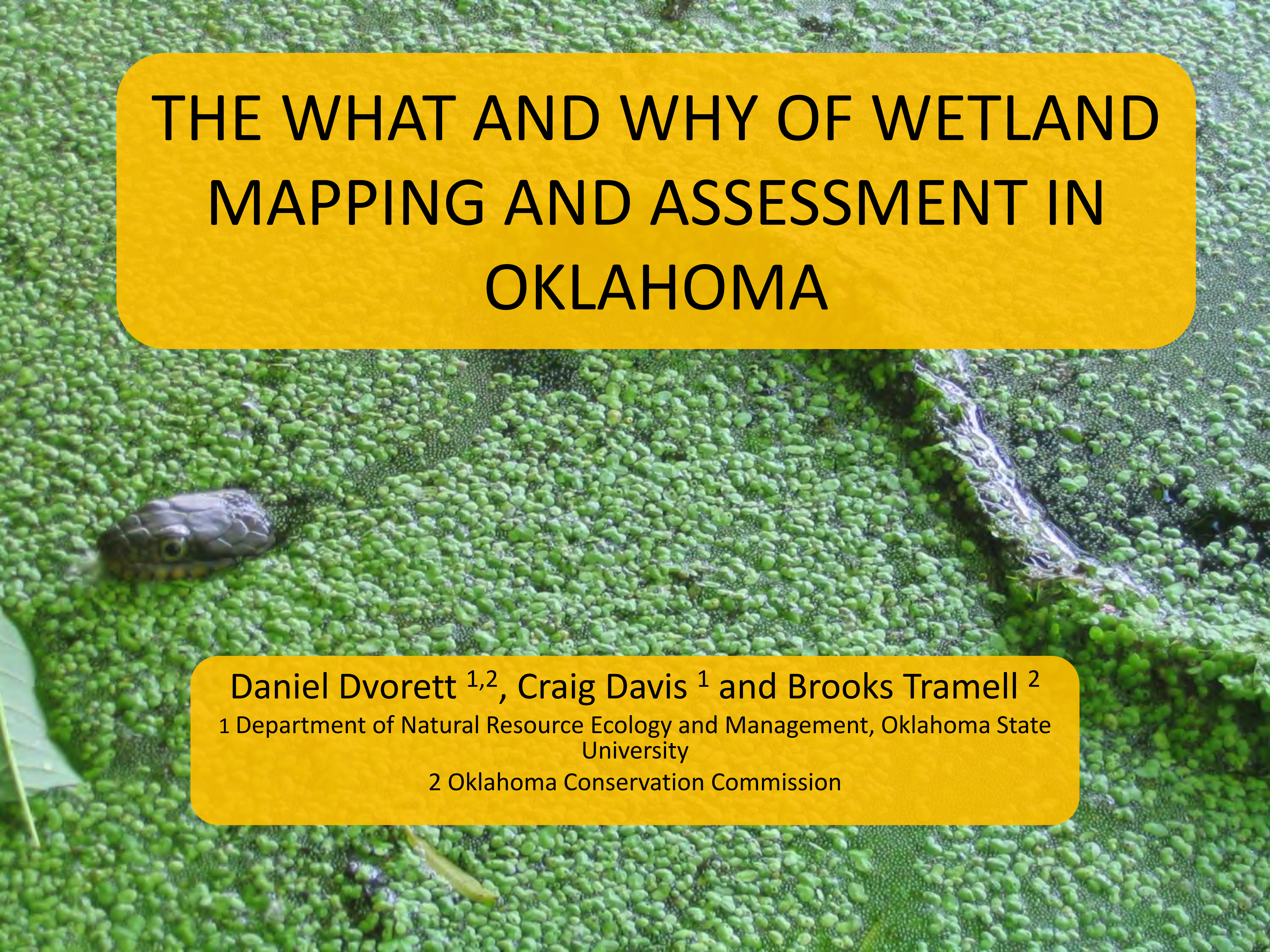

THE WHAT AND WHY OF WETLAND MAPPING AND ASSESSMENT IN OKLAHOMA

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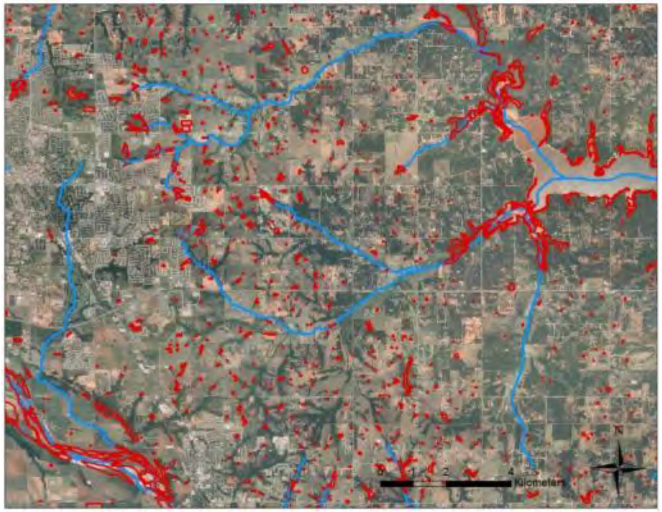
2 Oklahoma Conservation Commission

Maps and Assessment

- Cornerstones of wetland management
- Maps
  - Location, abundance, characteristics
- Assessment
  - Health, condition, integrity, functions



Conceptual Framework

Wetland Knowledge

- Classes
- Functions
- Stressors
- Locations
- Abundance

Logistical Framework

- Program Needs
- Regulatory
- Budgetary
- Staff
- Partnerships

Monitoring and Assessment Strategies

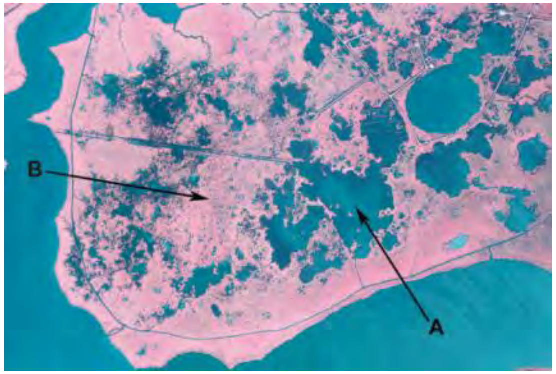
- Restoration
- Ambient monitoring
- Tracking loss/gains

