



# Floodplain Restoration Using a RiverVision Approach in Meacham Creek, Oregon USA.



5<sup>th</sup> National Conference on  
Ecosystem Restoration  
Greater Chicago, IL

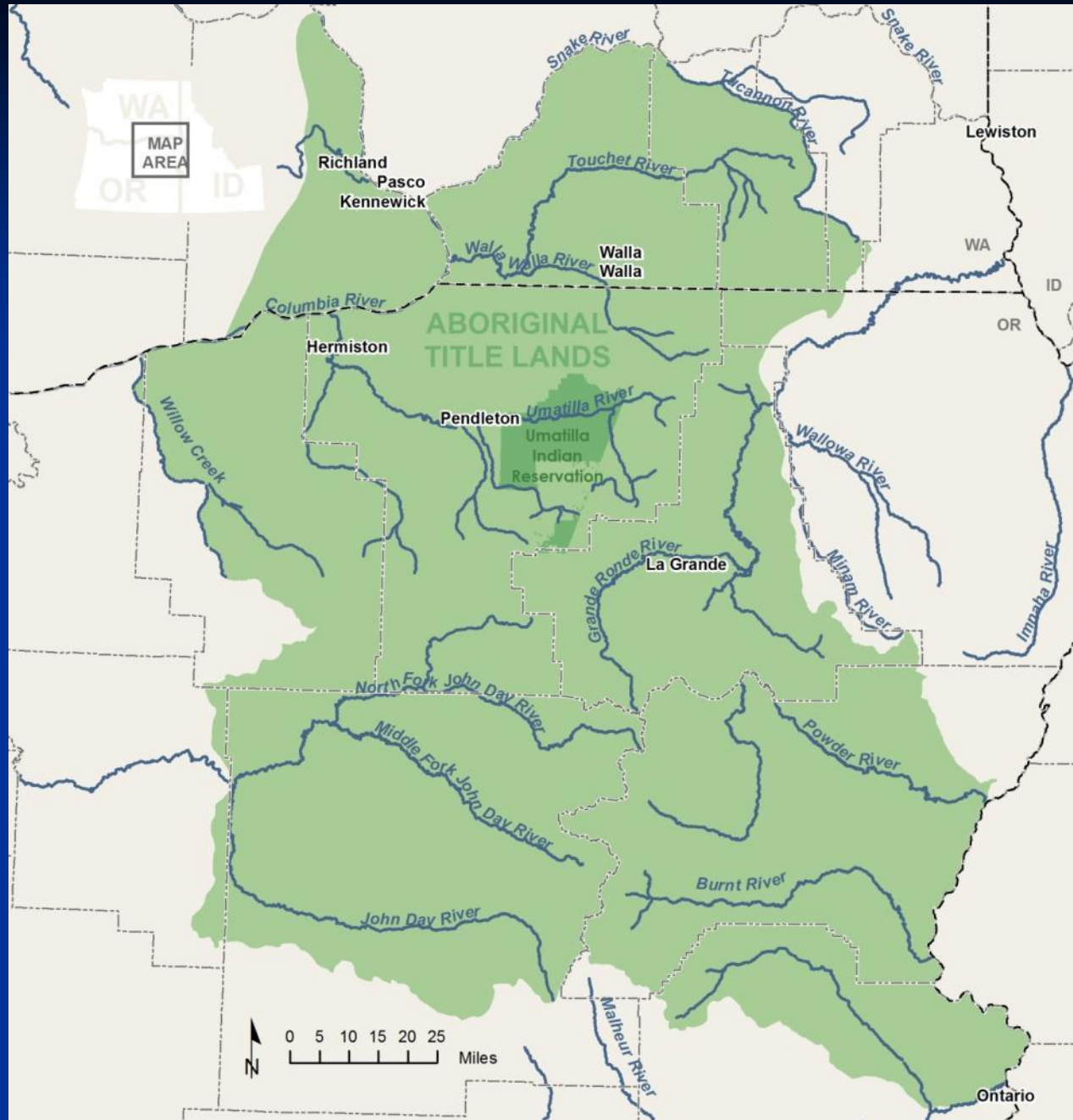
July 31, 2013



James Webster

Confederated Tribes of the Umatilla Indian Reservation, Department of Natural Resources

- Umatilla
- Walla Walla
- Tucannon
- Grande Ronde
- John Day



# Department of Natural Resources

## Mission Statement

To protect, restore, and enhance the First Foods for the perpetual cultural, economic, and sovereign benefit of the Umatilla Tribes.

This is accomplished utilizing traditional ecological and cultural knowledge and science to inform:

- 1) population and habitat management goals and actions; and
- 2) natural resource policies and regulatory mechanisms.



