

Planning, Prioritizing and Monitoring Restoration Sites with Level 1 Data

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Gateway Inn, Ames, IA
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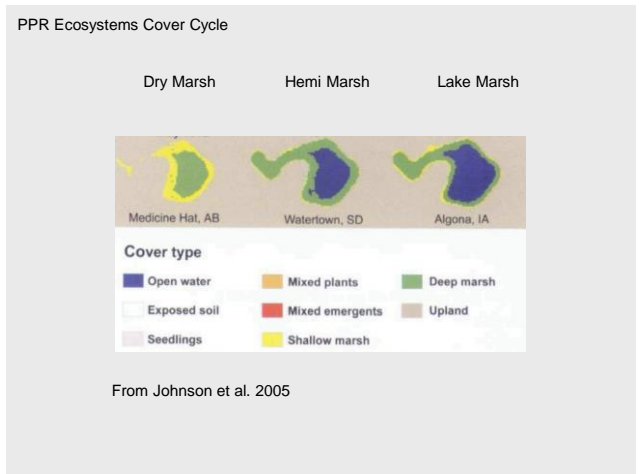
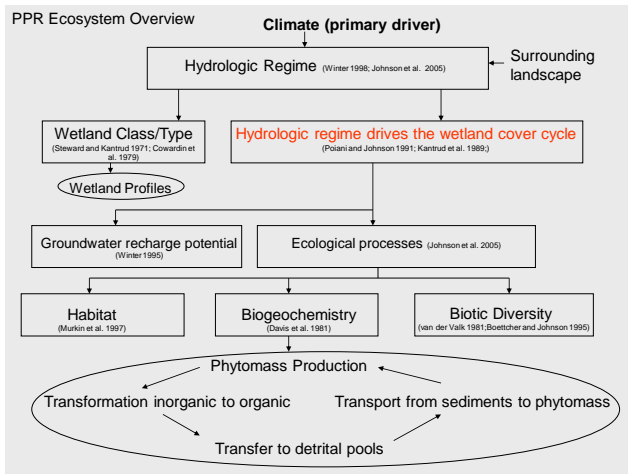
Outline

- PPR Wetland Ecosystem Overview
- Data Available in Geographic Information Systems (GIS),
a.k.a. Level 1
- Level 1 Demonstration
 - Disturbed vs. Reference Standard
- Profiling Watersheds

We should be mindful of how factors operating at
scales above and below the system we are
managing influence the system

(Gunderson and Holling; Wiens; others)





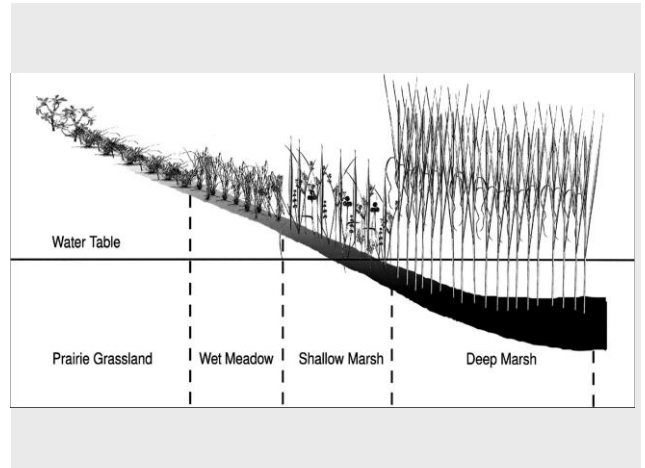
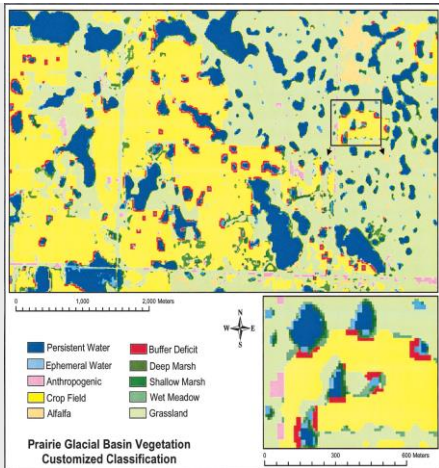
Level 1 Criteria for Restoration Planning and Effectiveness Monitoring

**Need metrics indicative of wetland function that are measurable at repeated intervals and at coarse spatial resolutions.