Outline

- Wetland Maps
  - Relation to programmatic needs and regulations
  - Background
  - Current techniques
  - Tracking losses and gains
  - Restoration identification
- Wetland Assessment
  - Relation to programmatic need and regulations
  - Background
  - Functional classification
  - Oklahoma Rapid Assessment Method (OKRAM)
  - Future directions for assessment

Maps: Needs and Regulations

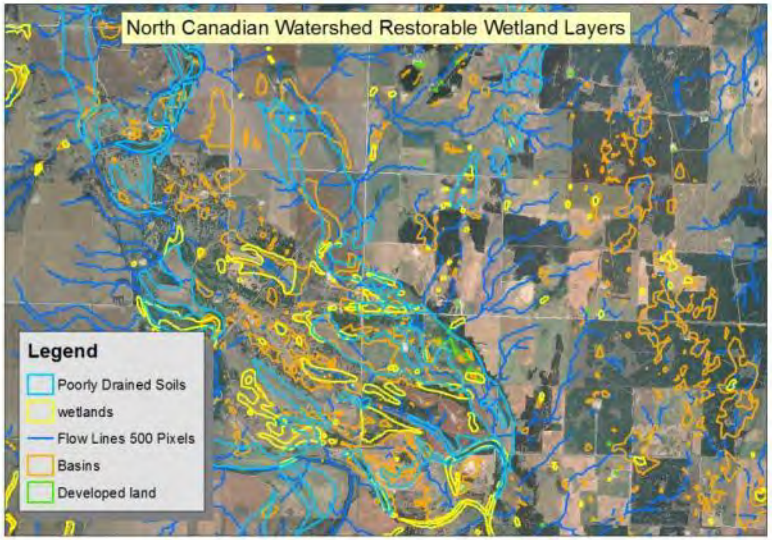
- Understanding distribution and location of wetlands
  - Rare wetland types
- Preliminary project planning
  - Highway planning
  - 404 impacts
  - Impacts from federal projects
- Status and Trends
  - Tracking wetland loss and gain



From: Dahl, T.E. 2011. Status and trends of wetlands in the conterminous United States 2004 to 2009. U.S. Department of the Interior; Fish and Wildlife Service, Washington, D.C. 108pp.

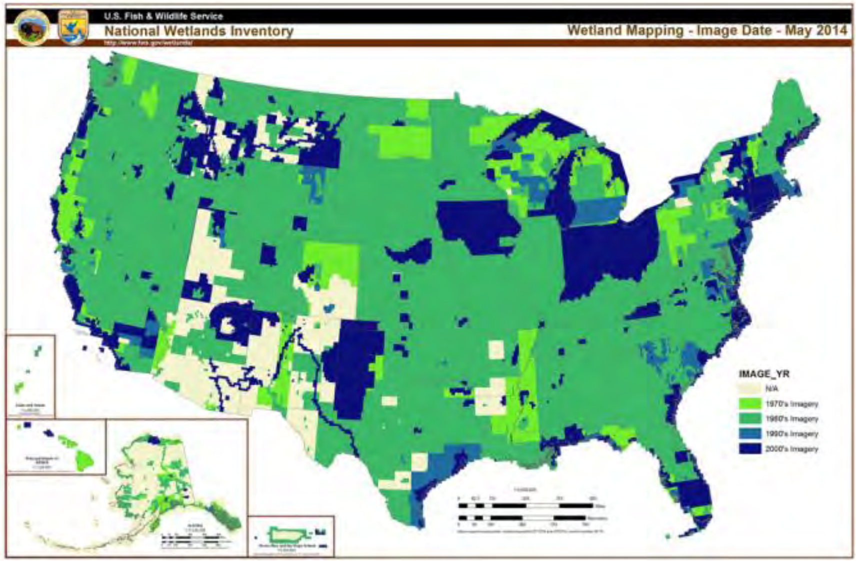
Maps: Needs and Regulations

- Restoration planning and prioritization
  - Integration with 319 program
- Level 1 Landscape Assessment
- Hydrologic studies



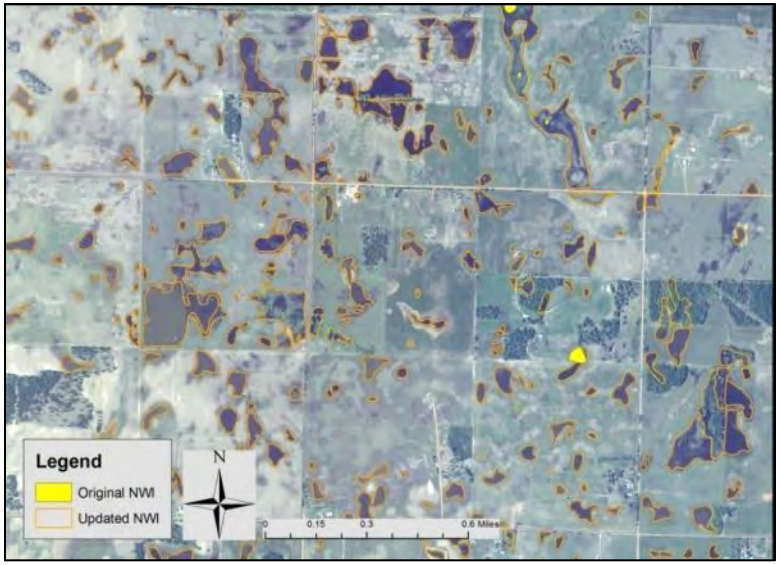
Maps: Background

- National Wetlands Inventory(NWI)
  - Most of the U.S. mapped
  - High altitude
  - Single date
  - 1980’s imagery in Oklahoma
  - Digitized and freely available



