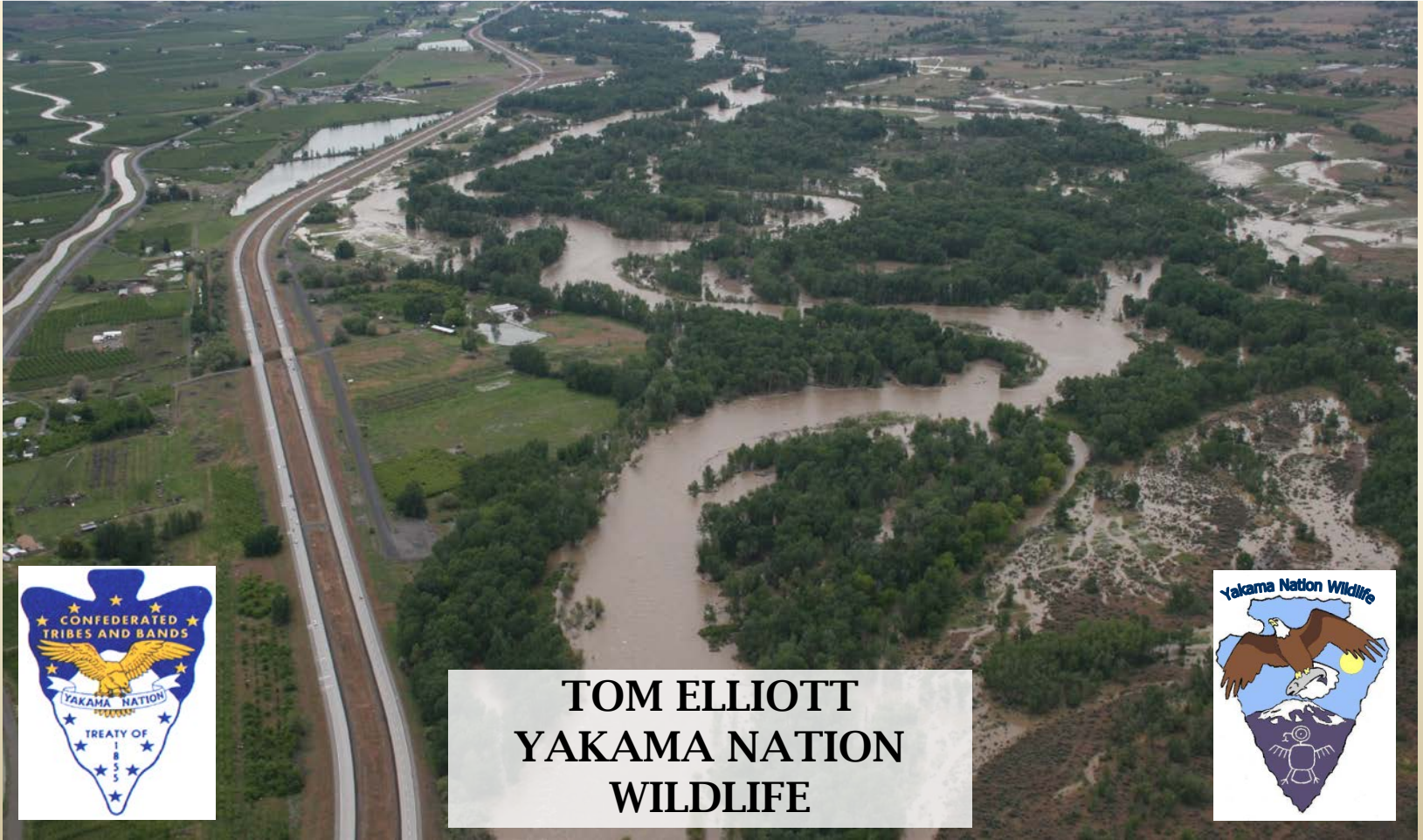


# WAPATO REACH - RESTORING PROCESS IN A DISTURBED LANDSCAPE

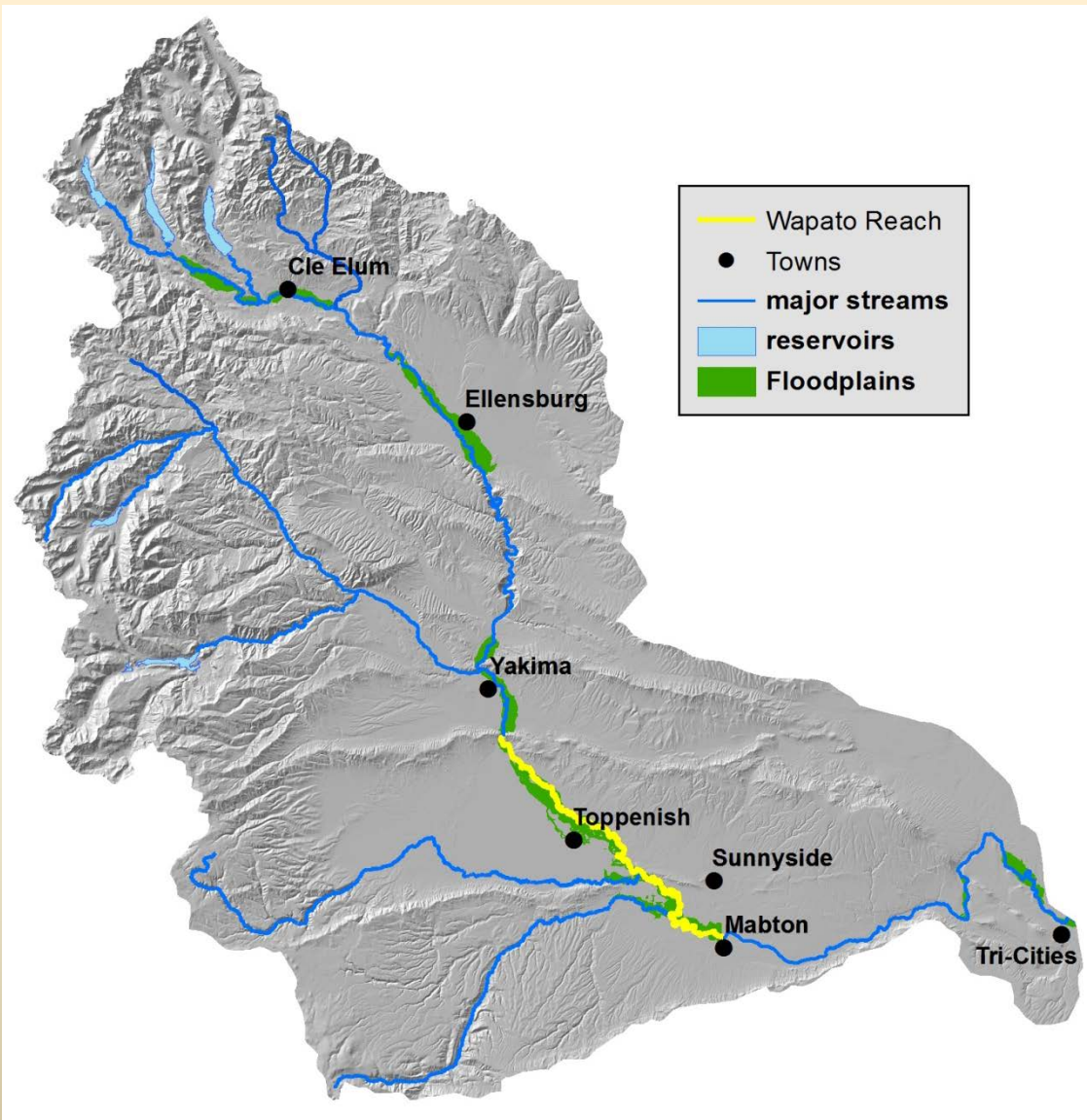


**TOM ELLIOTT  
YAKAMA NATION  
WILDLIFE**



# THE WAPATO REACH IS CRITICAL FOR FISH AND WILDLIFE

- Migration for all salmon, steelhead, and lamprey, in and out
- Spawning for fall and (soon) summer chinook
- Holding and rearing for Toppenish/Satus steelhead, lamprey
- Abundant deer and fur-bearing mammals
- Riparian forest supports eagles, songbirds, turkeys!



