

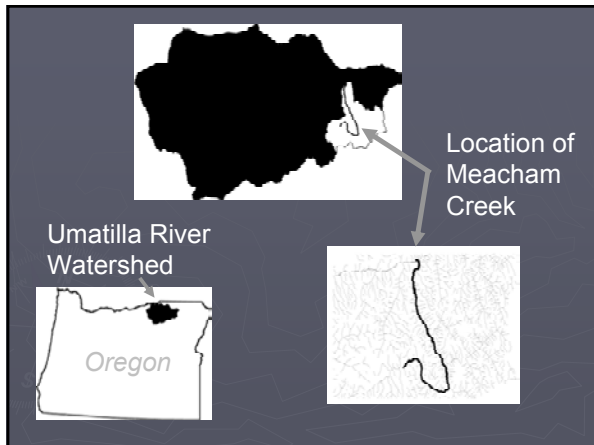
Watershed Restoration Planning and Monitoring; the Meacham Creek Example

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- ▶ 114,000 acres
- ▶ Elevation
 - 1800 to 4500 ft
- ▶ Listed Fish Species
 - Steelhead
 - Bull trout
 - Spring chinook
- ▶ TMDL - Temperature
- ▶ Mixed ownership

Meacham Watershed

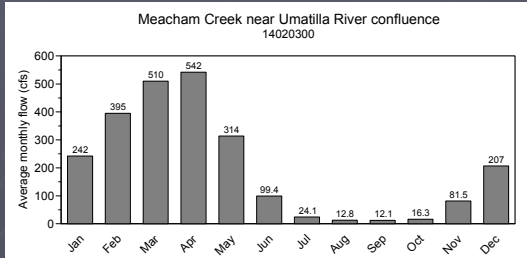
MEACHAM

Legend

- Boundary (tribal/land)
- Meacham
- Umatilla National Forest
- State road
- Highway
- Stream
- Railroad

Climate Regime

- ▶ 25 to 40 inches of precipitation
- ▶ Snow dominated above 3500 feet
- ▶ Rain-on-snow events at mid to lower elevations



Issues and Concerns

Railroad and
Related Infrastructure



Issues and Concerns Channel Form



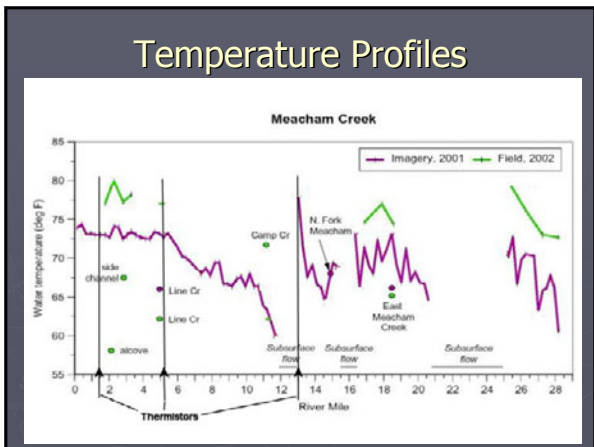


Issues and Concerns

Miscellaneous Impacts

Existing Water Quality Data

- ▶ Temperature
 - Continuous Thermistors (temporal patterns)
 - Point Samples
 - FLIR (spatial patterns)

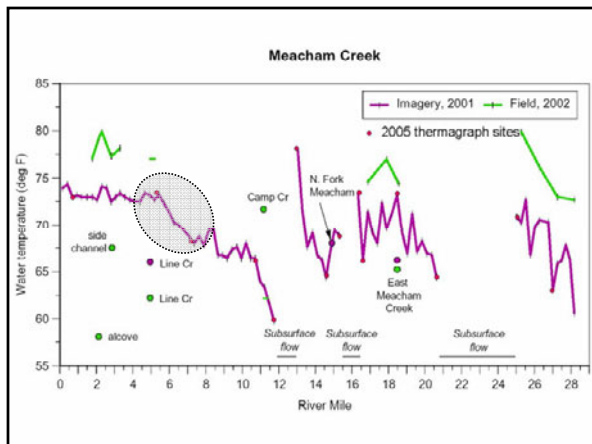


Assessment Results

- ▶ Lack of large woody debris and source
- ▶ Poor channel form in specific areas
- ▶ Constrained channel and disconnected floodplain
- ▶ Poor riparian vegetation coverage and conditions
- ▶ High water temperatures and high rate of heating