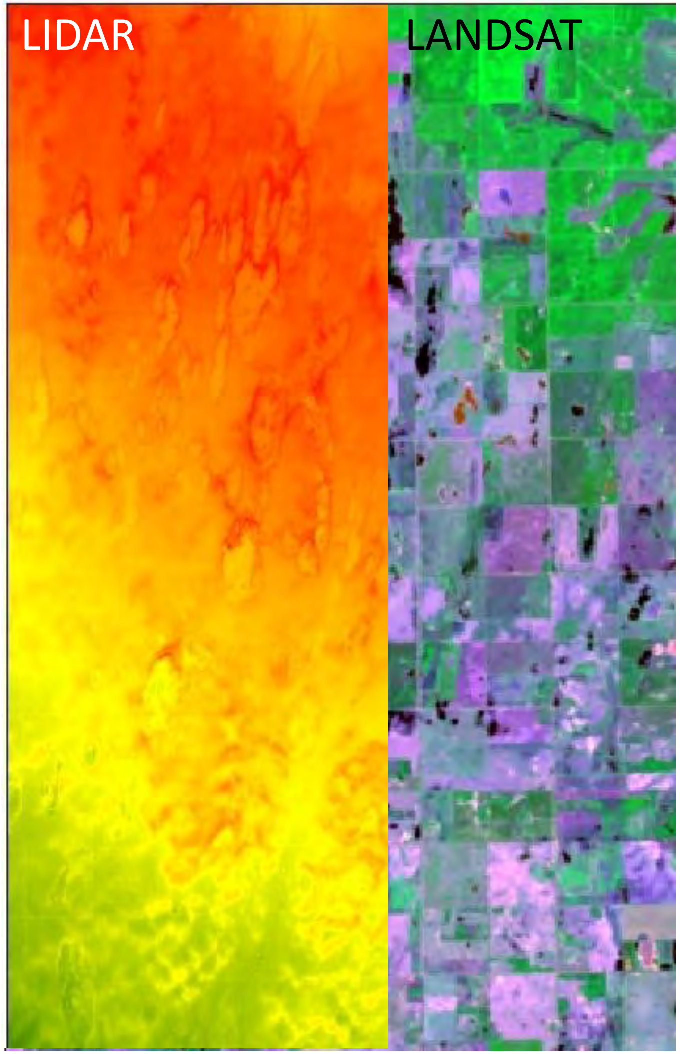
Maps: Background

- Need for regional NWI Updates
  - Forested wetlands
  - Ephemeral wetlands
  - Hydrologic classification
  - Age of maps



Maps: Background

- Improvements
  - New imagery
  - Multi-date imagery
  - High-recurrence satellite imagery
  - Leaf-off and leaf-on imagery
  - LIDAR
- Combining manual and automated protocols



Maps: Current Techniques

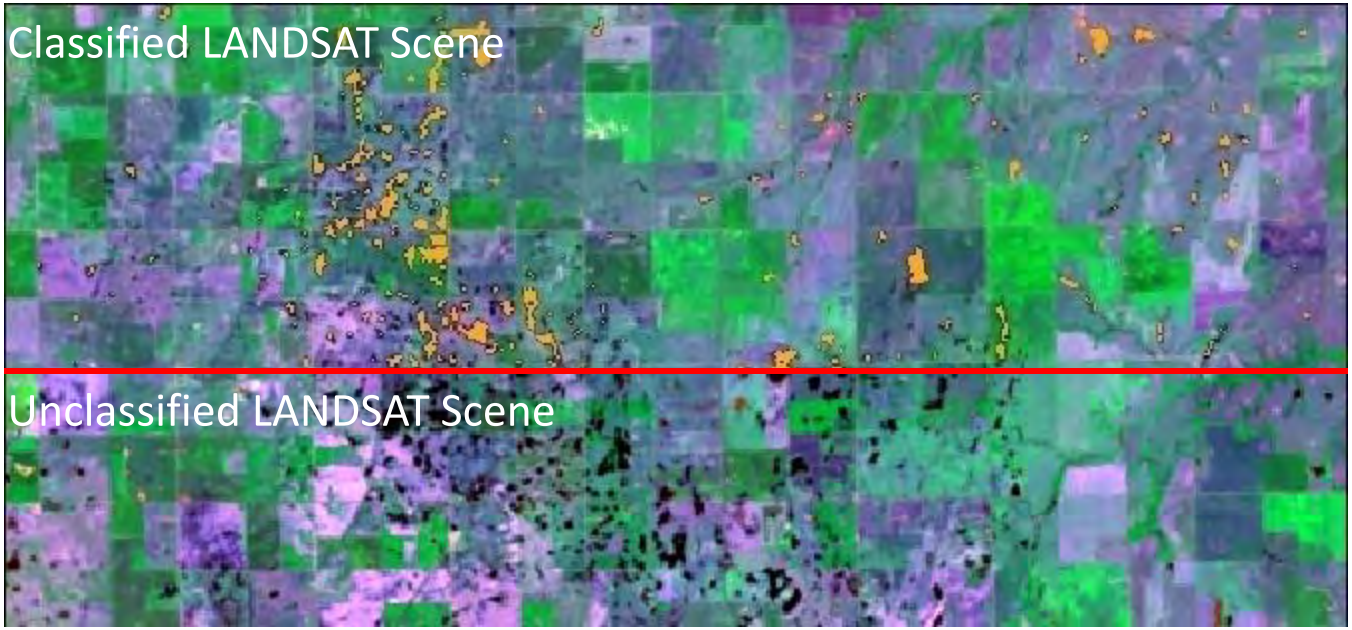
- Interdunal depressions
  - Pleistocene Sand Dunes Ecoregion
  - Formed in the valleys of dune fields (~700-800 years ago)
  - High Density
  - Ephemeral and stochastic hydroperiod
  - Largely invisible from aerial imagery when dry

Maps: Current Techniques

- Cimarron interdunal wetland maps
  - Base Imagery from wet year (2008)
  - Multi-year imagery
  - Reduces risk of missing wetlands during mapping