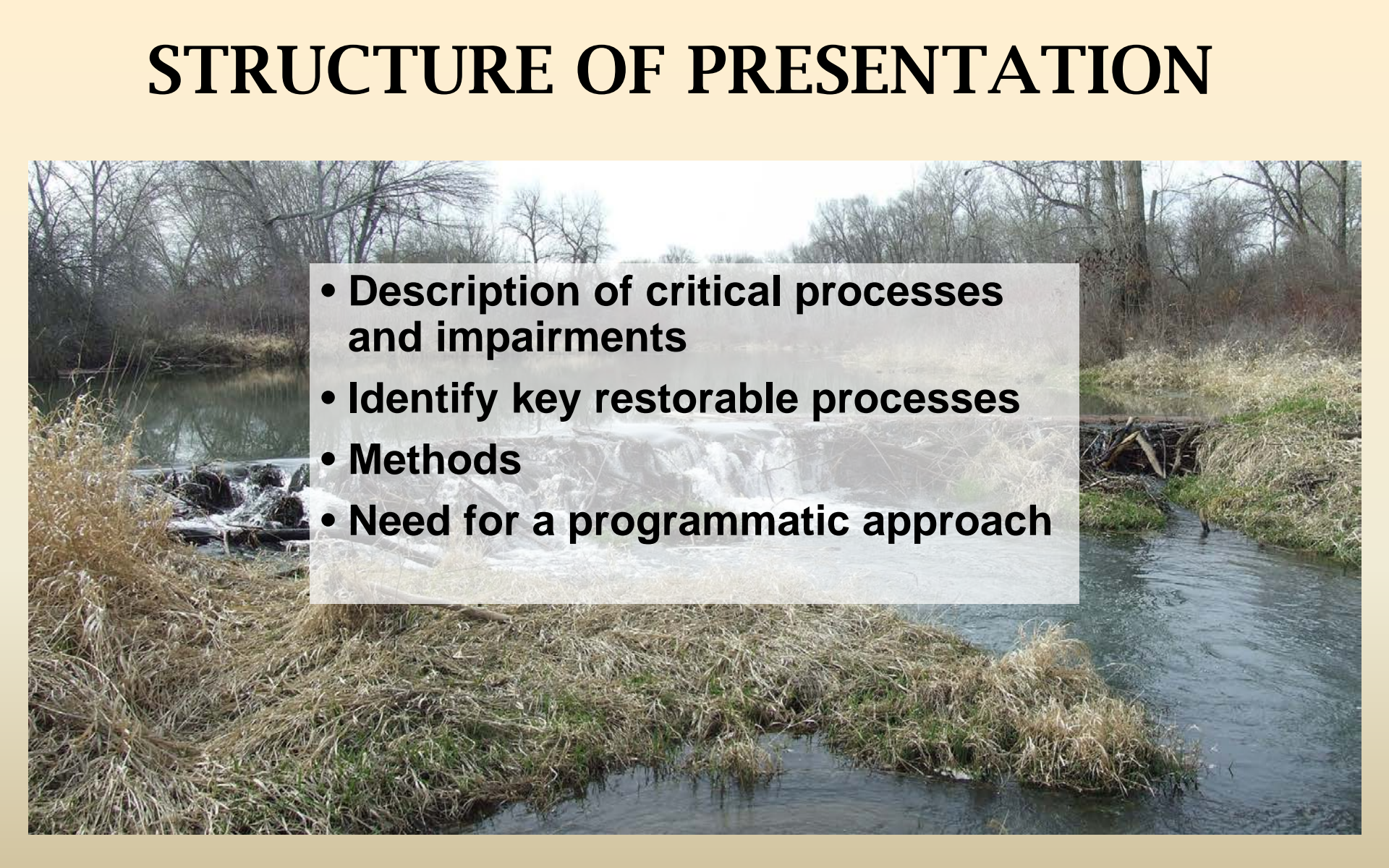


# **THE WAPATO REACH IS CRITICAL FOR PEOPLE**

- **Expansive floodplains provide flood control and sediment storage**
- **Traditional utilization by Yakama people**
- **Recreational use- fishing, birding, hunting**
- **Floodplains provide cropland and pasture**
- **Identified as a priority in multiple basin wide assessments-IP the latest**

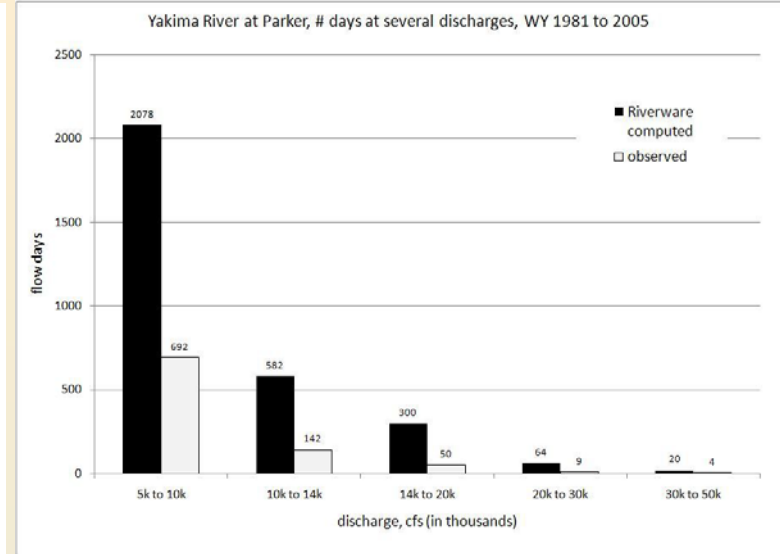


# STRUCTURE OF PRESENTATION

- 
- A photograph of a stream with a small waterfall and dense vegetation. The stream flows from the background towards the foreground, where it is partially obscured by tall, dry grasses and reeds. The background shows a line of trees under a cloudy sky.
- **Description of critical processes and impairments**
  - **Identify key restorable processes**
  - **Methods**
  - **Need for a programmatic approach**



