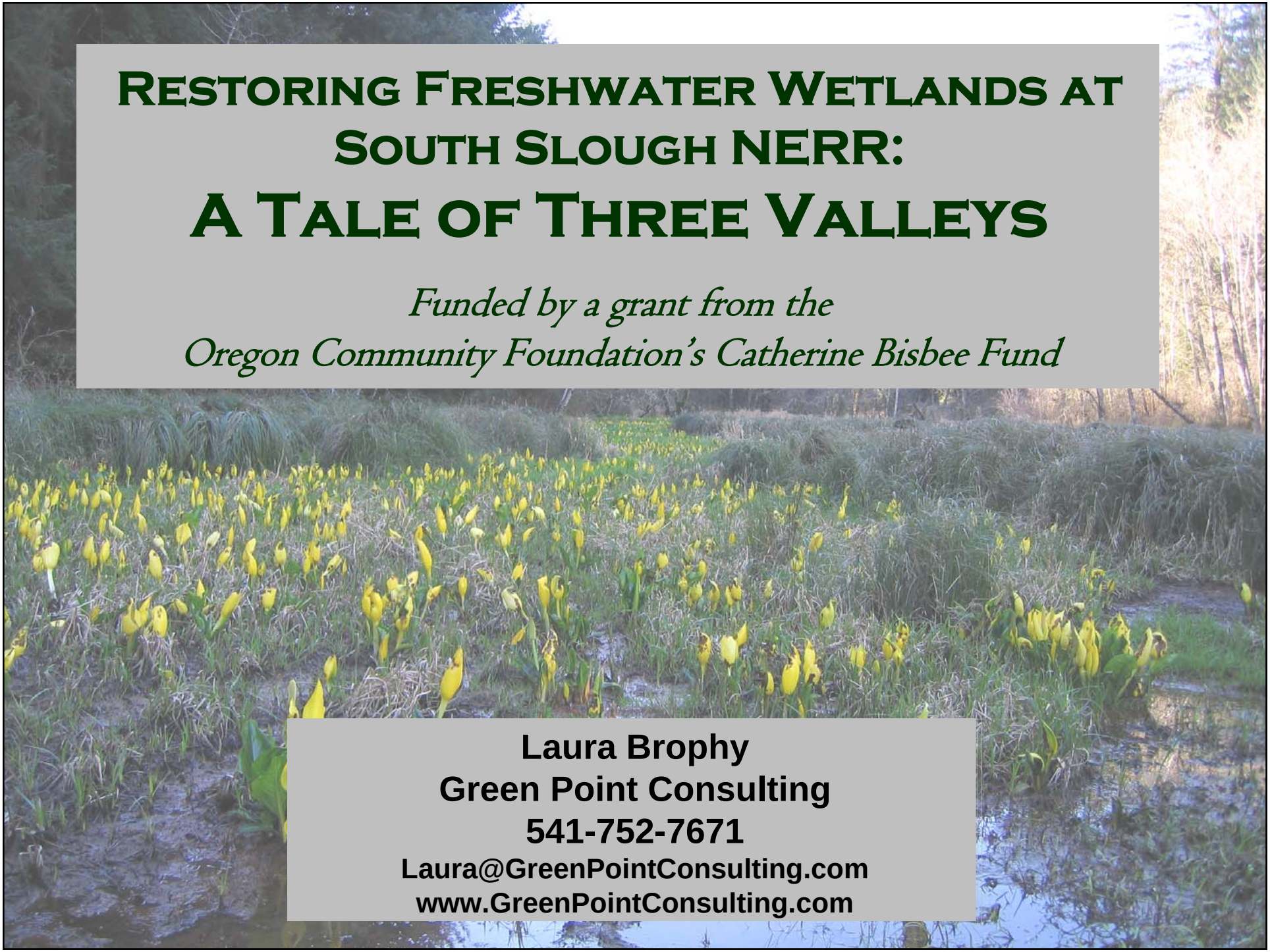

Restoring Freshwater Wetlands at South Slough NERR:
A Tale of Three Valleys

Funded by a grant from the
Oregon Community Foundation's Catherine Bisbee Fund

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And now for the rest of the title…