**Need restoration goals and effectiveness monitoring based on current and historical data collected over hydrogeomorphically similar, minimally disturbed sites (reference standard).

Data Available in GIS for the PPR

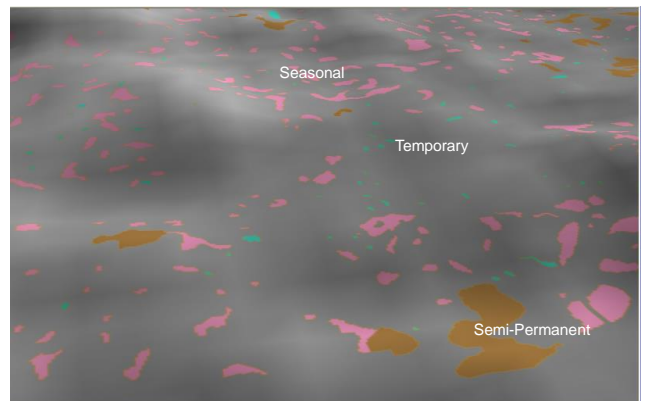
- National Wetlands Inventory
- Topography
- Land Use
- Hydric vegetation
- Hydroperiod



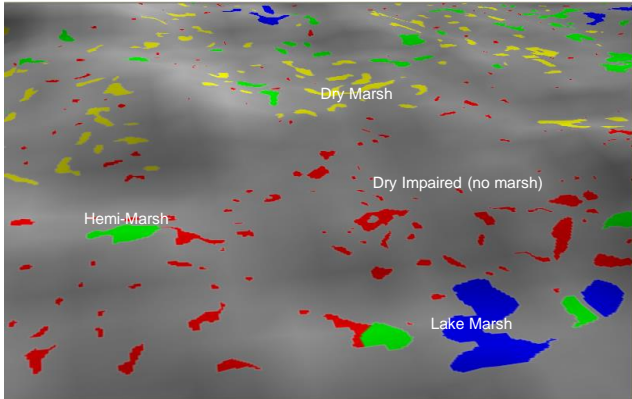
Data Available in GIS for the PPR

- National Wetlands Inventory
 - Topography
 - Land Use
 - Hydric vegetation
 - Hydroperiod
 - Watershed Maps
- Cover Cycle Class
- Lake Marsh
 - Hemi Marsh
 - Dry Marsh
 - Dry Impaired

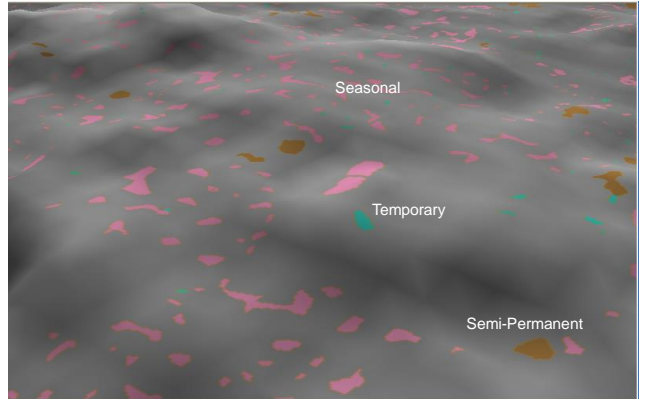
Spatial scale of interest: watershed
 Temporal scale of interest: seasonal