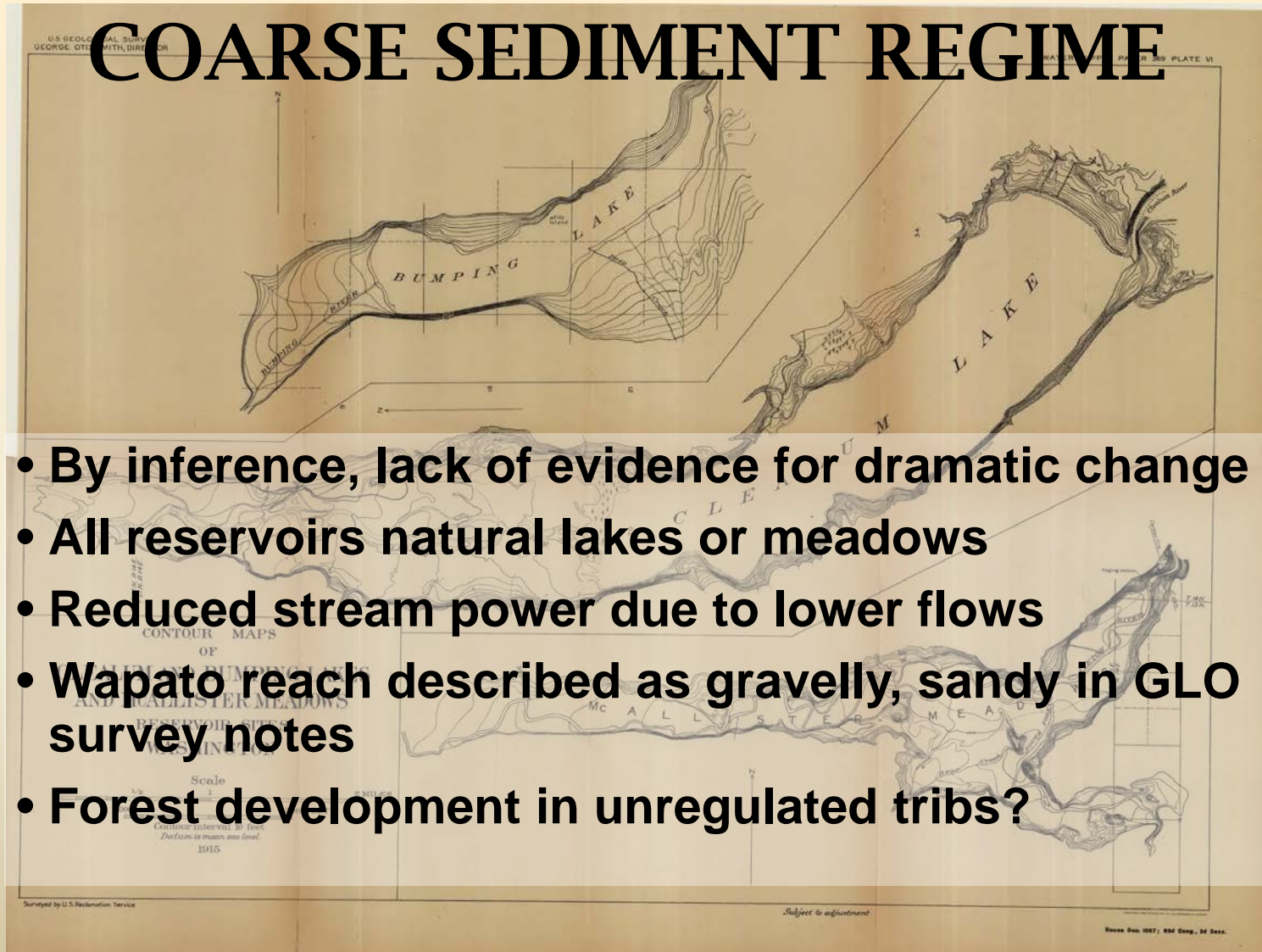
# FLOW REGIME



- **Spring freshet effectively eliminated**
- **All flow increments dramatically reduced**
- **Sediment mobilizing floods still occur**

# COARSE SEDIMENT REGIME

- By inference, lack of evidence for dramatic change
- All reservoirs natural lakes or meadows
- Reduced stream power due to lower flows
- Wapato reach described as gravelly, sandy in GLO survey notes
- Forest development in unregulated tribs?