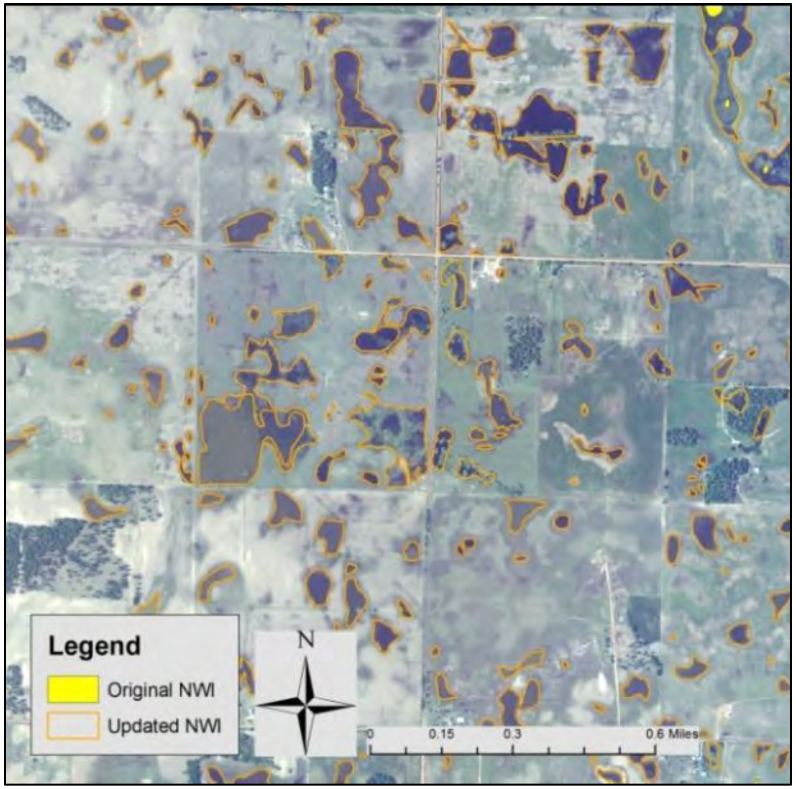
Maps: Current Techniques

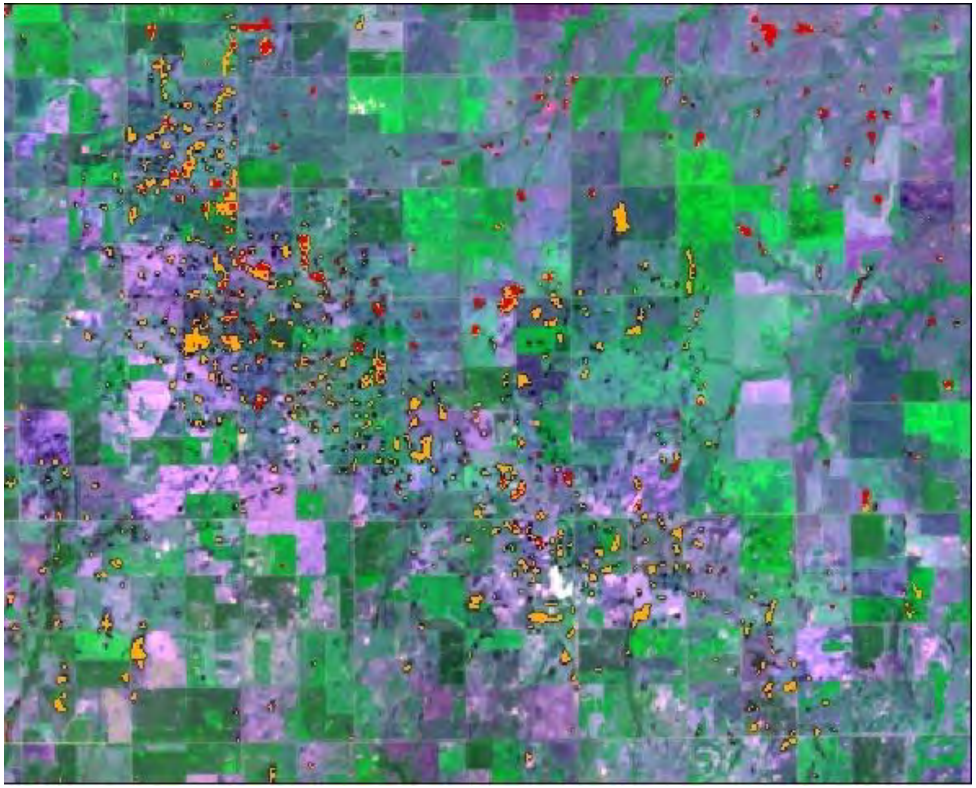
- 44 LANDSAT images from 18 years (1994-2011)
  - 3 images per year
    - (1)Pre-growing (2) peak rain (3) end growing
  - Classification of water pixels
  - Improves ability to detect wetlands and hydrologic attribution



Maps: Current Techniques

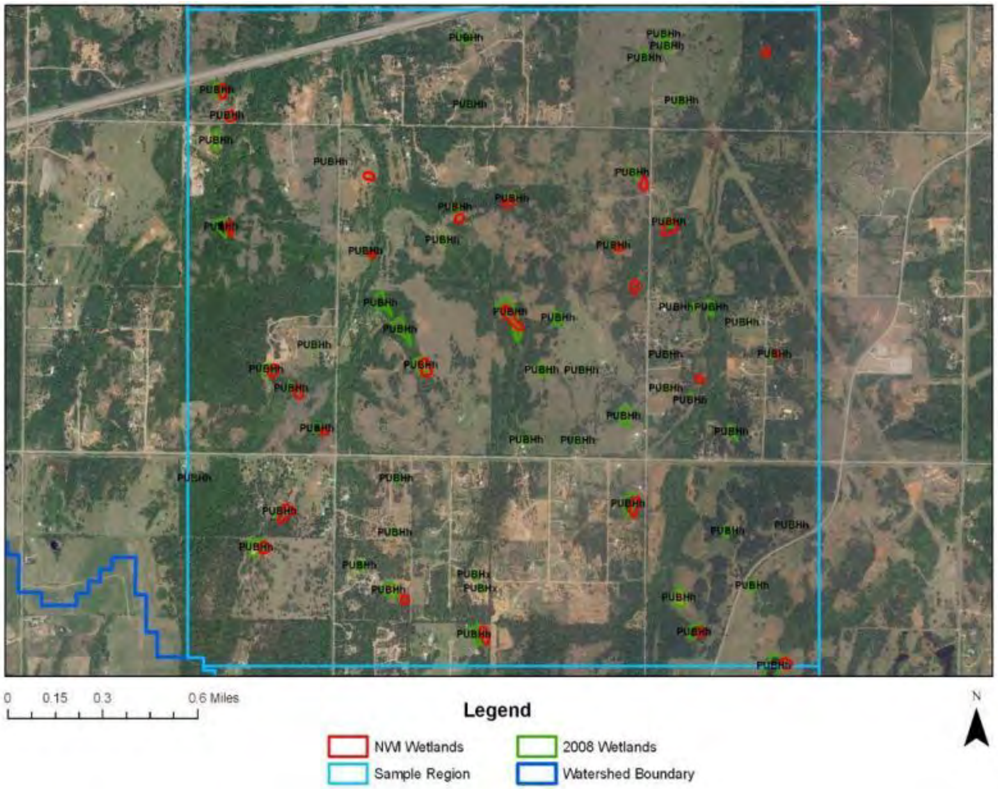
- Statistics comparing original mapping with new mapping
- Next step: Hydrologic processing