Links between:

- Water table elevation
- Soils
- Plant communities

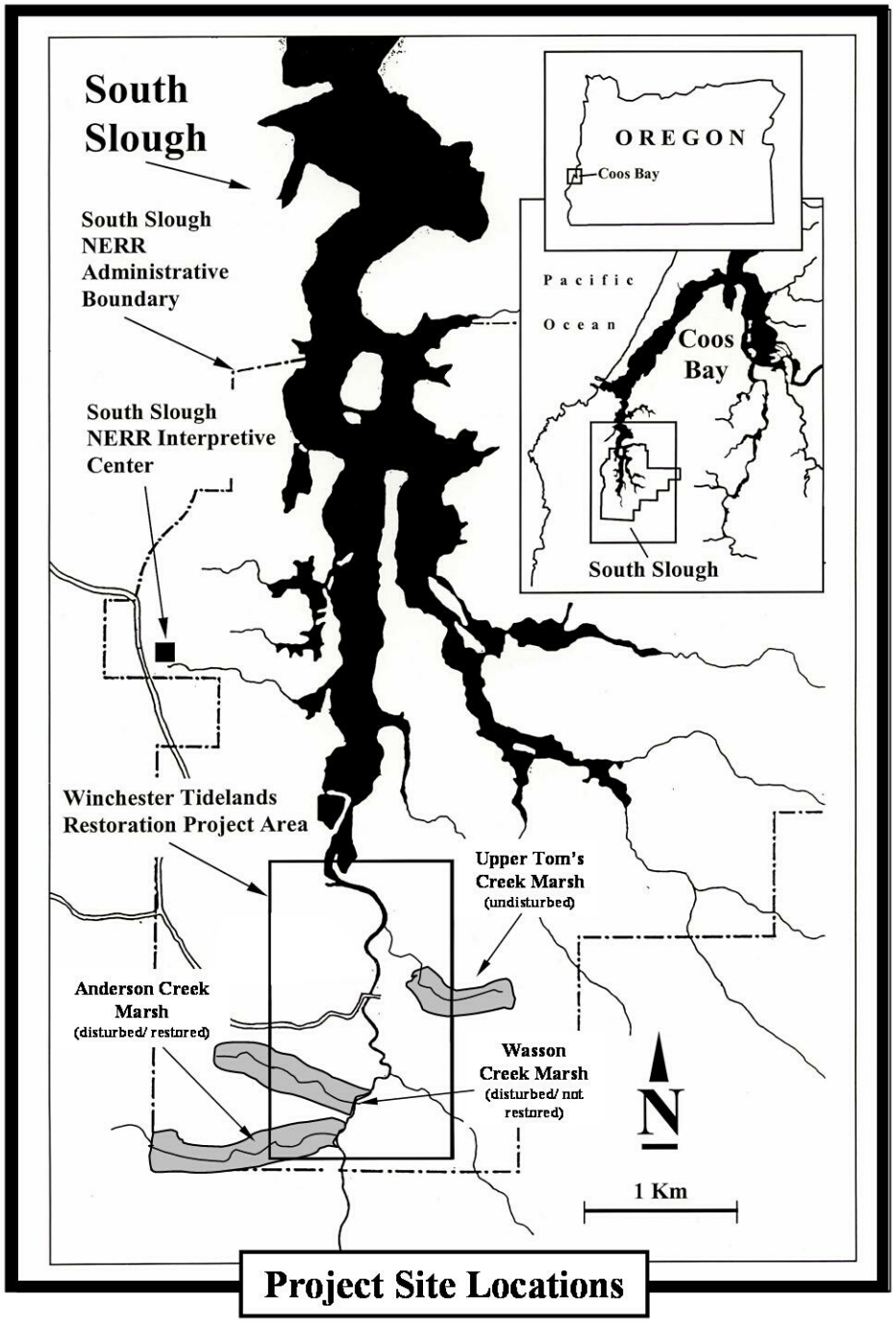
In:

- Restored,
- Altered, and
- Undisturbed wetlands

The big questions

- Structure-function linkages
- Feedback loops
- Human site engineering
- Nonhuman site “engineering” (beavers!)