# FINE SEDIMENT REGIME

- Agricultural inputs dominate
- Improving since the 1980s
- Embeddedness not observed on recent site visits
- Unknown effect of fines in rearing gravels
- Floods may flush sediments





# WOOD RECRUITMENT

- **Pre-development loading unknown**
- **Currently floods recruit large cottonwoods**
- **Wood stored on bars, islands, and bank, not in channel**
- **Transient near-bank habitat formed**





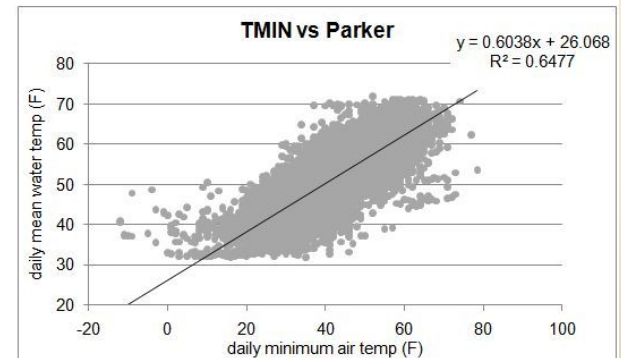
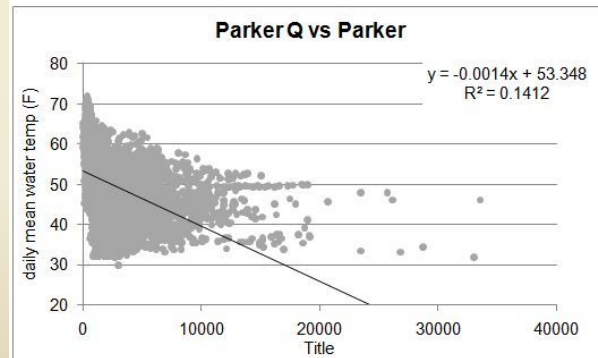
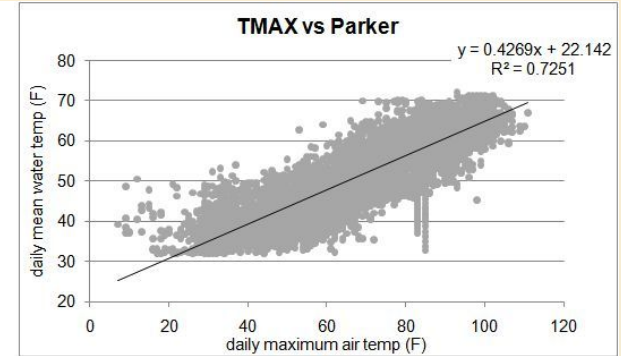
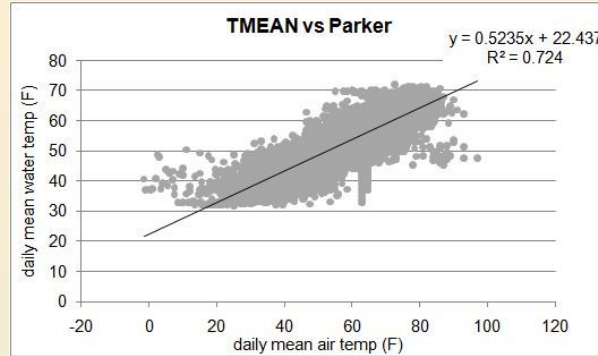
# WOOD RECRUITMENT

An aerial photograph of a wide river with a large, light-colored sandbar in the center. The riverbanks are covered in dense green forest. Numerous pieces of driftwood, including large logs and branches, are scattered along the banks and in the water. A prominent pile of driftwood is visible in the middle of the river, near the sandbar.

“Yearly, the Yakama River disgorges from its mountain sources [an] abundance of driftwood, composed of the finest quality of timber, whole trees from 20 to 70 in diam. And from 100 to 250 feet in length of fir and cedar lumber are often seen winding their way down its current, into the broad waters of the Columbia.”

# WATER TEMPERATURE

- Thermal limits exceeded in downstream areas
- Dominated by air temperature
- Large spring freshets prolong cool period
- Warm period extended compared to pre-development