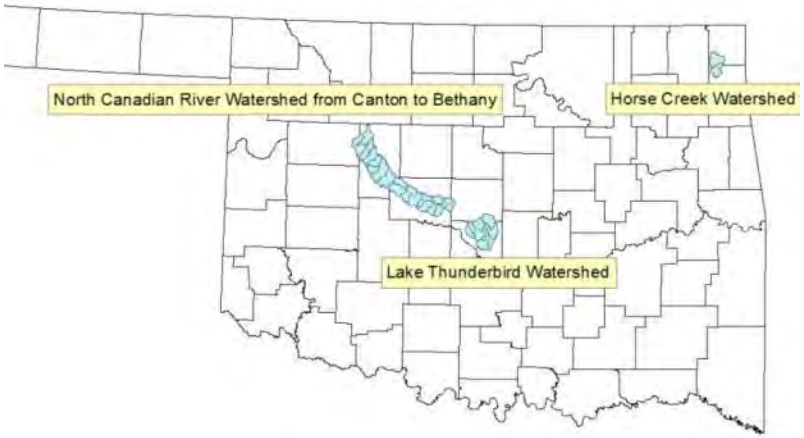
Maps: Tracking Loss and Gain

- Comparison of baseline to current maps
- 2005 study in the Deep Fork Watershed encountered problems identifying forested wetlands
- Need for accurate baseline and sufficient mapping protocols
- Developments in mapping techniques should improve accuracy



Maps: Restoration Identification

- Hydric soil locations where no current wetlands exist
- Can be prioritized by region to improve specific landscape function
- Coordination to conduct restoration/mitigation in the best locations



Assessment: Needs and Regulations

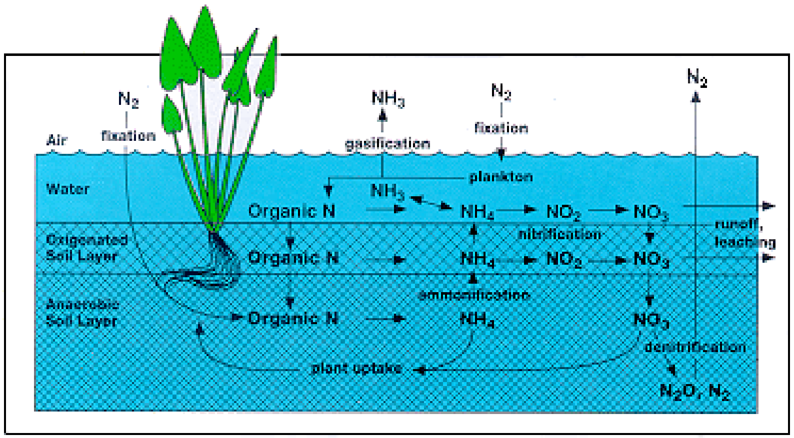
- ❑ Mitigation planning and tracking
- ❑ Ambient Monitoring
- ❑ Impairment identification
- ❑ Water Quality Standard Support

Valencia Wetlands Trust

Valencia Wetland Mitigation Bank: www.idahowetland.com

Assessment: Background

- Assessment Endpoint
  - Function
  - Condition
- Reference Condition
- Classification

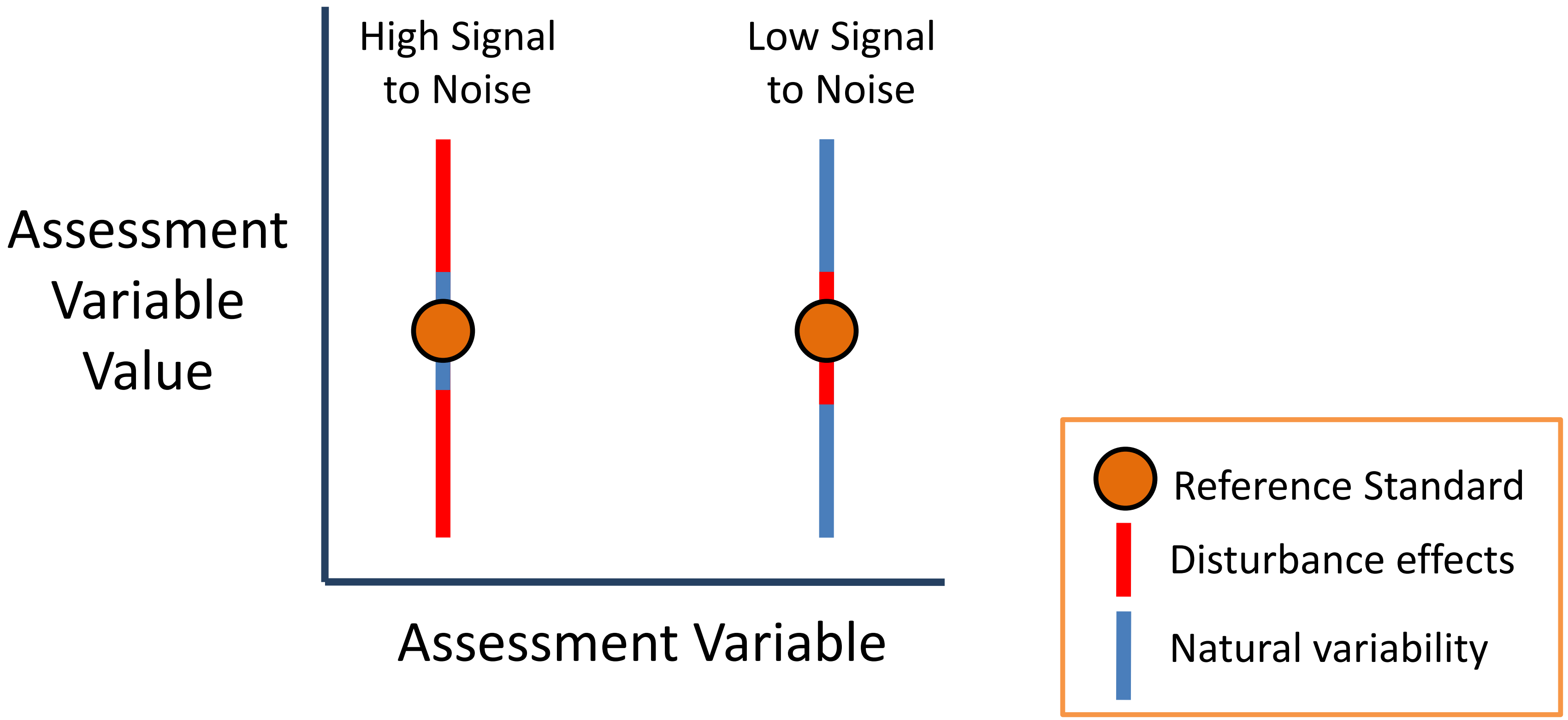


Nitrogen cycling in wetlands progresses more rapidly where there is a thin oxygenated soil layer present.

