to basin size

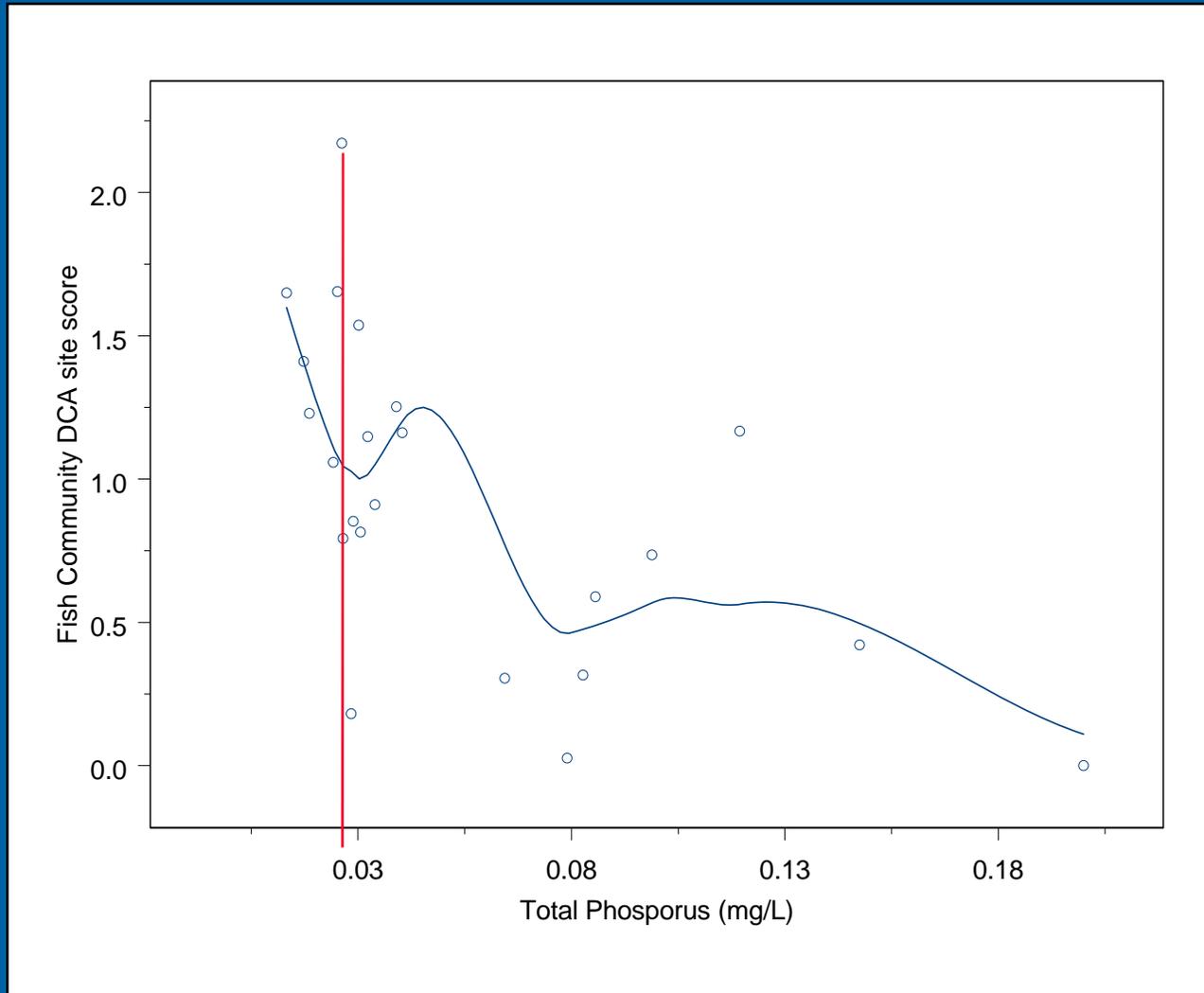


Case Study: WHMI Nutrient Study—Continued

- Fish-community response to nutrient
 - Total Phosphorus (n=30)
 - June: 0.09 mg/L
 - August: 0.025 mg/L
 - Total Phosphorus (n=23)
 - June: 0.1 mg/L
 - August: 0.028 mg/L



Case Study: WHMI Nutrient Study—Continued



Case Study: WHMI Nutrient Study—Continued

- Fish-community relation to nutrient
 - Total Phosphorus (n=30)
 - June: $r = -0.1510$
 - August: $r = -0.0121$
 - Total Phosphorus (n=23)
 - June: $r = -0.2348$
 - August: $r = -0.5910$

r = Pearson correlation coefficient



Management Implications

- **Recommending numeric nutrient criteria**
- **Nutrient relations are complex**
- **Preliminary results**
 - **Chlorophyll *a* to nutrients**
 - **Biological communities to nutrients**

Management Implications—Continued

- **The preliminary findings**
 - **Biological communities better indicate nutrient enrichment than does chlorophyll *a***
 - **Invertebrate communities often have more relations to nutrients**
 - **When developing nutrient criteria, measurements of biological communities should be included as a response parameter**

Management Implications—Continued

- If measurements of biological communities are used, then naturally occurring variations within data sets need to be identified
 - Naturally occurring variations warrant further workgroup discussion
 - Naturally occurring variations can be associated with basin size, season, year, and . . .

Management Implications—Continued

- Relations among biological-community measurements to nutrients can be strengthened
- It is important to understand the affects of both naturally occurring variation and sampling methods to the data

Questions

- **USGS Indiana Water Science Center**
 - 5957 Lakeside Blvd.
 - Indianapolis, IN 46278
 - Phone: (317) 290-3333
 - Home Page: <http://in.water.usgs.gov>
- **WHMI Project Chief**
 - Jeffrey W. Frey
 - Phone: (317) 290-3333, ext. 151
 - email: jwfrey@usgs.gov