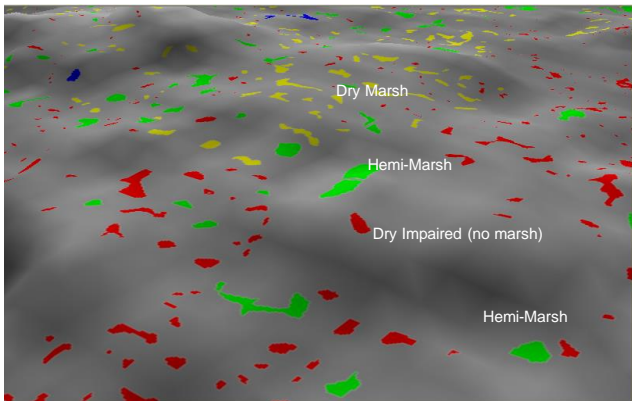
NWI PEM classified by water regime



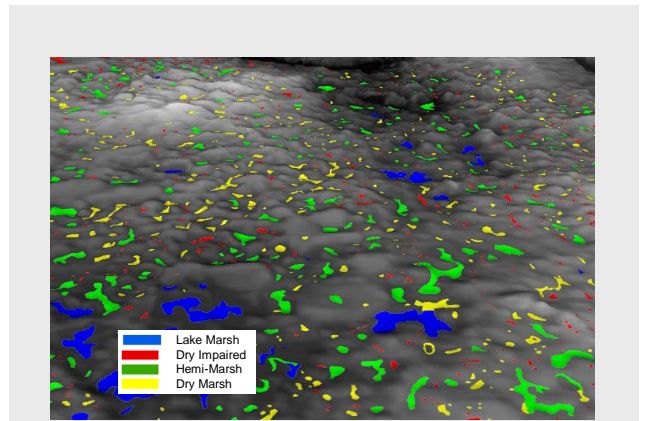
Current (2007) classification by stage of the cover cycle



NWI PEM classified by water regime



Current (2007) classification by stage of the cover cycle



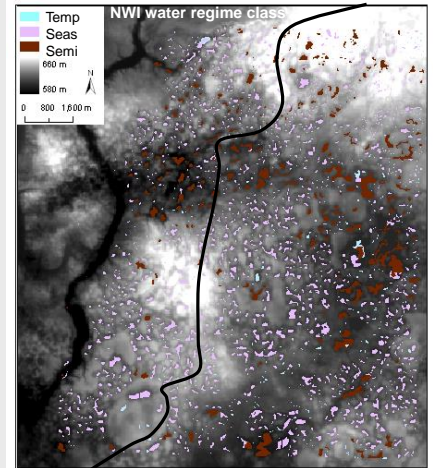
Current (2007) classification by stage of the cover cycle

Watershed Mapping in GIS

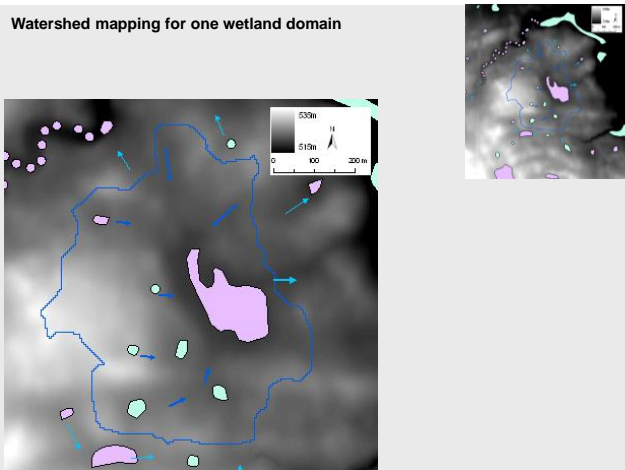
Definition:

Map flow of water from highest point in a domain in all possible directions until water no longer flows or until water flows out of that domain