# “Extending the Table”

## Using the First Foods to Guide DNR

Water

Salmon

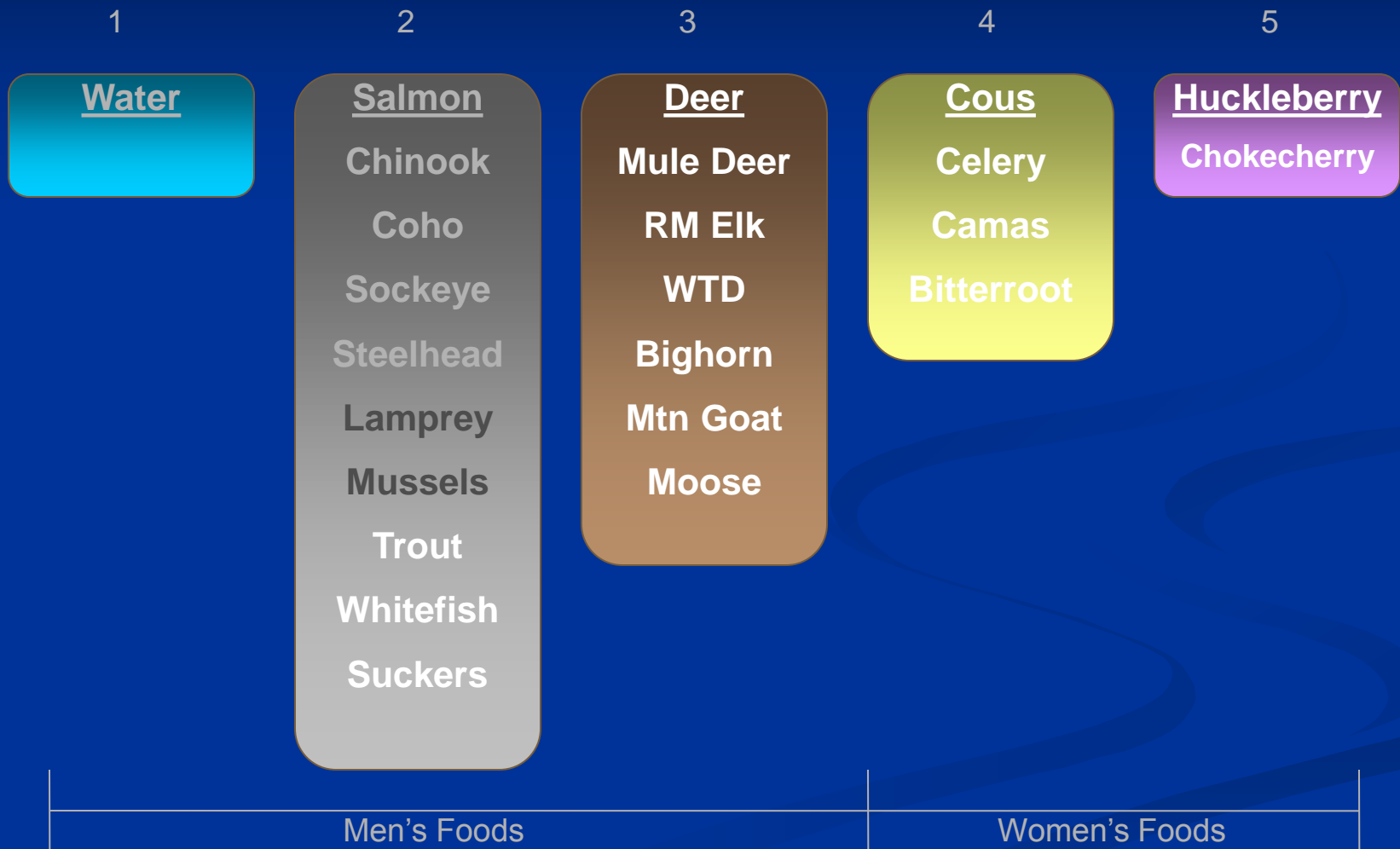
Deer

Cous

Huckleberry

# “Extending the Table”

Using the First Foods to Direct Natural Resource Restoration



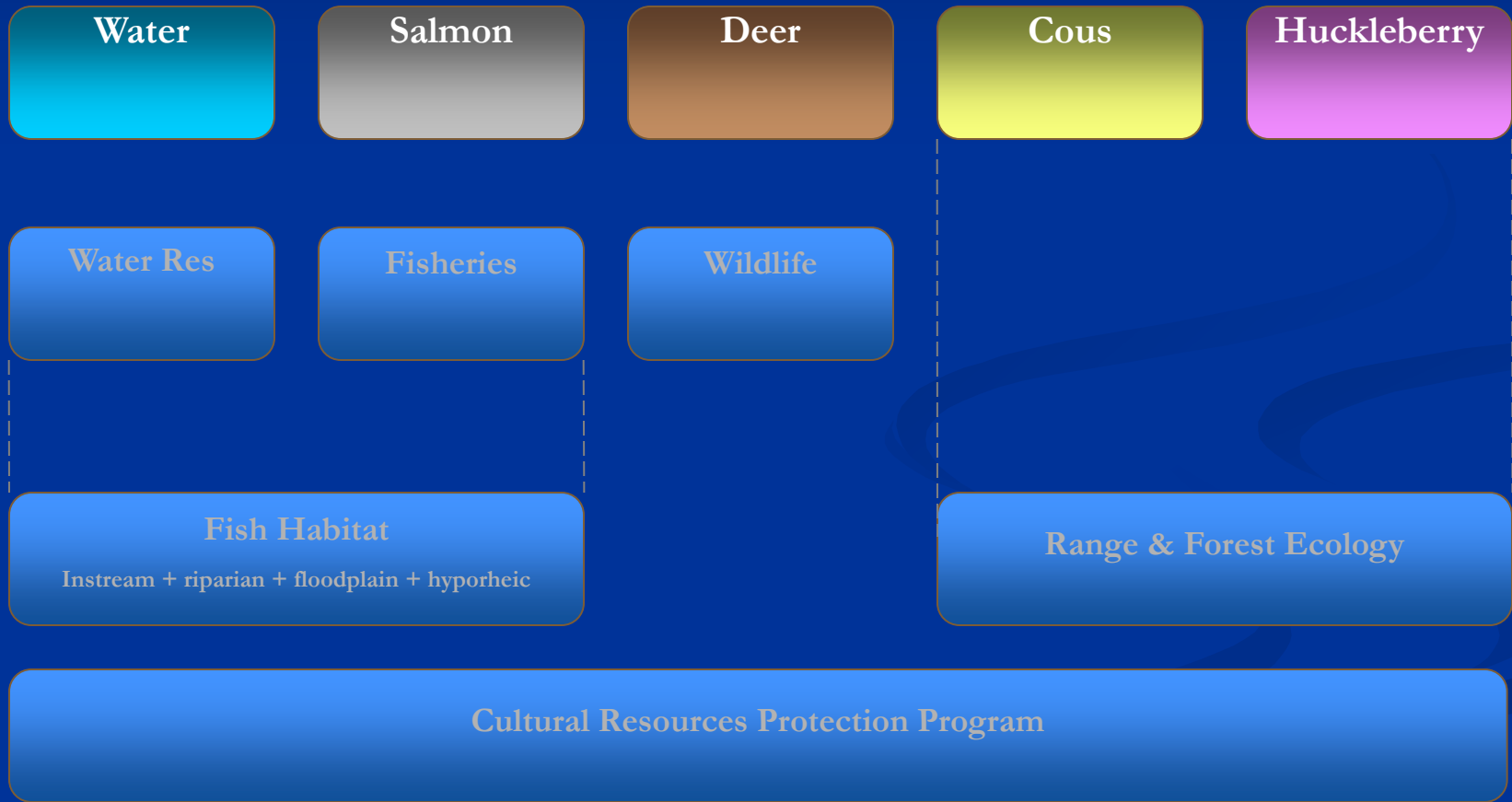
Featured Management

Research/Development

Future Investigations

# “Extending the Table”

## Using the First Foods to Organize DNR



# The Need for a Vision

Sound river management and restoration include the need to develop a systemic and holistic vision of a functional river.

The vision provides:

- 1) a framework for planning management or restoration efforts;
- 2) a benchmark for assessing management progress and outcomes; and
- 3) context necessary for understanding the role of any specific management decision or action in the context of other decisions or actions.