After Mitsch & Gosselink 1993

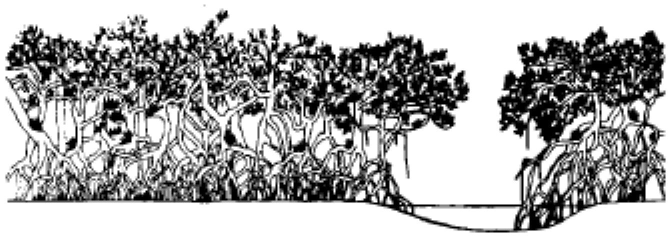
Assessment: Classification

- Natural variability can render condition assessment output useless in identifying impairment

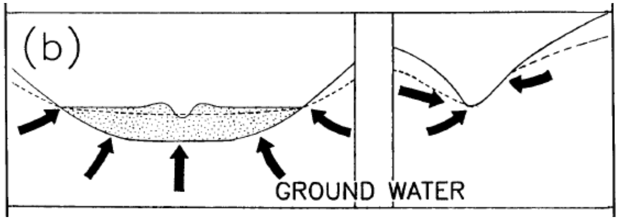


Assessment: Classification

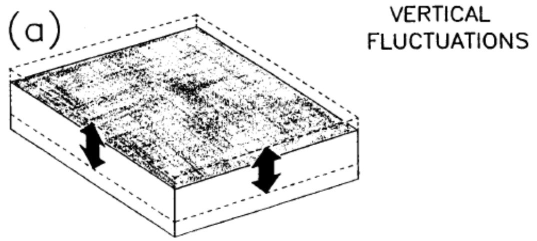
- Hydrogeomorphic Classification: based on three components that drive wetland function:
  - Geomorphic setting



  - Water Source



  - Hydrodynamics



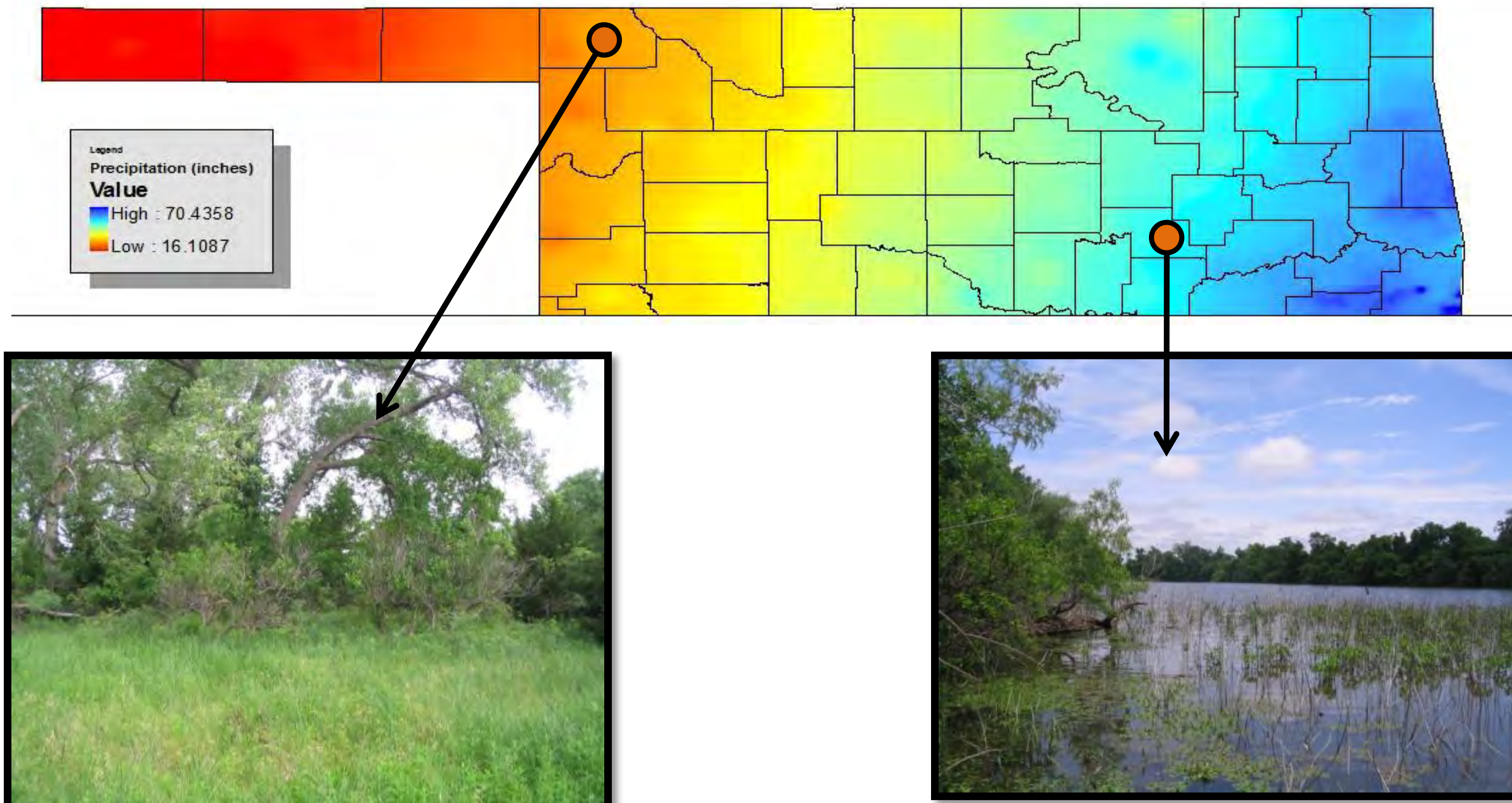
From Brinson, M.M. 1993. A Hydrogeomorphic classification for wetlands. U.S. Army Corps of Engineers, Washington, DC. Wetlands Research Program Technical Report WRP-DE-4.