Watershed mapping for a 100 km² domain



Watershed mapping for one wetland domain

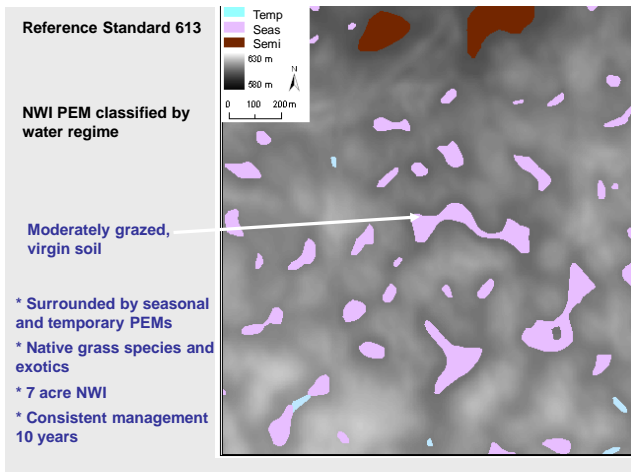
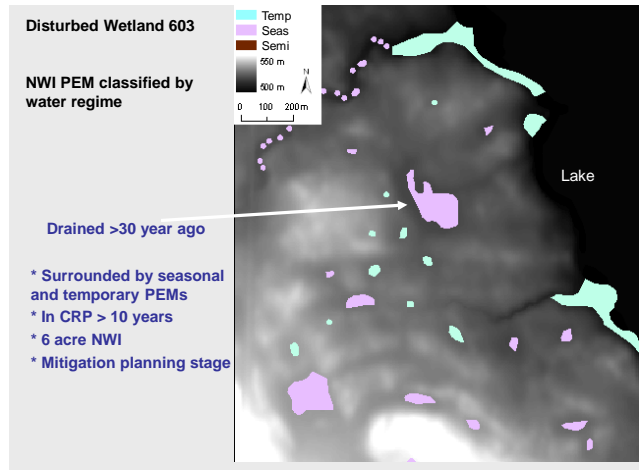


Planning and Monitoring Restoration Effectiveness

The need for Level 1 to establish benchmarks

Demonstration

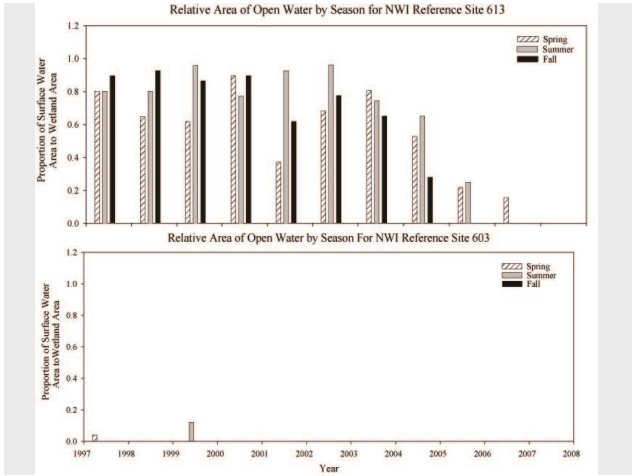
A drained PEM seasonal wetland (#603) compared with a similar, minimally disturbed PEM seasonal wetland (#613)



Hydroperiod Historical Comparison

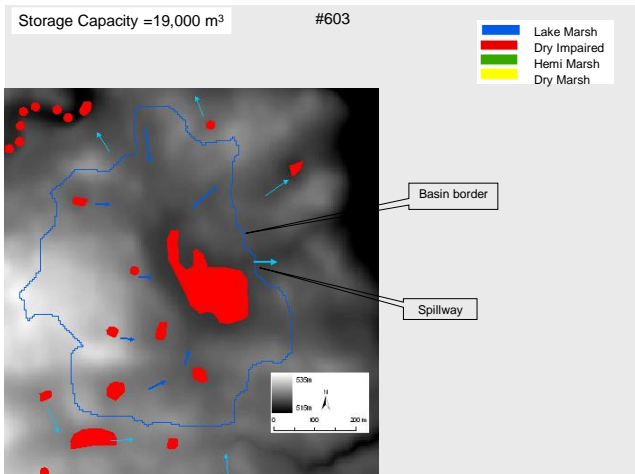
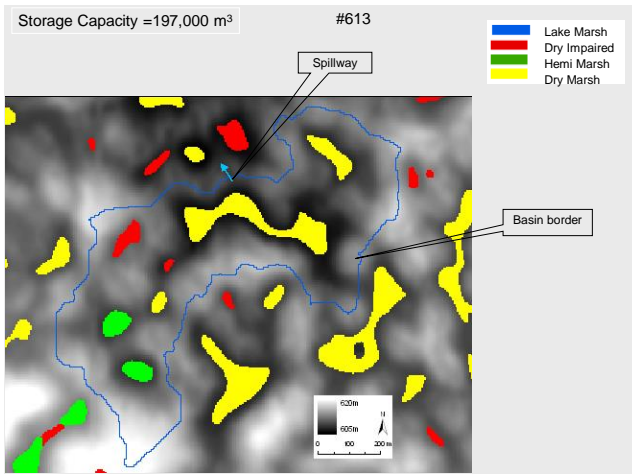
Proportion of NWI Polygon that is covered by open water in Spring, Summer, Fall