# Umatilla River Vision

Hydrology

Connectivity

Geomorphology



Aquatic Biota

Riparian Vegetation

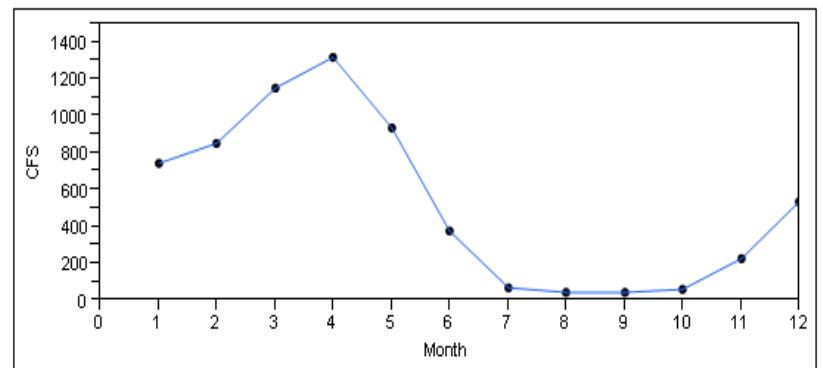
The River Vision provides a holistic view of a functional river with connectivity in space (longitudinal, lateral, vertical) and time.