Sites


South Slough
South Slough NERR Administrative Boundary
South Slough NERR Interpretive Center
Winchester Tidelands Restoration Project Area
Upper Tom's Creek Marsh (undisturbed)
Anderson Creek Marsh (disturbed/ restored)
Wasson Creek Marsh (disturbed/ not restored)
OREGON
Coos Bay
Pacific Ocean
Coos Bay
South Slough
N
1 Km
Project Site Locations

Site characteristics

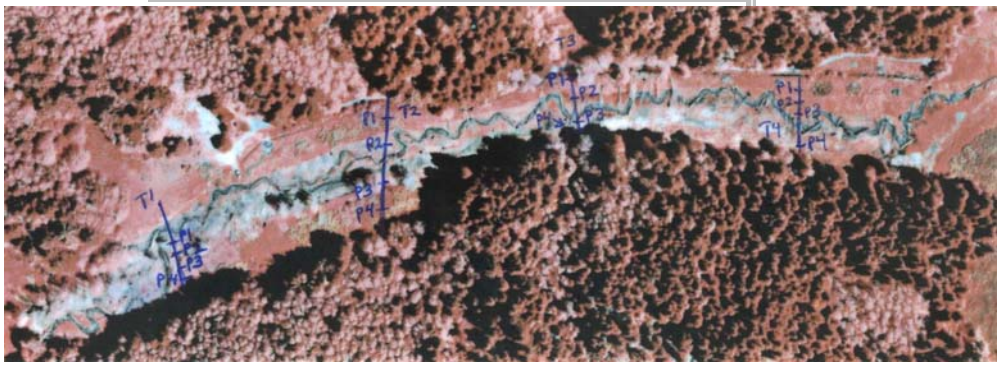
Site	Impacted?	Restored?
Anderson Creek	Yes – ditched and grazed from early 1900s through 1970s	Yes – ditch filled and channel restored in 2002; planted with native wetland species; LWD placed in channel
Wasson Creek	Yes – ditched and grazed from early 1900s through 1970s	No, but lots of beaver activity
Tom's Creek	No – undisturbed	n/a