Monitoring Actions

- ▶ Temperature Monitoring
 - Longitudinal thermistors



Paired Thermistor Sites

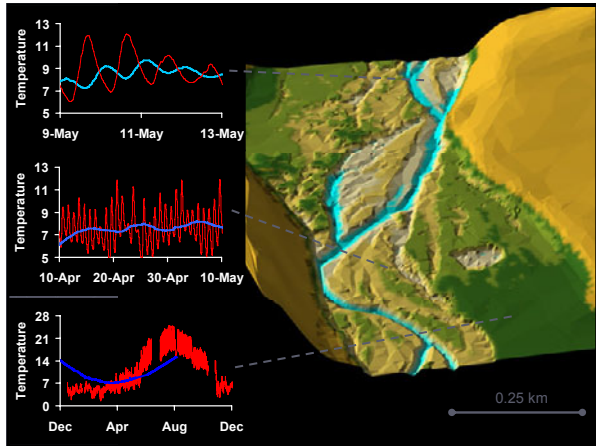


Monitoring Actions

- ▶ Stream Temperature
- ▶ Hyporheic Flow
 - Measure of residence time
 - Evaluate flowpaths


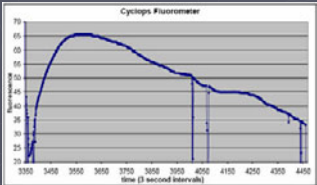
Hyporheic Investigation Sites





Hyporheic Investigation

- ▶ Shallow piezometers
- ▶ Fluorescent dye and salt tracer

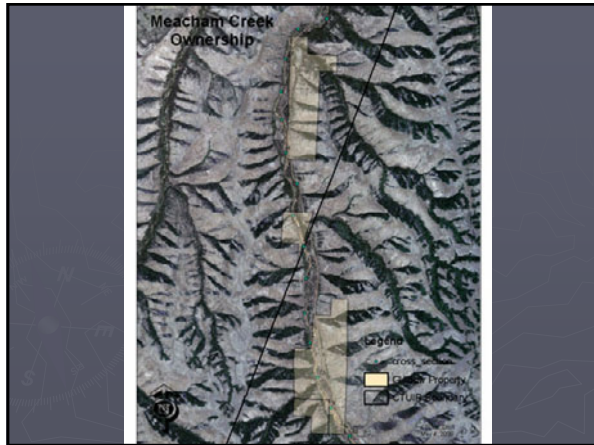
Monitoring Actions

- ▶ Stream Temperature
- ▶ Hyporheic Flow
- ▶ Fish and Habitat Surveys
 - Electroshocking at 11 sites
 - ▶ 180m sample reaches
 - ▶ Species and size recorded
 - Habitat inventory
 - ▶ Used ODFW fish habitat methodology
 - ▶ Surveyed habitats within 180m reach

Restoration Activities

Restoration actions are intended to achieve objectives.

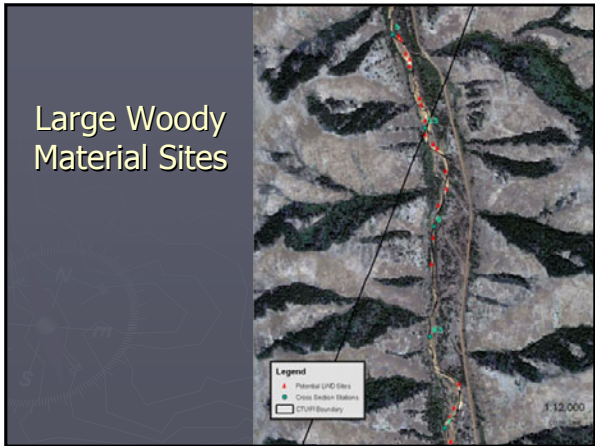
1. Riparian easement / riparian pasture development.
2. Whole conifer tree additions to channel and floodplain.
3. Levee reduction and/or removal within the floodplain.
4. Channel form and sinuosity improvement.
5. Riparian planting and noxious weed treatment













Funding Sources

- ▶ EPA NPS Clean Water Act 319 Funding
 - Assessment and Action Plan development
 - Botanist support
 - Large wood placement
- ▶ Clean Water Act Section 106
 - Channel morphology
 - Water quality monitoring
- ▶ General Assistance Program
 - Supporting Water Quality Monitoring

Matching Funds

- ▶ Blue Mountain Habitat Restoration Council
 - Union Pacific Railroad Mitigation
- ▶ Bonneville Power Administration
- ▶ Pacific Coastal Salmon Recovery Fund
 - Columbia River Inter-Tribal Fish Commission
 - NOAA Fisheries
- ▶ Natural Resource Conservation Service
- ▶ Oregon Department of Transportation