# Hydrology



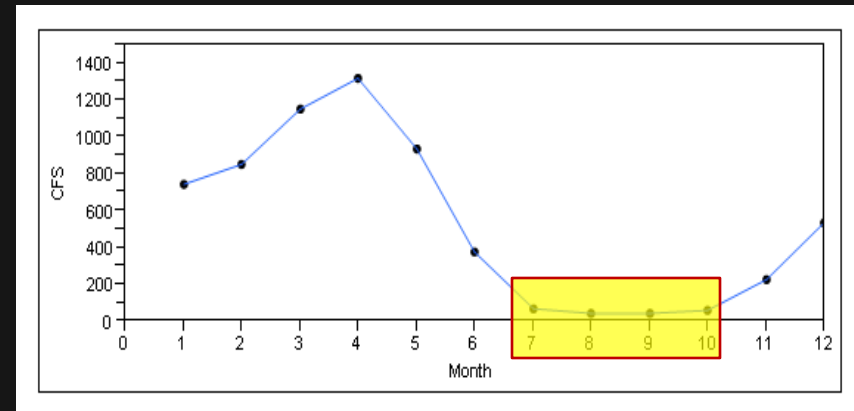
*Volume and timing of water*



# Hydrology



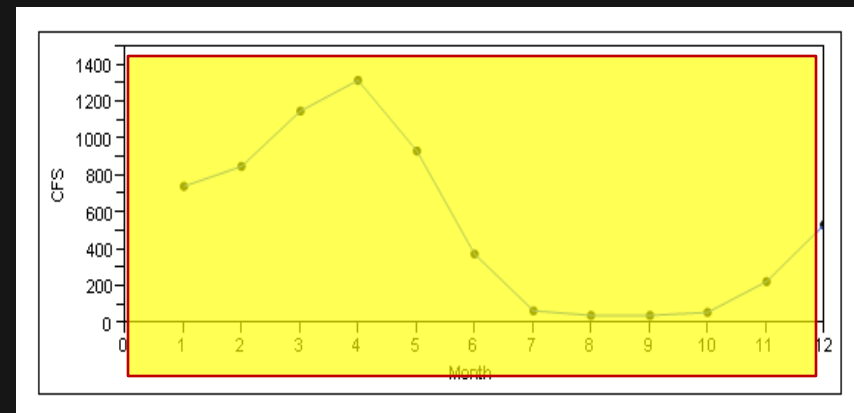
*Volume and timing of water*



# Hydrology



*Volume and timing of water*

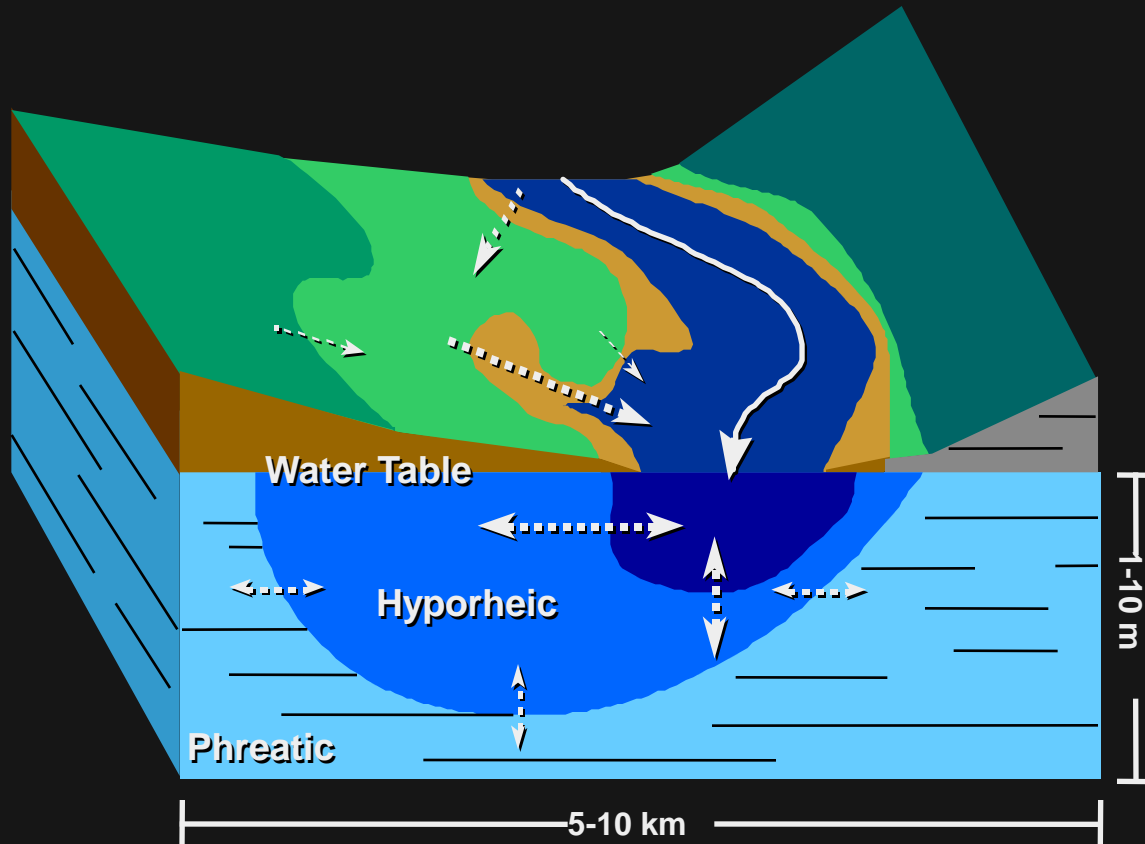


# Connectivity



***Longitudinal, Lateral, and Vertical***

# Floodplain/channel water exchange

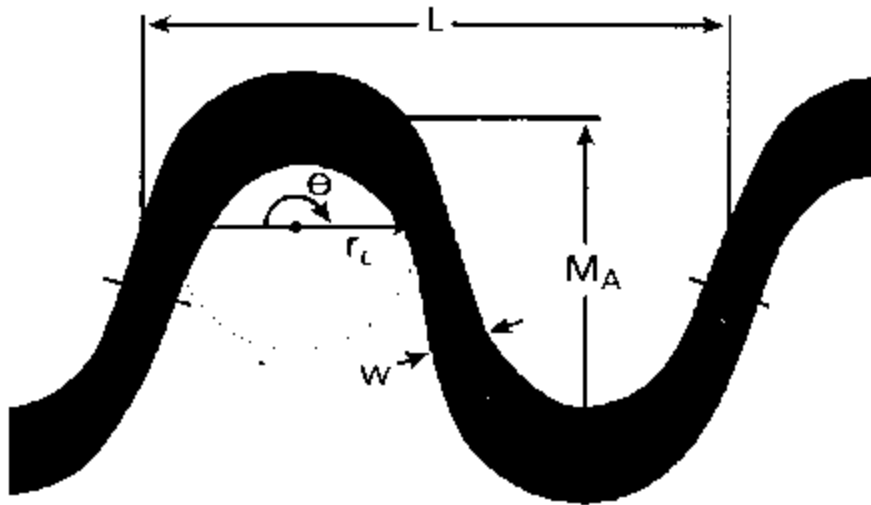


# Geomorphology



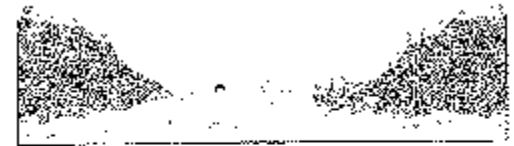
*Topographically Diverse, Accessible by River*

# Channel Geometry

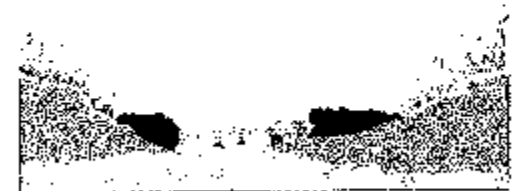


- L meander wavelength
- M<sub>L</sub> meander arc length
- w average width at bankfull discharge
- M<sub>A</sub> meander amplitude
- r<sub>c</sub> radius of curvature
- θ arc angle