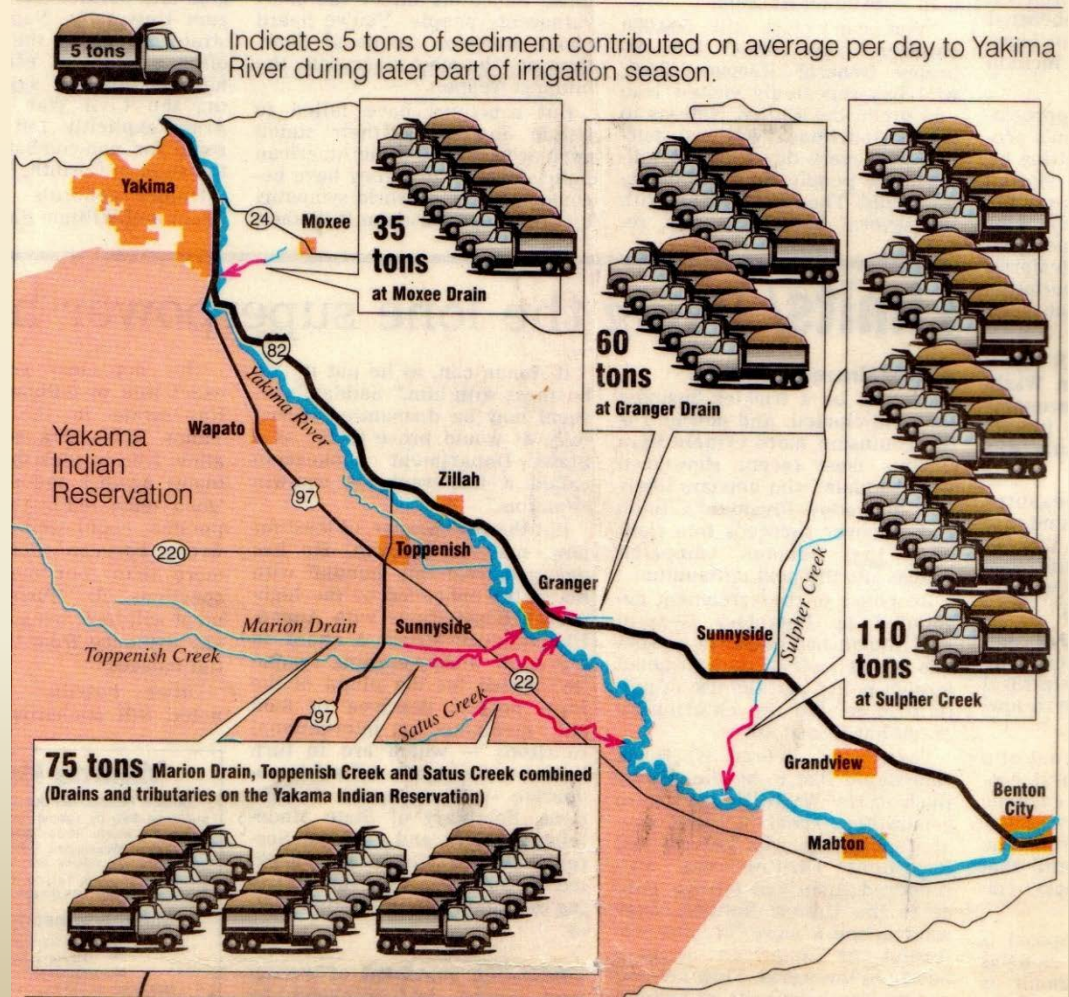
# WATER QUALITY

Sewage is quite heavily concentrated in river between Ellensburg and Granger. However, the long stretch of quiet water between Granger and Prosser acts as a settling basin, so that the water is clean below the latter point.

The Yakima River is practically nothing but a great irrigation canal. Diversion dams, unscreened irrigation ditches, and great fluctuation in water level all contribute to its unsuitability as a spawning stream for salmonids. The sewage dumped into the river by the various towns and cities along its banks is probably sufficiently concentrated to spoil the stretch between Ellensburg and Prosser for successful spawning. Furthermore, the bottom between Yakima and Prosser is covered with a coat of silt and algae sufficiently heavy to smother eggs. The gradient from Granger to Prosser is very slight, resulting in the river winding all over the flat valley through swamps and sloughs. Here the current is negligible, the water deep and the bottom 100% mud. The preponderance of large rubble, and the frequency and swiftness of the riffles precludes the possibility of many salmon spawning between Prosser and Kiona and in the canyon between Ellensburg and Yakima.

# THINGS HAVE IMPROVED

- Agricultural run-off controlled
- Turbidity has declined
- Rapid growth of algae and aquatic plants
- Still high load of agricultural contaminants relative to pre-development





# RIPARIAN RECRUITMENT

- **Abundant recruitment is rare**
- **Flow regime impairs seedling establishment**
- **Black cottonwoods clone vigorously to maintain stands**



# FLOODPLAIN CONNECTIVITY

- **Connectivity high downriver, lower upriver**
- **Levees, bank hardening contribute**
- **Lack of large, frequent floods creates hydrologic disconnection**