Assessment: Classification

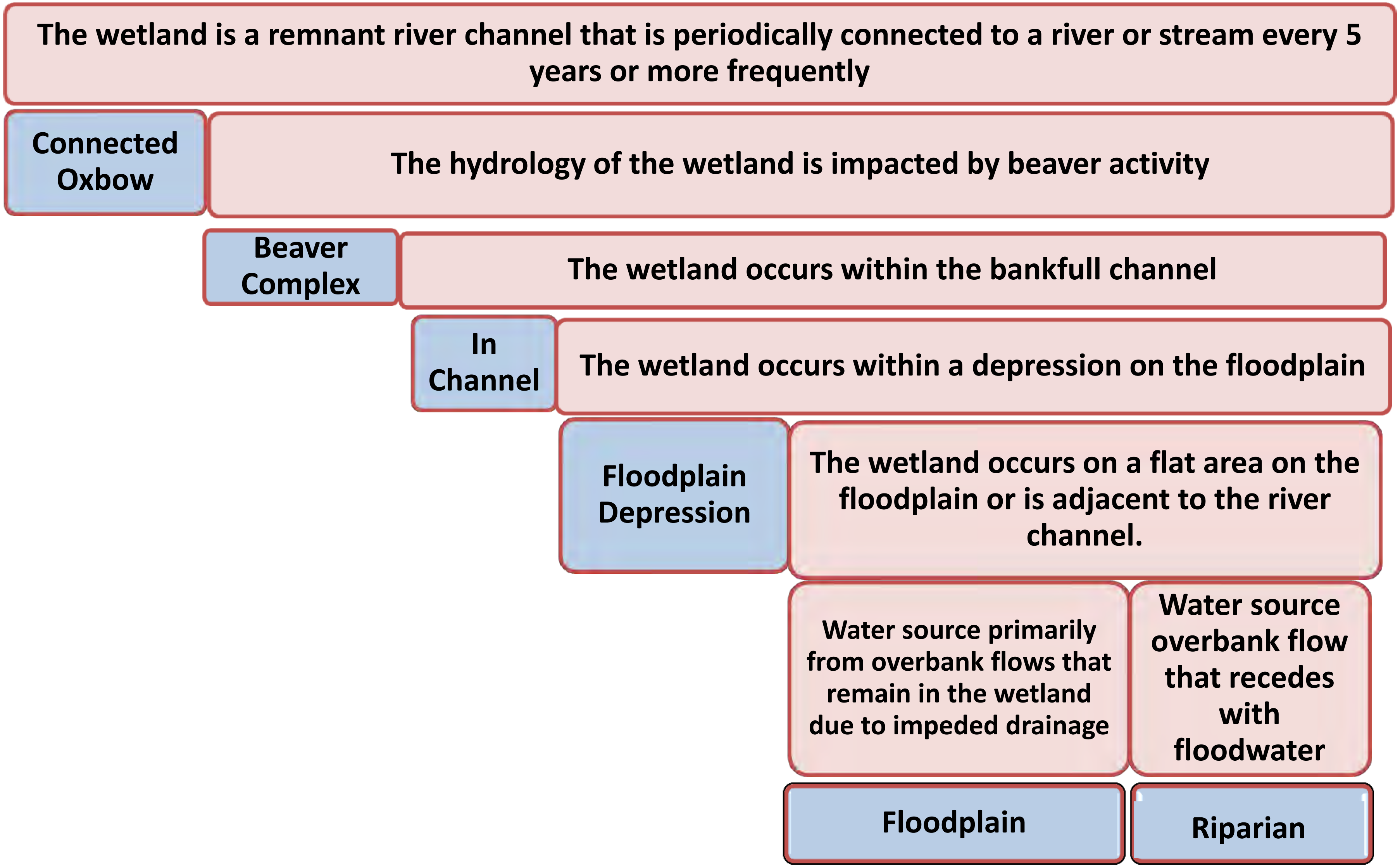
1. Depressional
2. Lacustrine Fringe
3. Riverine
4. Slope
5. Mineral Soil Flats
6. Organic Soil Flats
7. Tidal Fringe

Assessment: Classification

- Subclasses further reduce natural variability in HGM National Classes due to climate and geography

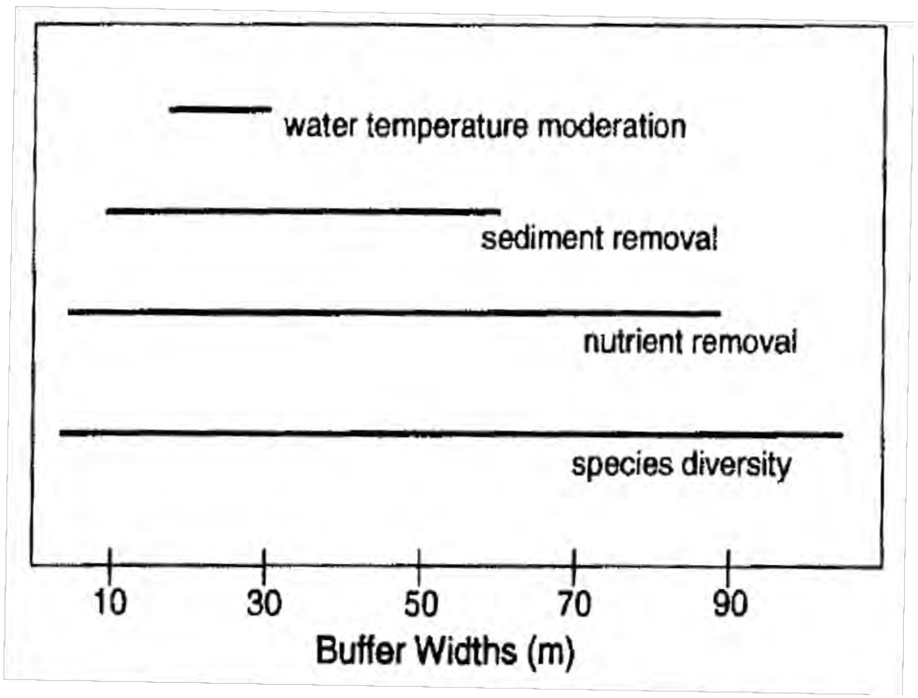


Assessment: Classification

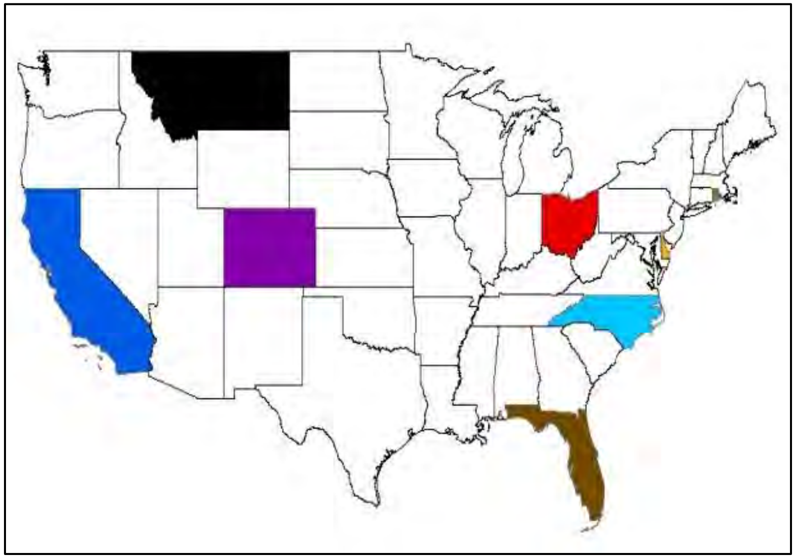


Assessment: OKRAM

- Extensive Literature Review
  - Effects of alteration on structure and process
  - Previously developed methods