Reference Standard vs. Disturbed
1997-2007



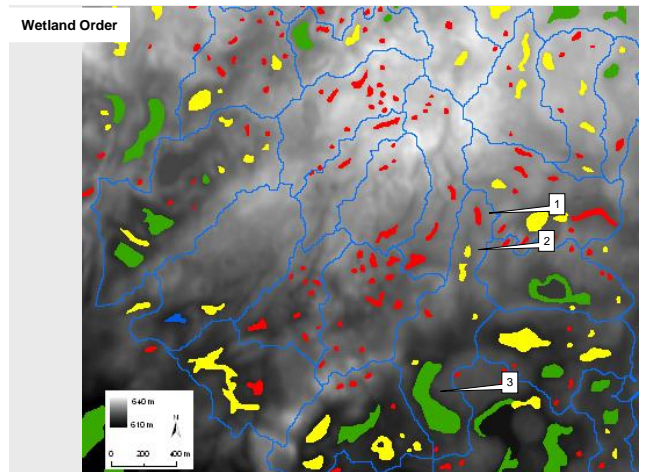
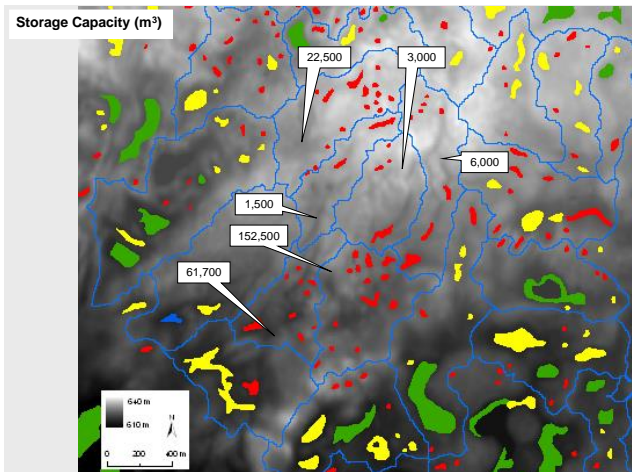
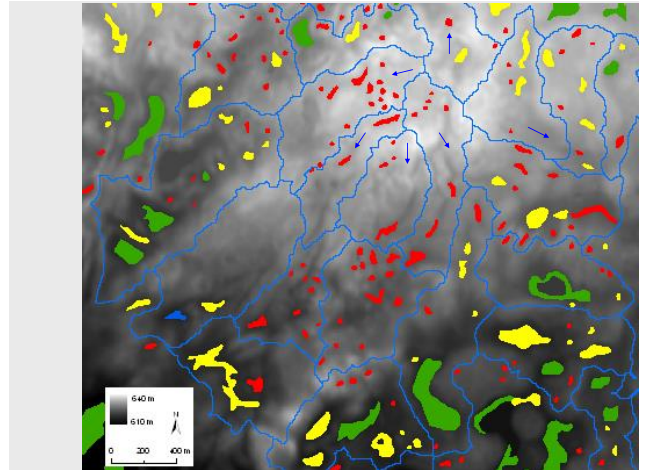
Cover Cycle Classification and Watershed Mapping