Anderson Creek

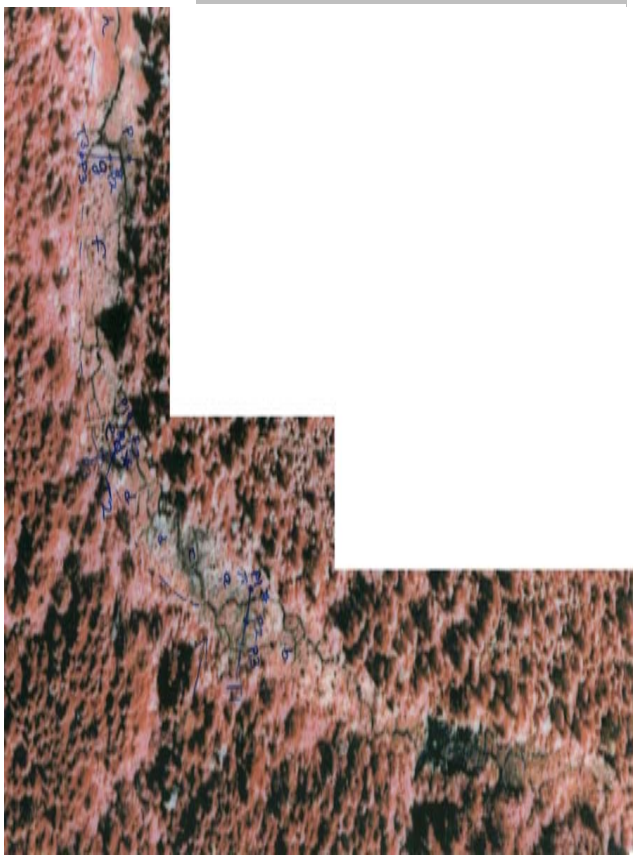
Tom's Creek

Wasson Creek

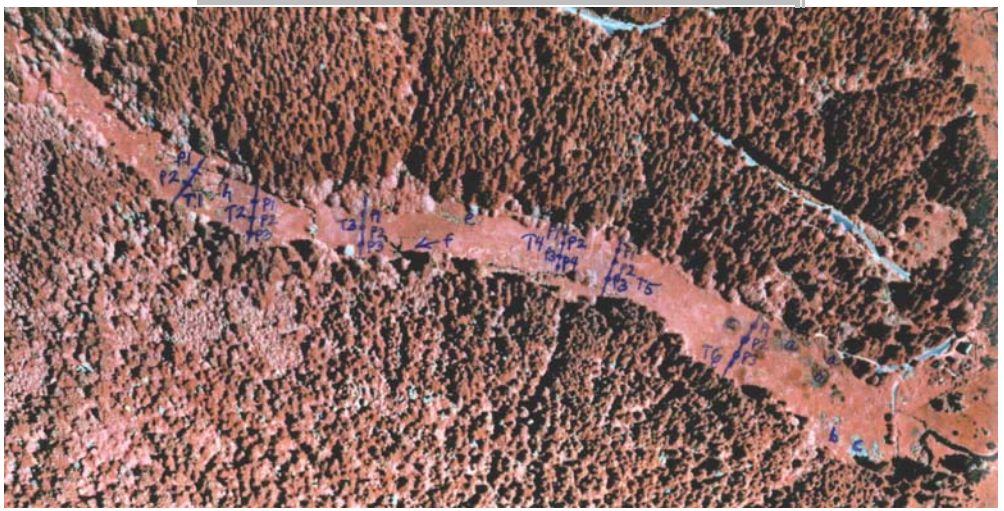
Anderson Creek



Tom's Creek



Wasson Creek



Study questions

- How have human impacts affected site characteristics?
- Is restoration re-establishing characteristics similar to an unimpacted reference site?
- Are there significant relationships between physical and biological site characteristics?
  - Is dominance of reed canarygrass related to specific abiotic conditions?

Where to start?

- Basic structural characteristics / controlling factors (abiotic factors)
  - Hydrology, soils, elevation, distance from channel
- Plant communities
  - Both structural and functional characteristics
  - Sensitive response variable
- Accepted high-priority monitoring parameters for wetland characterization

Methods I.

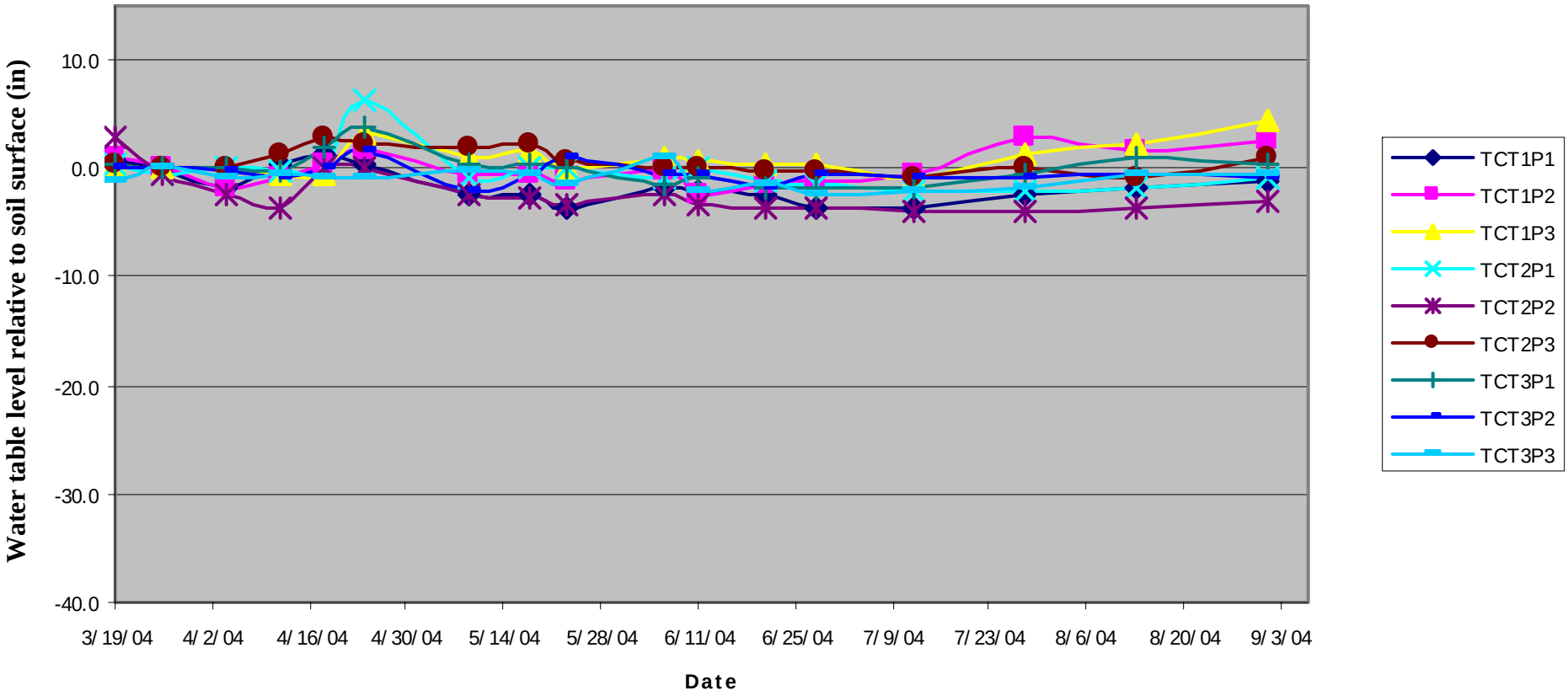
- Principles:
  - Use standard sampling and analytical methods
  - Stratify sampling within elevation zones
  - Embed within existing sampling design at Anderson
- Sampling parameters:
  - Vegetation: % cover for all species present
  - Soil: % organic matter, pH, total N, total P, texture
  - Hydrology: Depth of water table within 36” deep wells