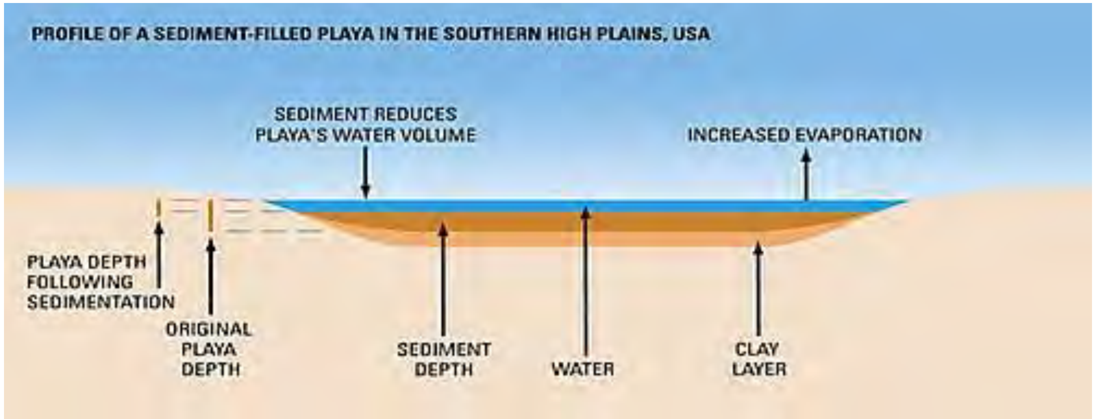


From: Castelle, A.J. et al., 1994. Wetland and stream buffer requirements: A review. Journal of Environmental Quality 23, 878-882.



Assessment: OKRAM

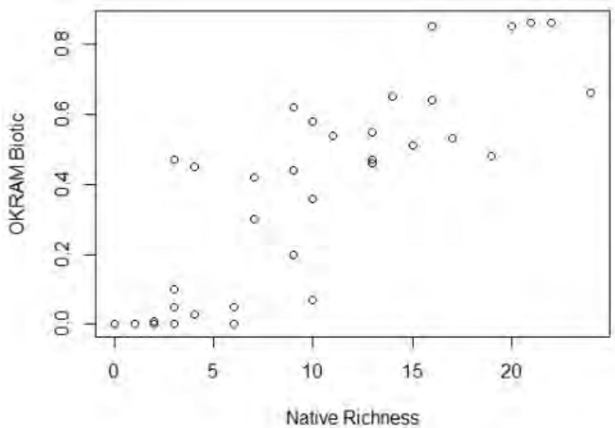
- Rapid Condition Assessment
- Stressor based
  - Hydrology
  - Biota
  - Water Quality



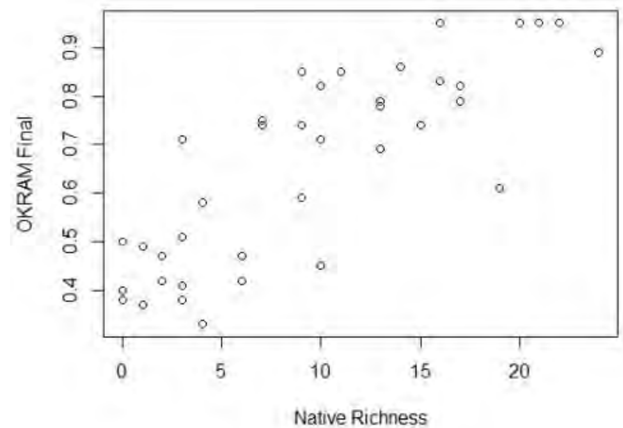
Assessment: OKRAM

- Applied at depressional wetlands
  - Validated with plant community and sediment chemistry
- Currently being applied at lacustrine fringe and riverine wetlands
  - Multiple wetland types
  - User repeatability

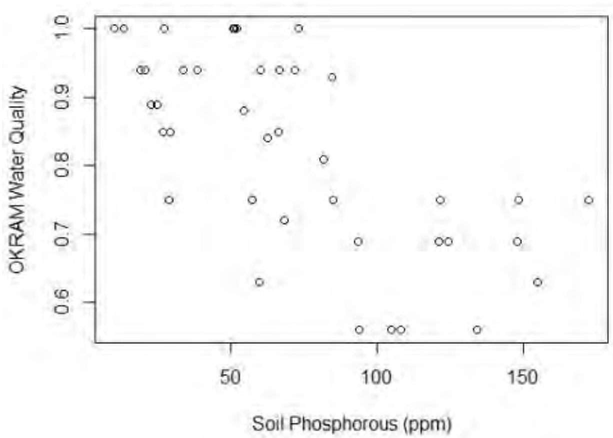
Assessment: OKRAM



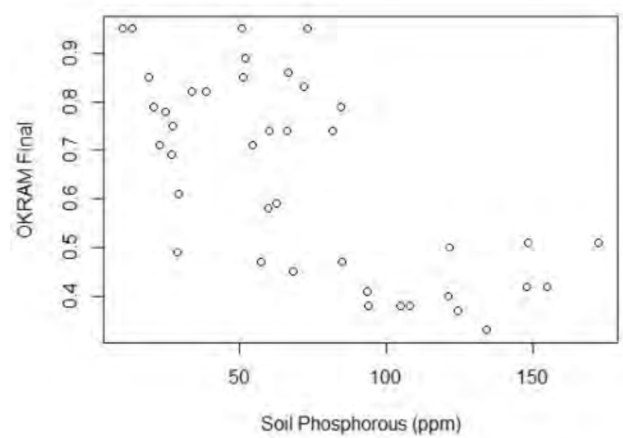
Spearman ρ=0.89; *p* <0.001



Spearman ρ=0.83; *p* <0.001



Spearman ρ=-0.69; *p* <0.001



Spearman ρ=-0.66; *p* <0.001

Assessment: Future Directions

- Continue to refine OKRAM
  - Multiple wetland types
  - Repeatability
  - Range of scores
  - Redundancy of metrics
  - Guidebook
- Work with partners to expand assessment into water quality standard and 401/404 program support

Acknowledgments

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Questions