Reference Standard vs. Disturbed



Planning and Prioritizing within a Hydrologic Landscape

Profiling Watersheds

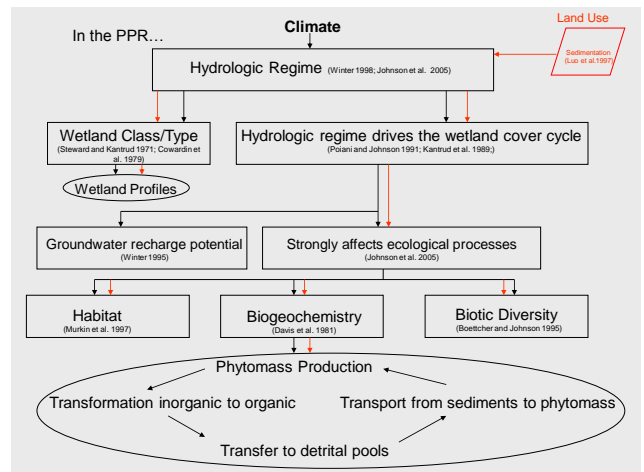


Summary

- PPR watershed maps indicate storage capacity service
 - Optical data available at coarse scales (0.1 ha) from satellite platforms in the PPR provide current and historical data needed for
 - Establishing benchmarks and restoration goals
 - Biotic classification (cover cycle)
 - Watershed profiling
- GIS provides the framework for building monitoring capability and restoration feedback at multiple scales

And Finally....

Upland Land Use and Sediment
Deposition into PPR Wetlands
Research Opportunities

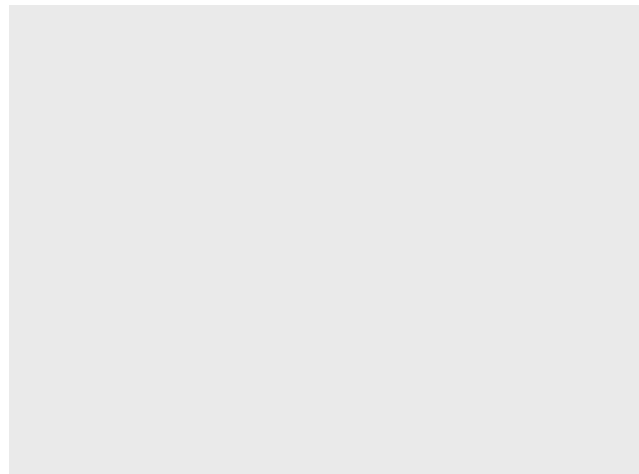
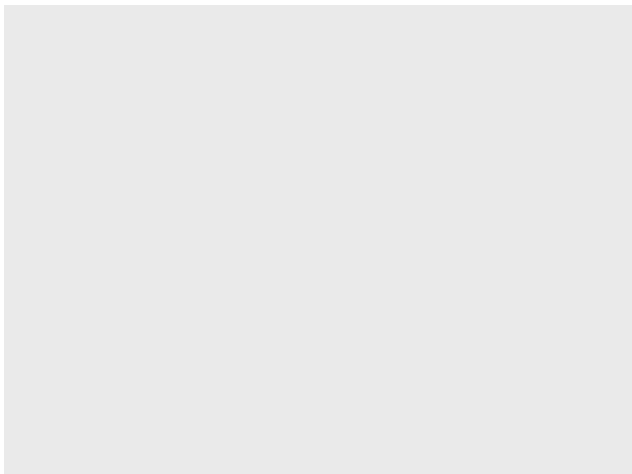
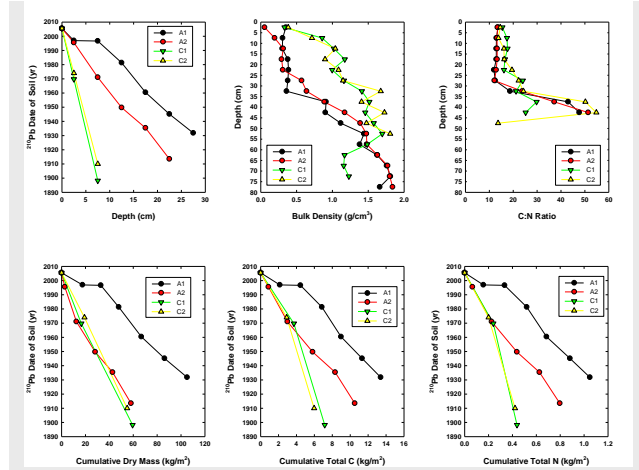