# FLOODPLAIN CONNECTIVITY

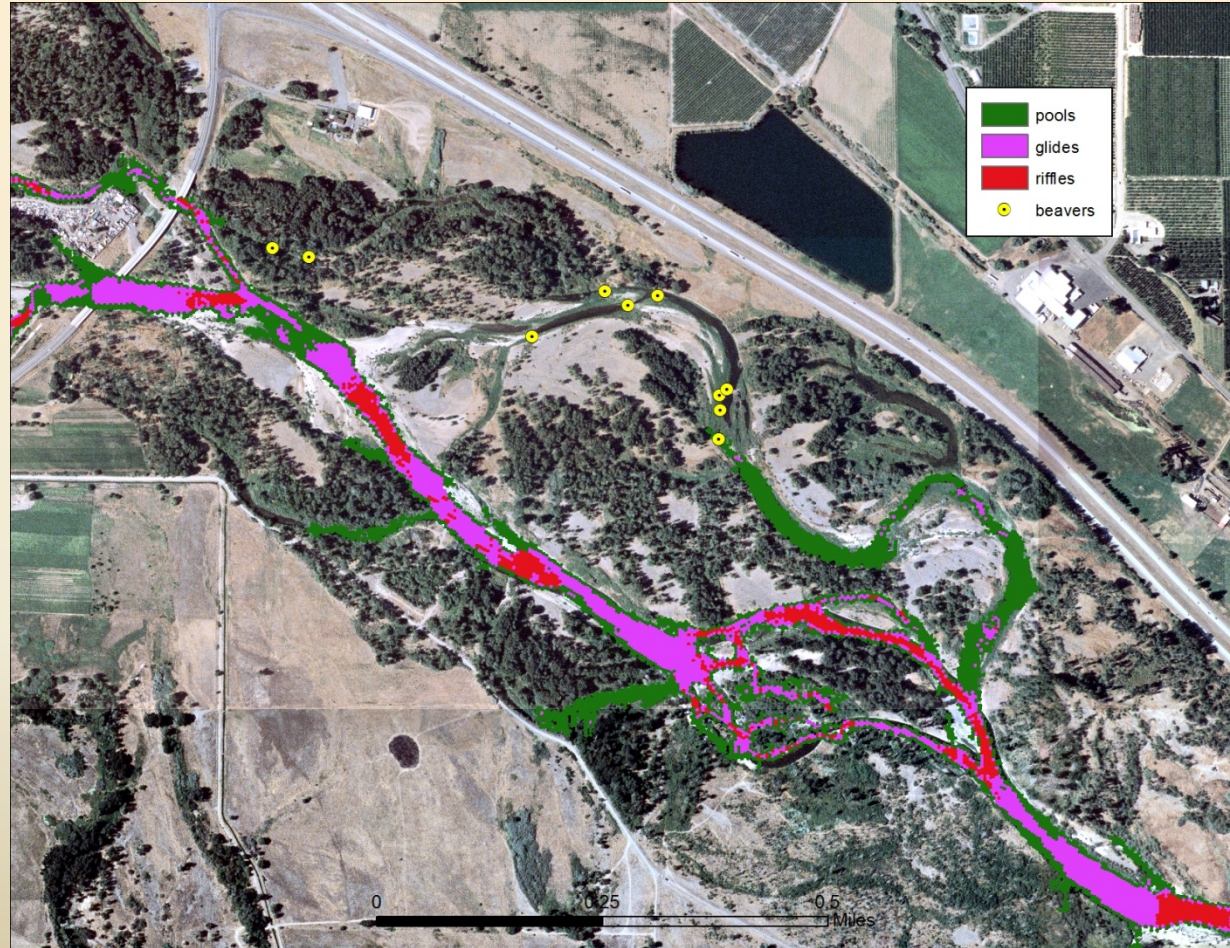
- **Interstate 82 affects some segments**
- **Natural terraces and touchet beds naturally confine other areas**
- **Degree of confinement less than Kittitas and Union Gap reaches**





# HABITAT

- Habitat models reveal a preponderance of glides
- Observations suggest simplification
- 1940s survey reported sparse pools
- Side channels de-activated in summer and fall





# HABITAT



- Extensive gravel and shallow channels at low flows
- Hydraulic diversity reduced
- Abandoned channels fill in rapidly