State A  
Bare Ground



State B  
Early Seral



State C  
Mid-Seral



State D  
Late Seral



State E  
Potential



# Riparian Vegetation



*Native Vegetation – Large Wood Inputs, Other*



# Aquatic Biota



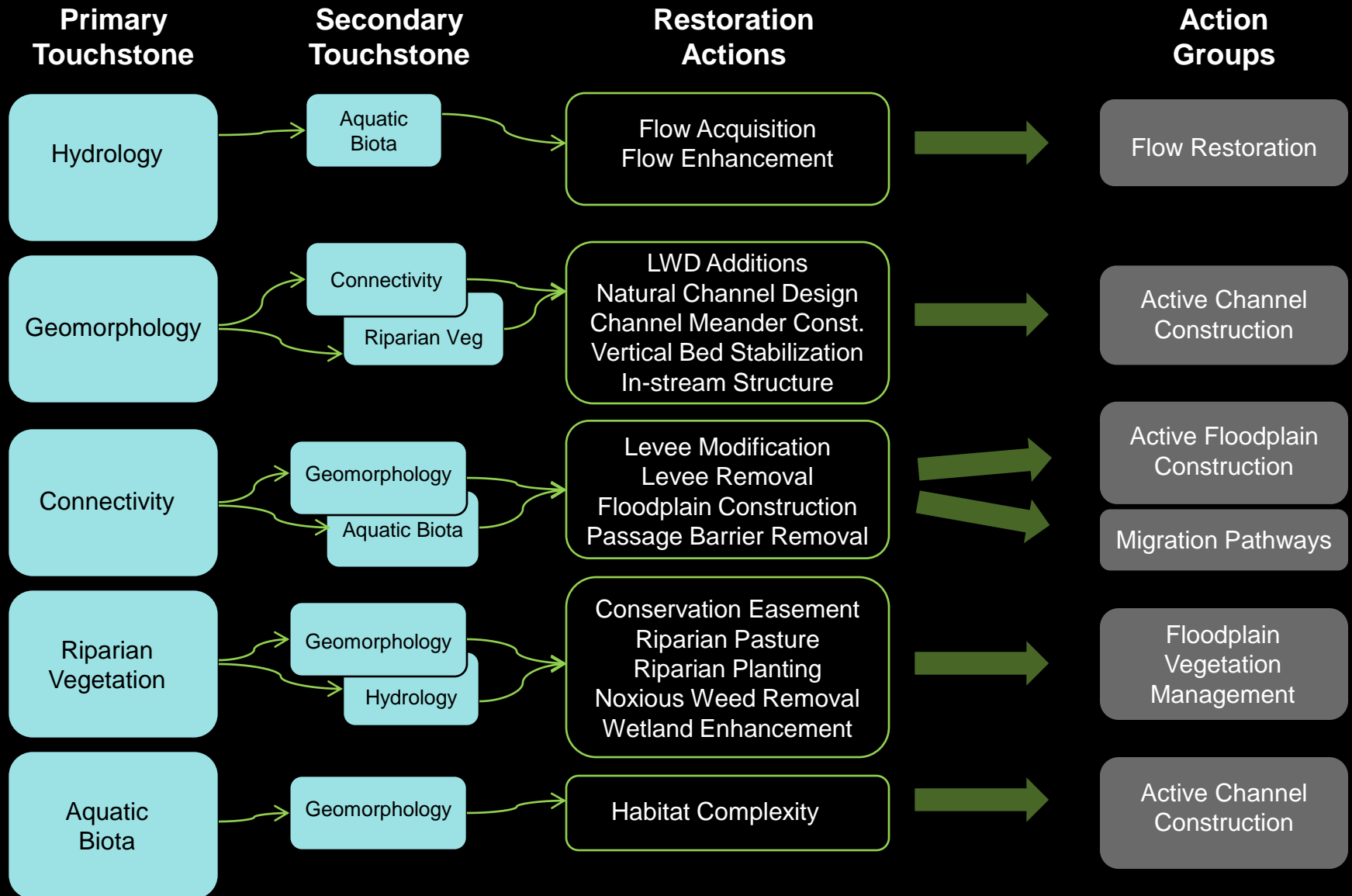
***Healthy Native Species***

# Vision Statement

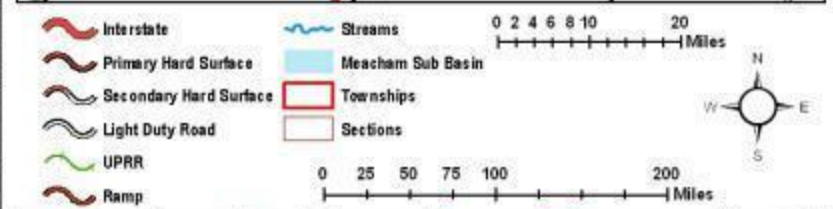
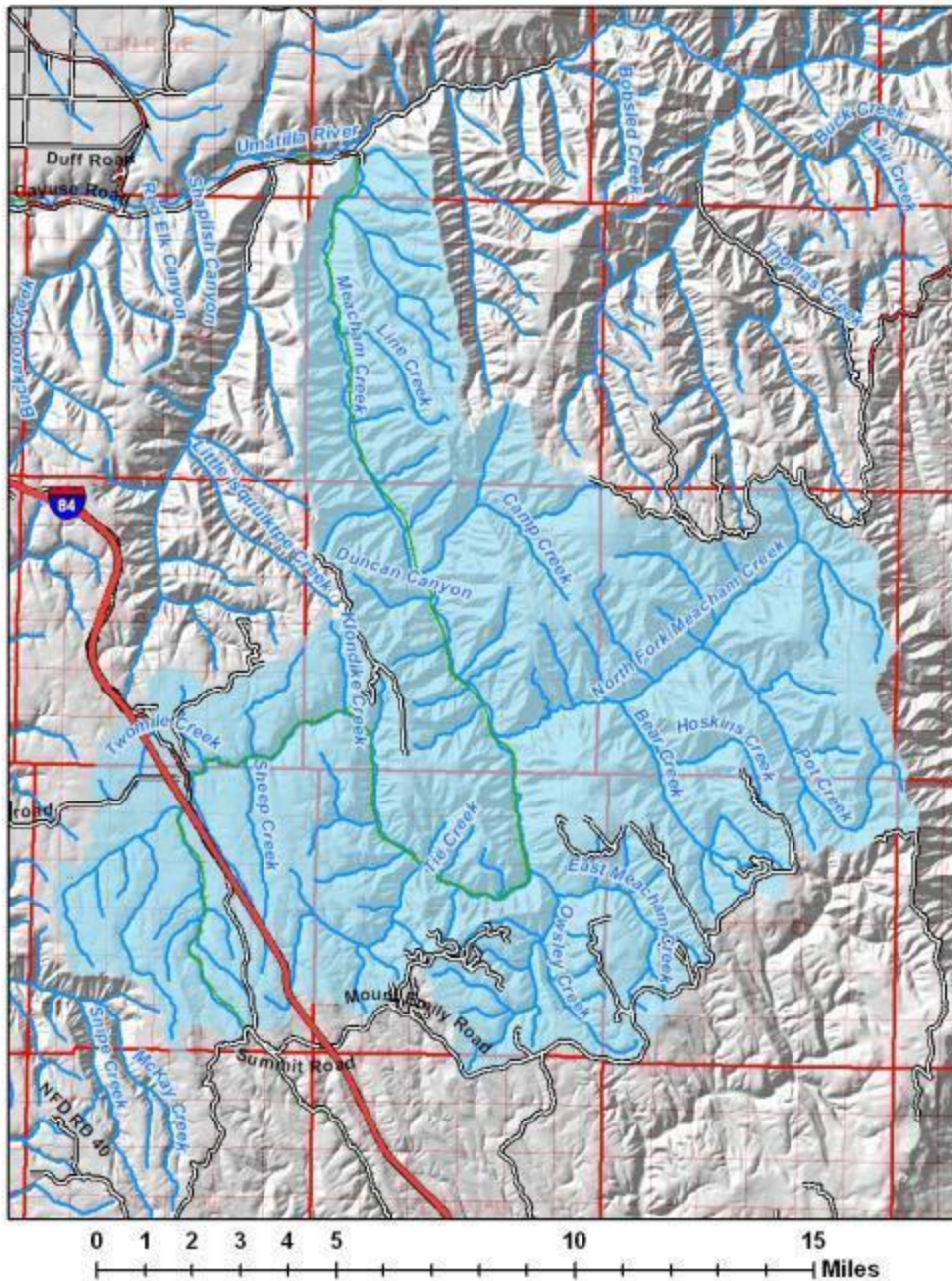


*“The Umatilla basin includes a healthy river capable of providing First Foods that sustain the continuity of the Tribe’s culture. This vision requires a river that is dynamic, and shaped not only by physical and biological processes, but the interactions and interconnections between those processes.”*

# Vision Application: Fisheries Habitat



# Meacham Creek Subbasin



# Critical data needs - Meacham Creek specific

- Hydrology
  - Historical variability of low and high flows
  - Location and extent of subsurface flows
- Geomorphology
  - Controls limiting the availability of spawning gravels
  - Expected LWD supplies
- Connectivity
  - Historical diversity of habitats and floodplain channel feature patterns
  - Location and timing of migration barriers (physical and habitat based)
- Aquatic biota and communities
  - Habitat utilization by First Foods fishes
  - Density and distribution of beaver and dams on the floodplain
- Riparian vegetation
  - Assess natural potential and range distributions of species
  - Quantify recruitment and retention rates for large wood