Methods II.

- Sampling design: 3m circular plots within strata
- Sampling plan:
  - Vegetation sampled in midsummer
  - Soils subsampled & bulked in midsummer
  - Water table depth measured weekly/biweekly Mar.-Sept. in standard shallow observation wells
- Analysis by site, stratum, plant wetland indicator status (t-tests, linear correlation)

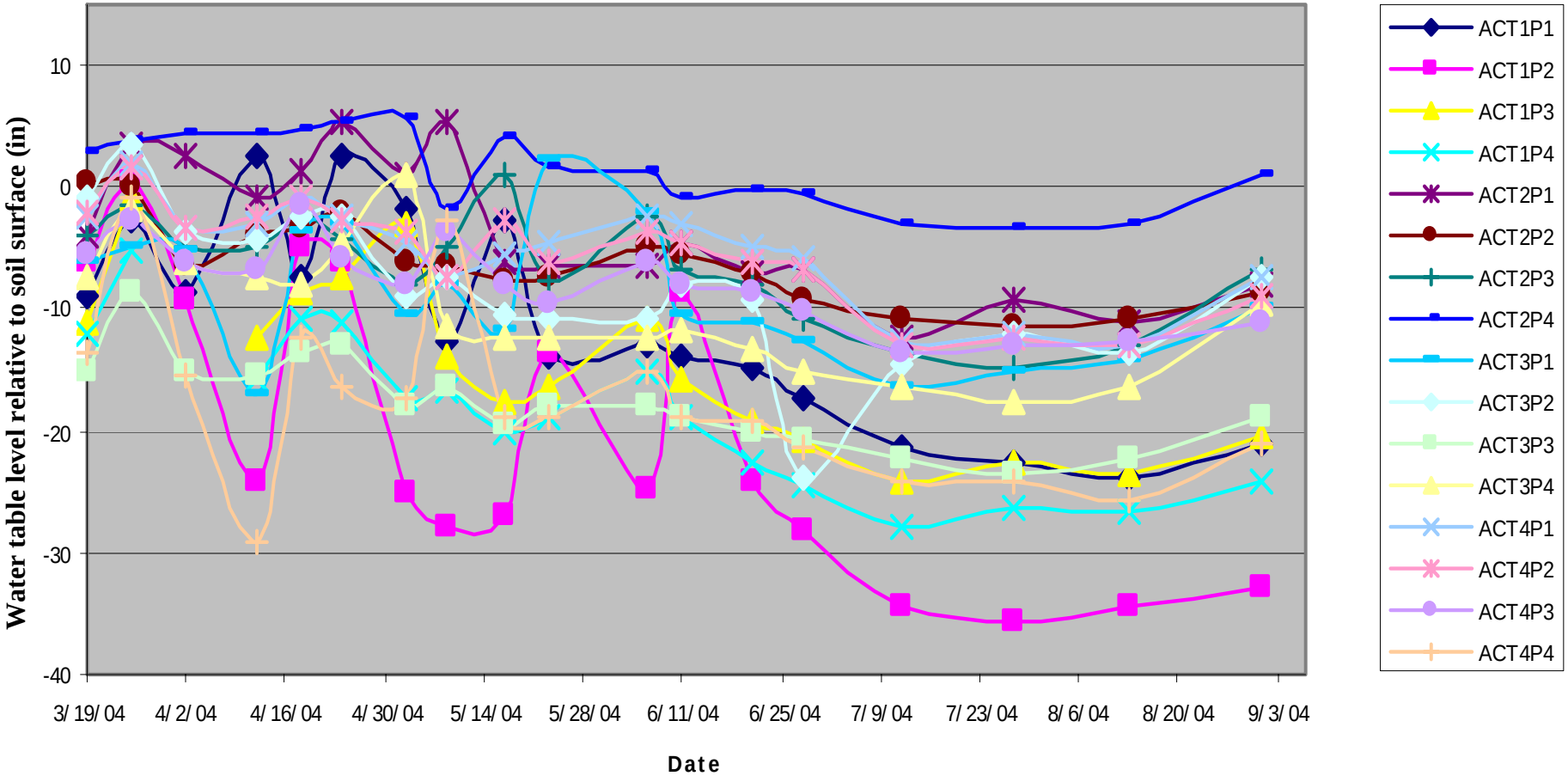
Results: Hydrology at reference site

- Water tables were at or near the soil surface at all times
- Strikingly stable conditions
  - Beaver dam upstream
  - Highly organic soils, unditched



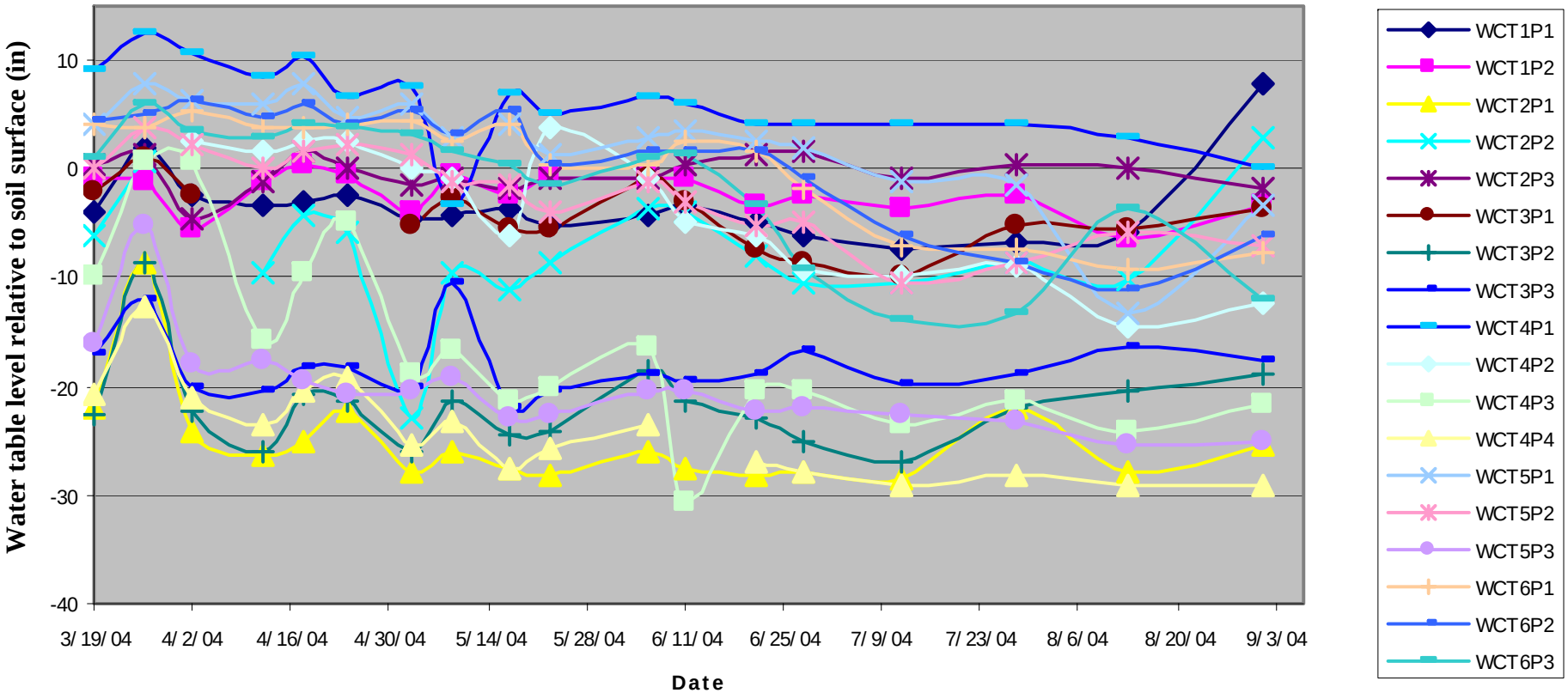
Hydrology: Restored site (Anderson)