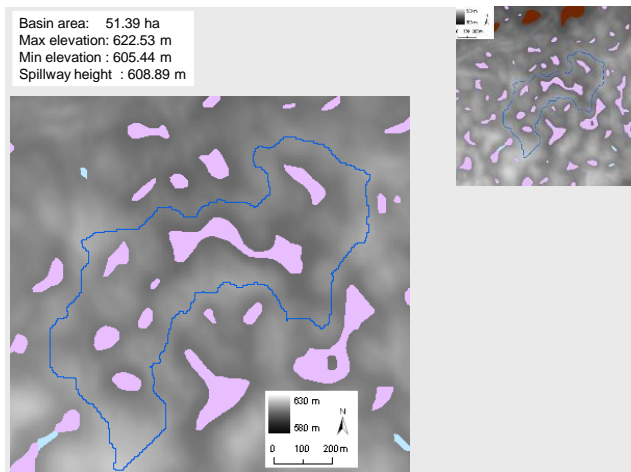
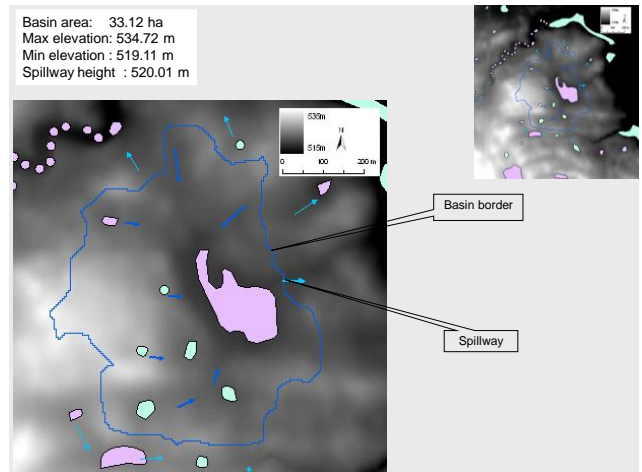
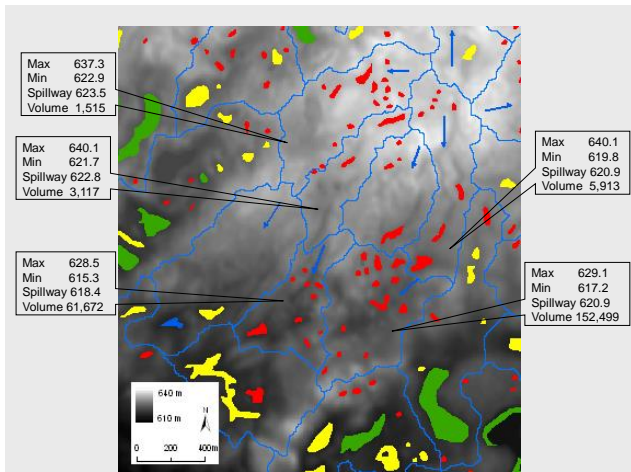
How recent were wetland soils deposited into PPR wetlands, based on the soil depth profile?

Preliminary Data

²¹⁰Pb Dating Four Soil Cores
Shallow Marsh Zone
2-Crop Fields; 2-Virgin Rangeland

In collaboration with Villanova University





The adequacy of remotely sensed data and analysis must be evaluated in reference to a clearly defined problem and goal (Ludwig 2007)

What is the management goal to be achieved?

Restore hydrology and hydric vegetation communities

What is the size of the area where monitoring is needed?

Watersheds from 10 to 10,000 ha in area

Are the grain of these data sufficient to address the question?

Units of 0.1 ha for hydrologic and hydric vegetation data

Variables smaller than the grain size cannot be detected. May need to add layers of data at finer spatial scales, e.g. Level 3.