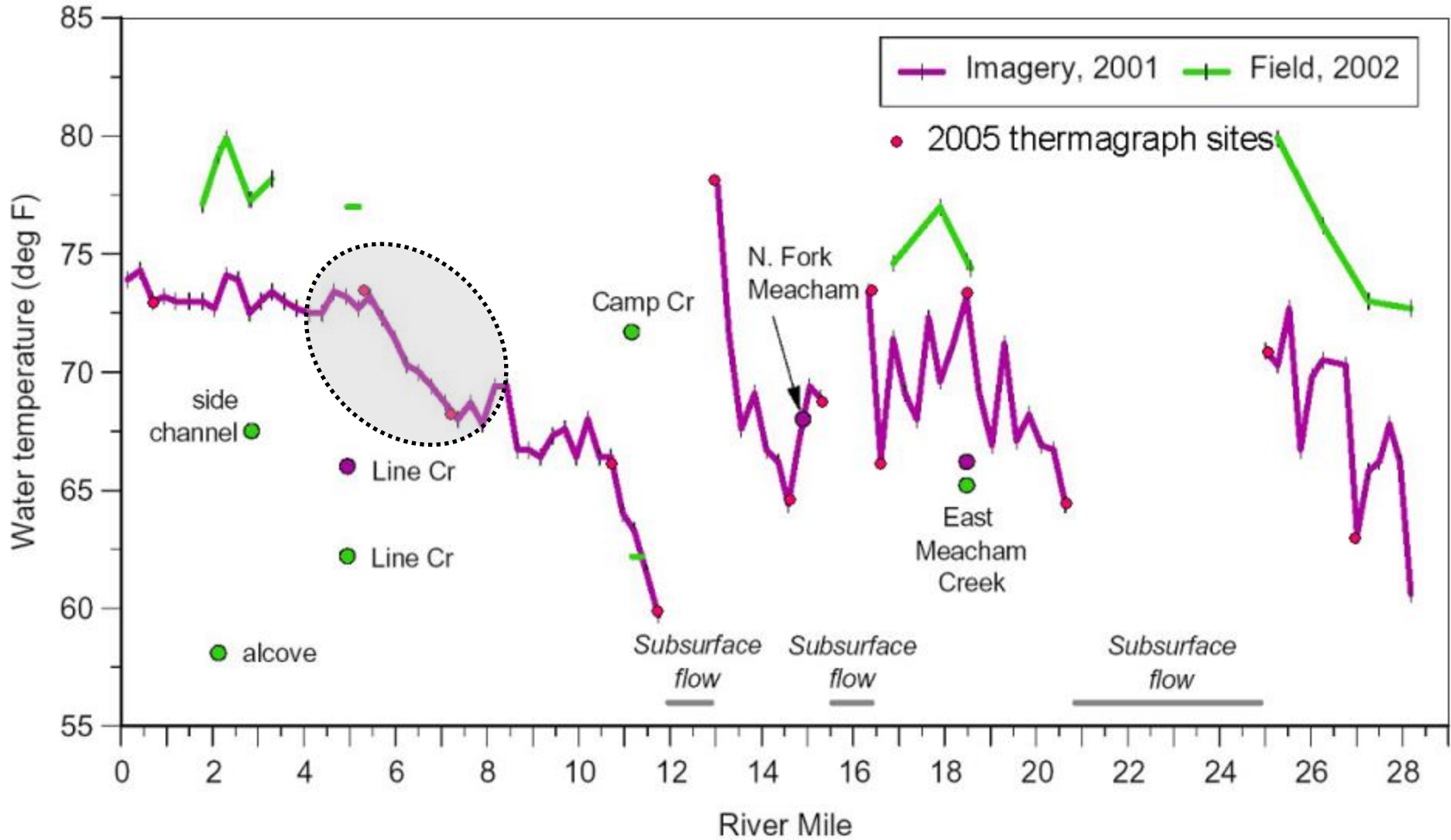
# Touchstone Correlation Examples

Restoration actions are intended to directly address touchstones.

- Hydrology - Increased quantity and quality through floodplain storage
- Geomorphology - Channel meander development, LWD additions
- Connectivity - Levee removal and floodplain activation
- Riparian vegetation- Land acquisition and use changes, vegetation management
- Aquatic Biota - Remove physical migration barriers, increase habitat complexity