- 2/3 of plots had long-duration shallow water tables (>44d)
- Water levels were generally dynamic and seasonal
- Pre-restoration conditions were important for some plots



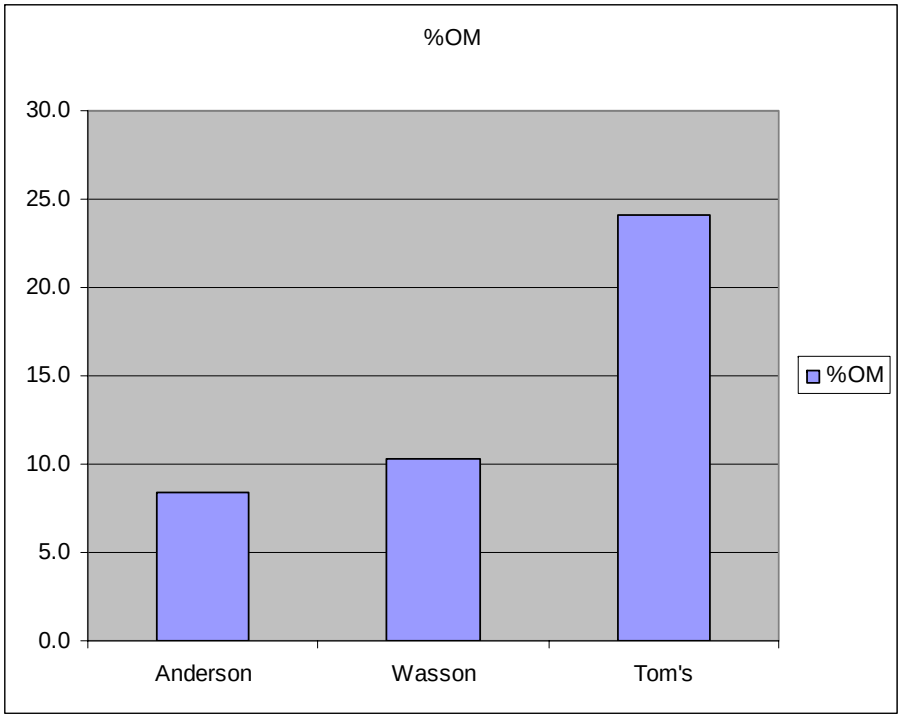
Hydrology: Unrestored site (Wasson)

- 2/3 of plots were consistently wet, likely due to beaver dams
- Shallow water table duration was less variable than at Anderson
- Duration was inversely correlated to distance from ditch
- Plots were either wet or dry; few were seasonally wet