# Meacham Creek

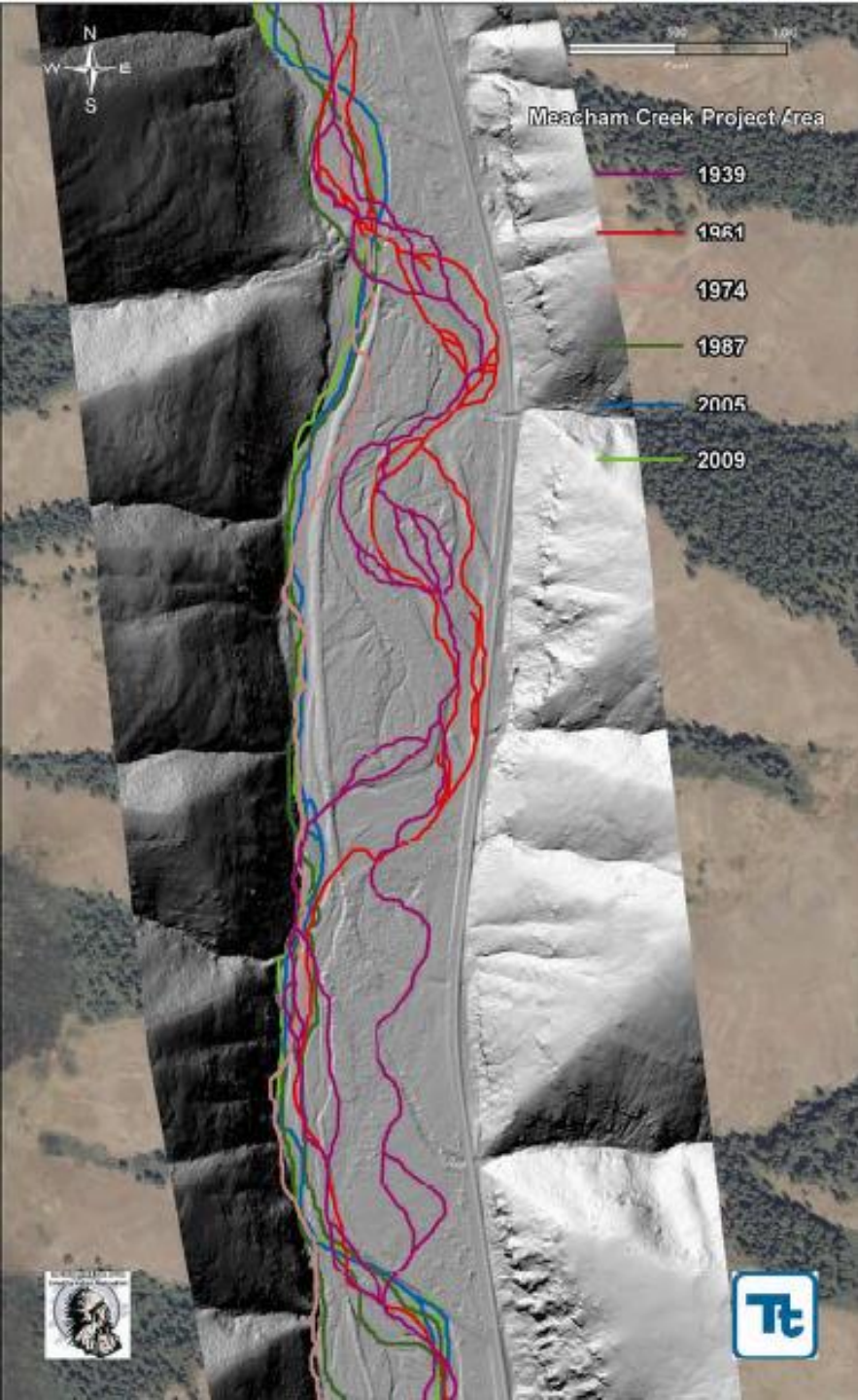


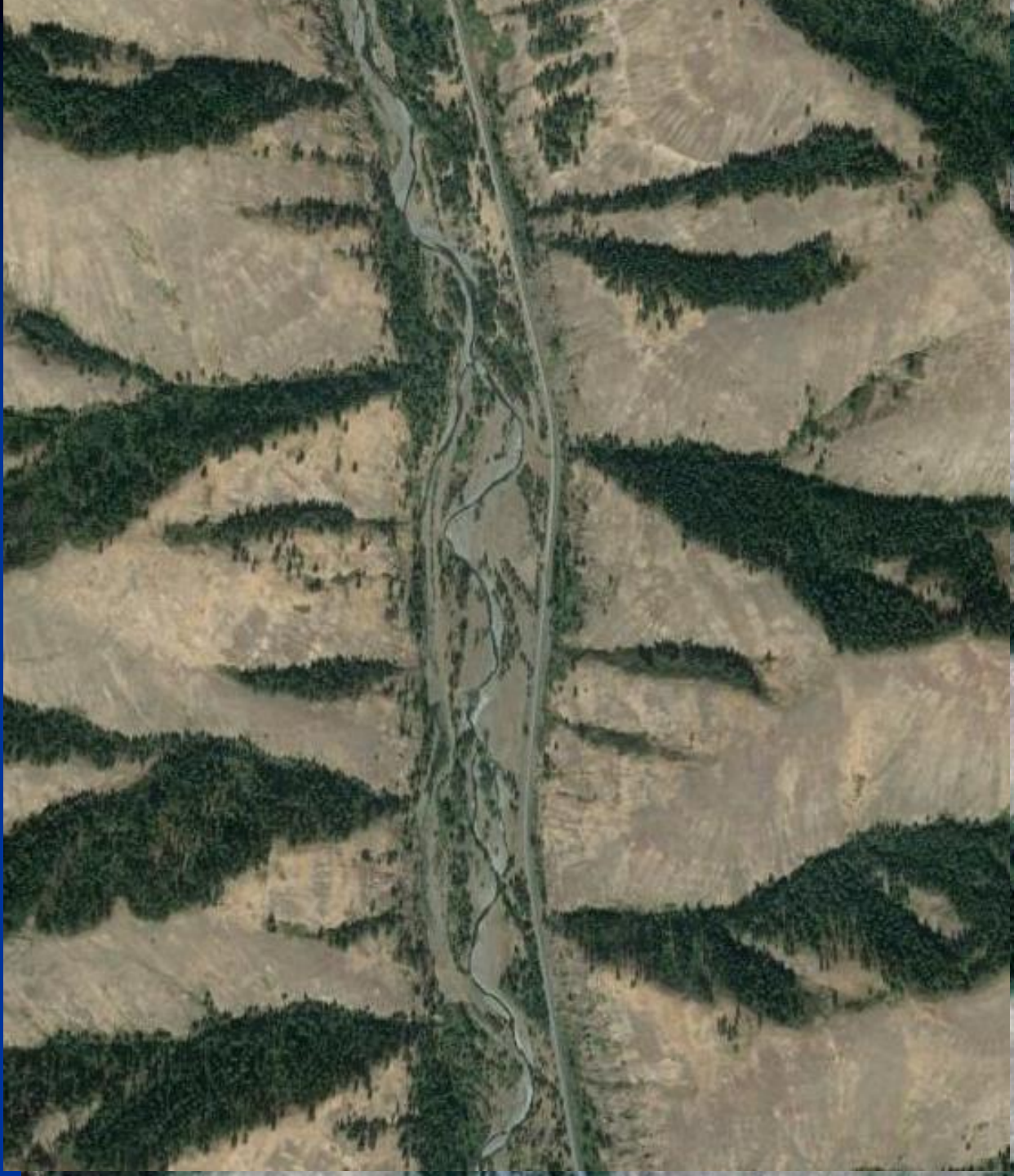


RM 5.5

RM 7.0

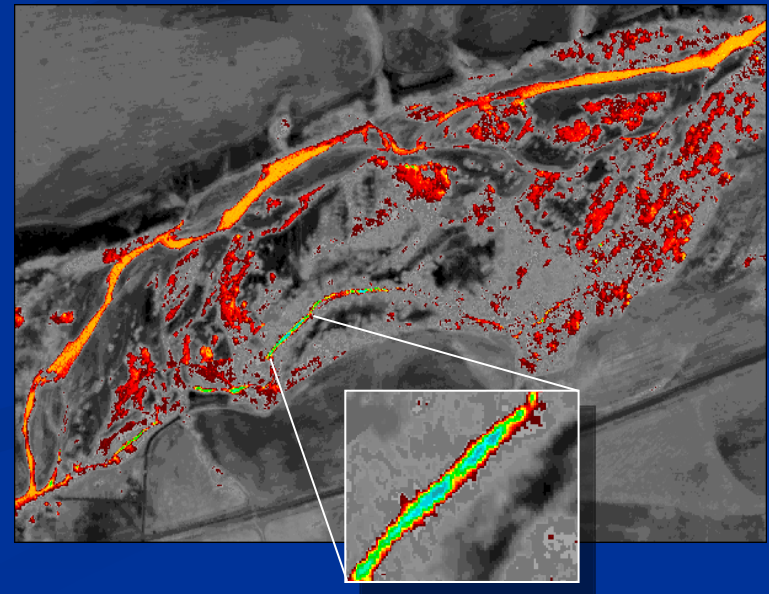
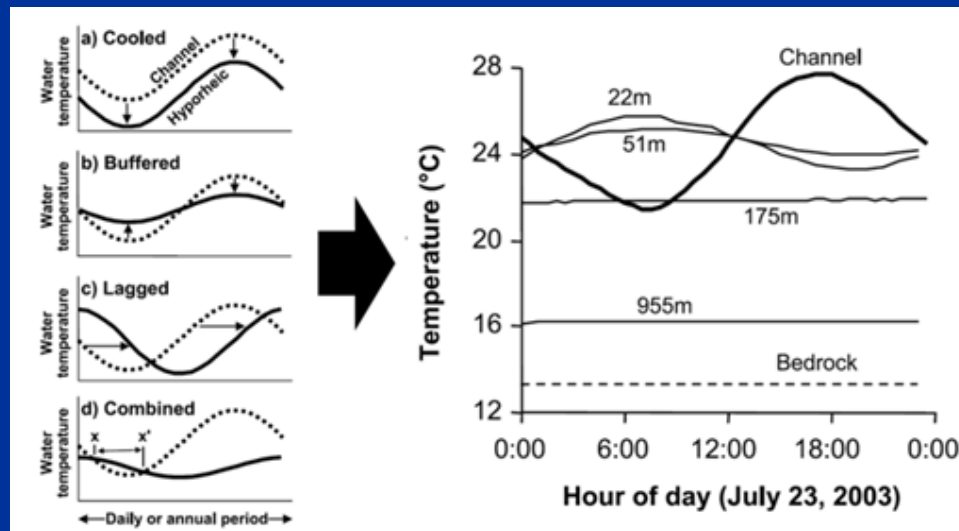