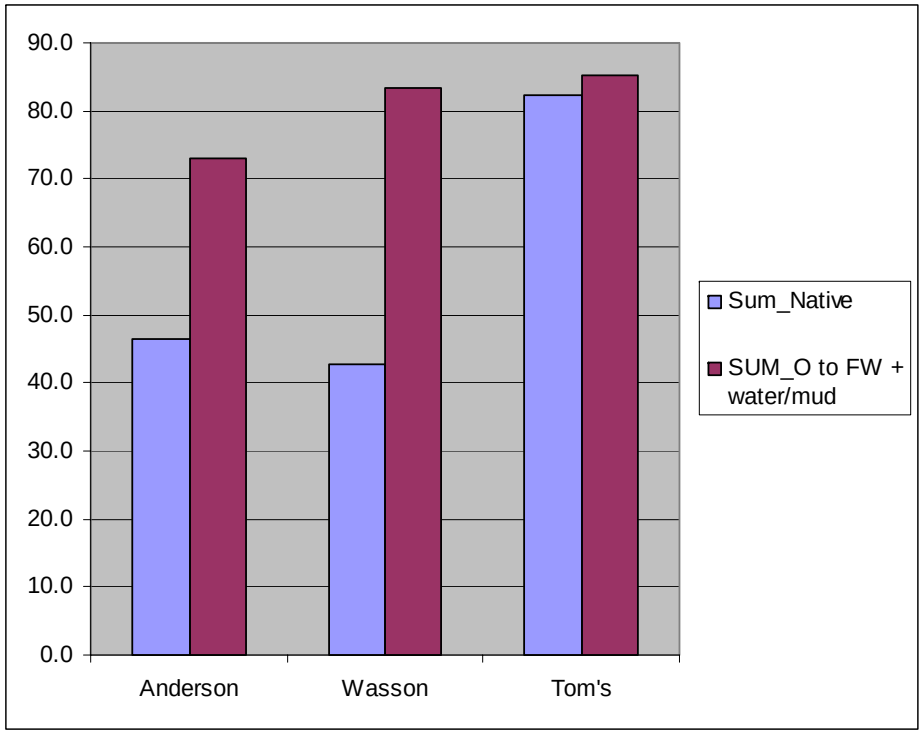
Results: Soils

- Soils at reference site (Tom's) were highly organic (~50% histosols)
- Total N pattern at the three sites was similar to % OM
- Texture was sandy at reference site (Tom's), intermediate at restored site (Anderson), and finest at unrestored site (Wasson)
- Beaver dams strongly affect reference site soils (LWD, deposition)



Results: Vegetation

- Unimpacted site had higher % cover of native plants
- All sites had predominantly wetland plants (highest % cover at unimpacted site).
- A rare plant community was present at Tom's Creek (Pacific reedgrass fen, ONHP rank S1G3)



Results: Linkages

- There were highly significant differences in plant communities, soil characteristics, and hydrology between impacted/unimpacted and restored/unrestored sites.
- Duration of shallow water table was significantly (and positively) correlated to % cover of wetland plant species, % organic matter and total N
- Reed canarygrass cover was not obviously related to specific abiotic conditions

Conclusions

- Ditching and grazing have strongly affected physical and biological conditions at Anderson and Wasson Creeks.
- Restoration at Anderson Creek appears to have re-established seasonal wetland, and Wasson Creek appears to be “self-restoring” as a result of beaver activity.
- Conditions at both Anderson and Wasson are very dynamic, with significant differences from the reference site that may resolve with time. Continued monitoring is needed to verify trajectory and eventual outcome.
- Beaver are major site engineers affecting all controlling factors – hydrology, soils, vegetation, sedimentation.

Recommendations

- Continue monitoring to establish site development trajectories at Anderson and Wasson Creeks.
- Monitor hydrology year-round; explore relationships between streamflows, beaver activity zones, and water table depths.
- Continue to encourage beaver at all sites.
- Re-establish Pacific reedgrass at restoration sites.
- In future projects, conduct multi-year baseline monitoring to help evaluate restoration trajectory.

Thank you!

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