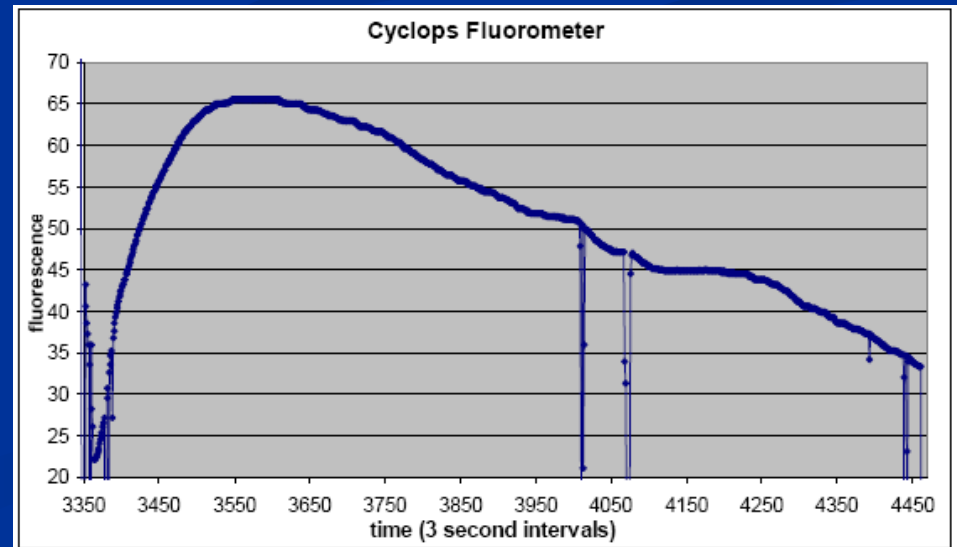
# Hyporheic Investigation (Connectivity)

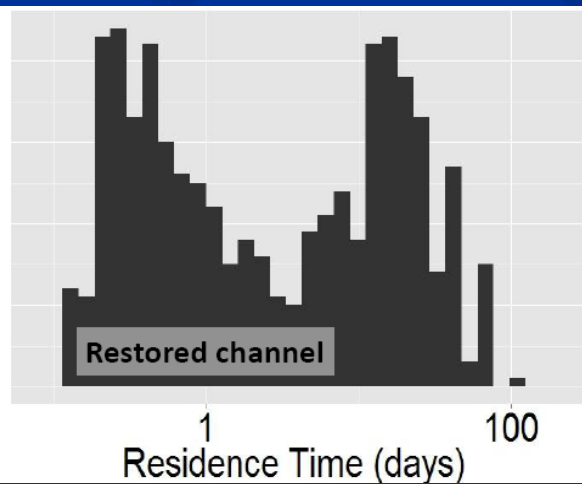
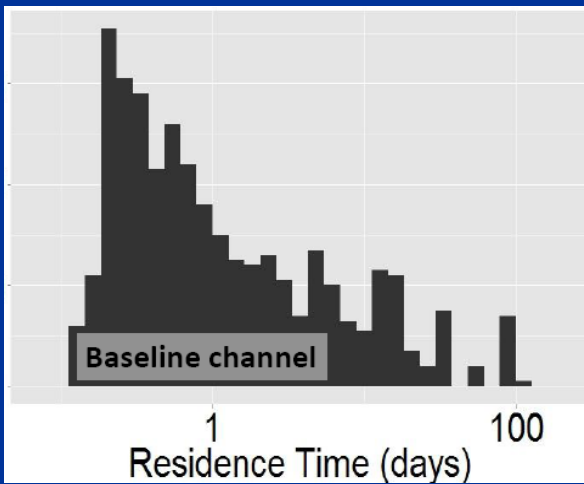
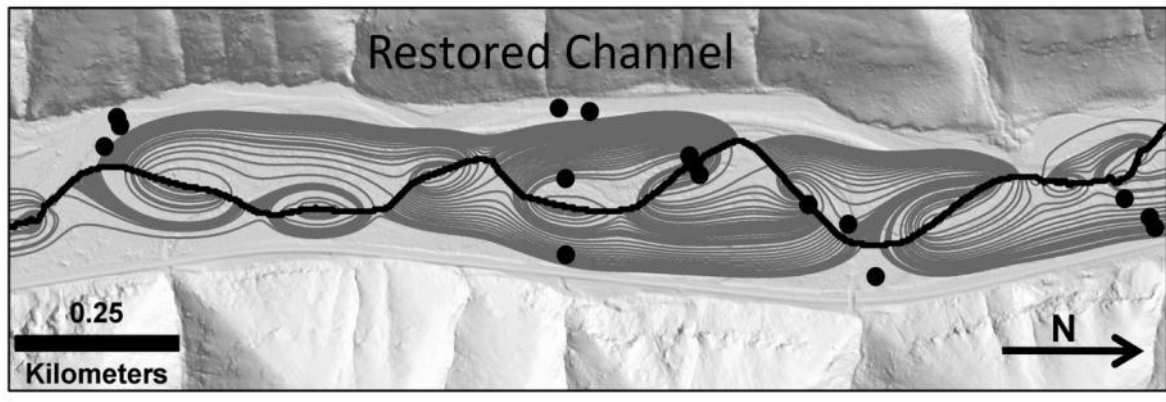
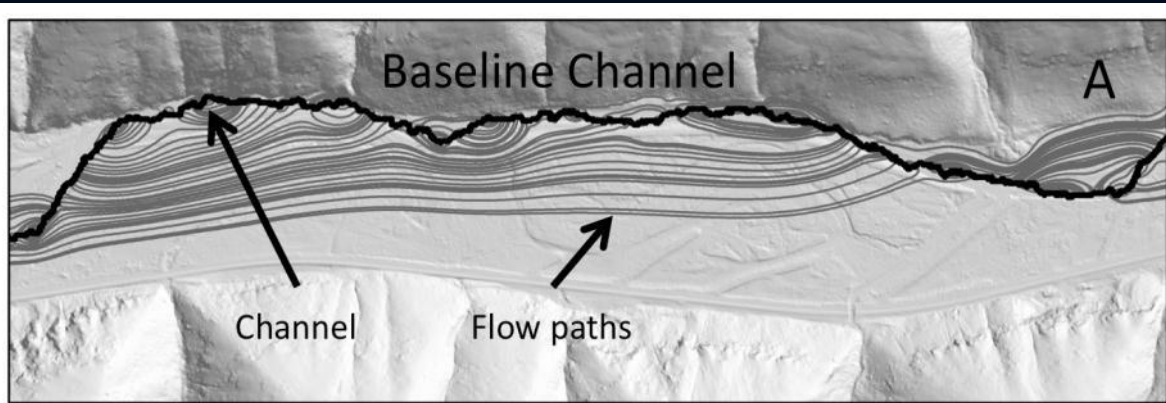
- Quantify water residence time pre- and post restoration (hyporheic exchange).
- Establish monitoring network of thermographs to measure changes in surface/groundwater temperatures.
- Pilot a new method of stream restoration monitoring.



# Hyporheic Investigation (Connectivity)

- Shallow piezometers
- Fluorescent dye and salt tracer





# Acknowledgements

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First Foods Concept, Umatilla River Vision

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Umatilla River study results and analysis, Umatilla River Vision

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