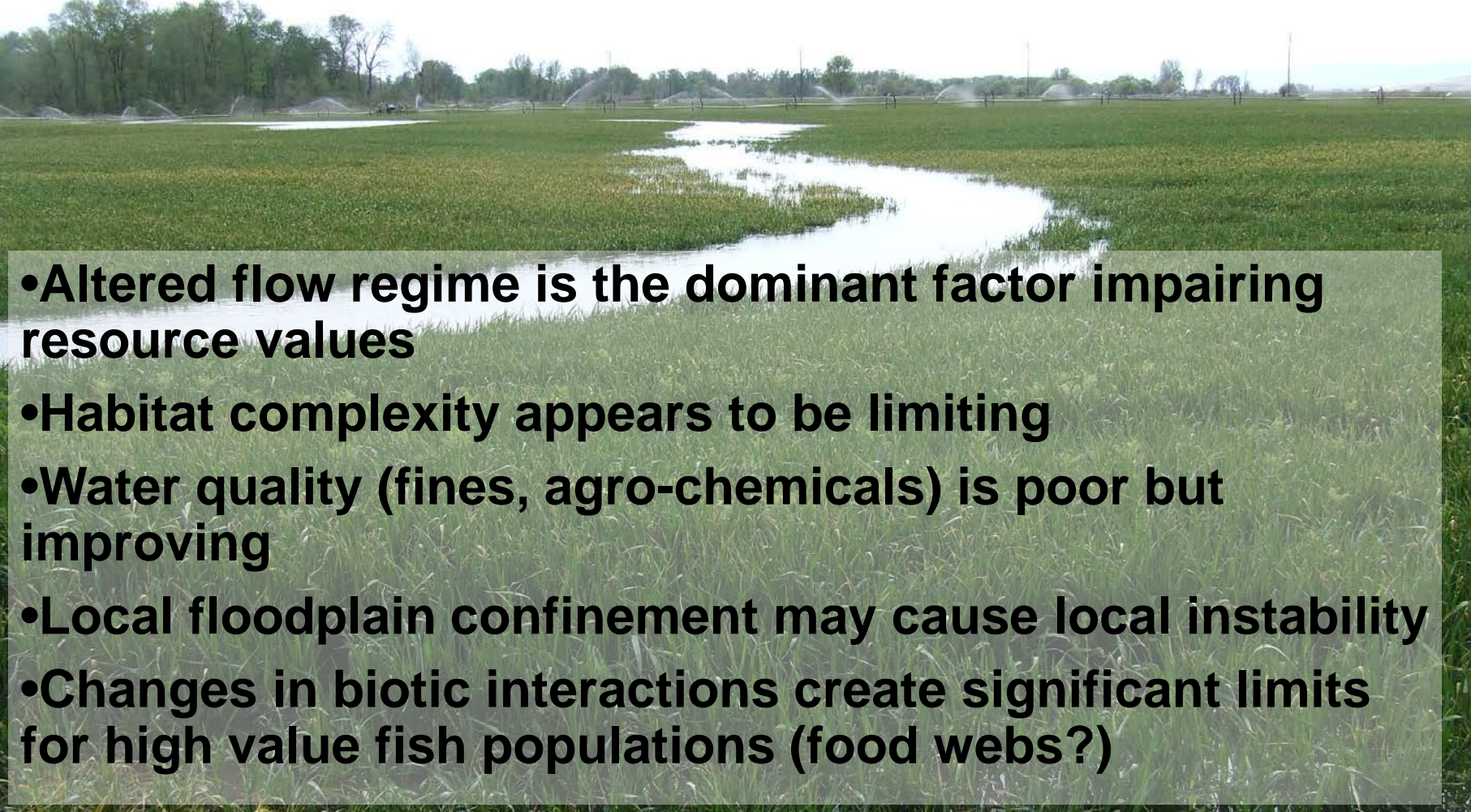
# PREDATION

- **Recent review by Watson showed an average of 40% smolt predation by Pike Minnow and birds**
- **Interactions with water temperature, habitat complexity, and flow regime**





# CONDITION SUMMARY

- 
- **Altered flow regime is the dominant factor impairing resource values**
  - **Habitat complexity appears to be limiting**
  - **Water quality (fines, agro-chemicals) is poor but improving**
  - **Local floodplain confinement may cause local instability**
  - **Changes in biotic interactions create significant limits for high value fish populations (food webs?)**





# KEY LINKAGES

## FLOW REGIME

- Lack of the spring freshet reduces riparian establishment and reduces the cool water window
- smaller, fewer floods reduce wood recruitment and bed-form formation, leading to simplified habitat
- Lack of habitat complexity, along with warmer water enhances predation
- Side channels plug more quickly without large, frequent floods



# KEY LINKAGES



- **Floodplain confinement reduces opportunities for new habitat and riparian formation over time**
- **Impaired riparian establishment reduces future habitat abundance and complexity**
- **Current or legacy load of fine sediment may clog rearing gravels**



# PRESSURE POINTS



- **Habitat complexity can be enhanced and abundance increased**
- **Floodplains can be reconnected where feasible**
- **Predation potentially can be reduced**
- **Water quality can continue to improve**



# CONSTRAINTS

An aerial photograph showing a wide, muddy river flowing through a landscape. On the left, a multi-lane highway runs parallel to the river. In the center, a dam structure is visible, with water cascading over it. The surrounding floodplains are partially submerged, with some green vegetation and trees still visible above the water level. The overall scene depicts a significant flood event.

- Flow regime will probably not be substantially altered
- Portions of the floodplain will remain disconnected
- Predation will persist at some level



# APPROACH AND METHODS

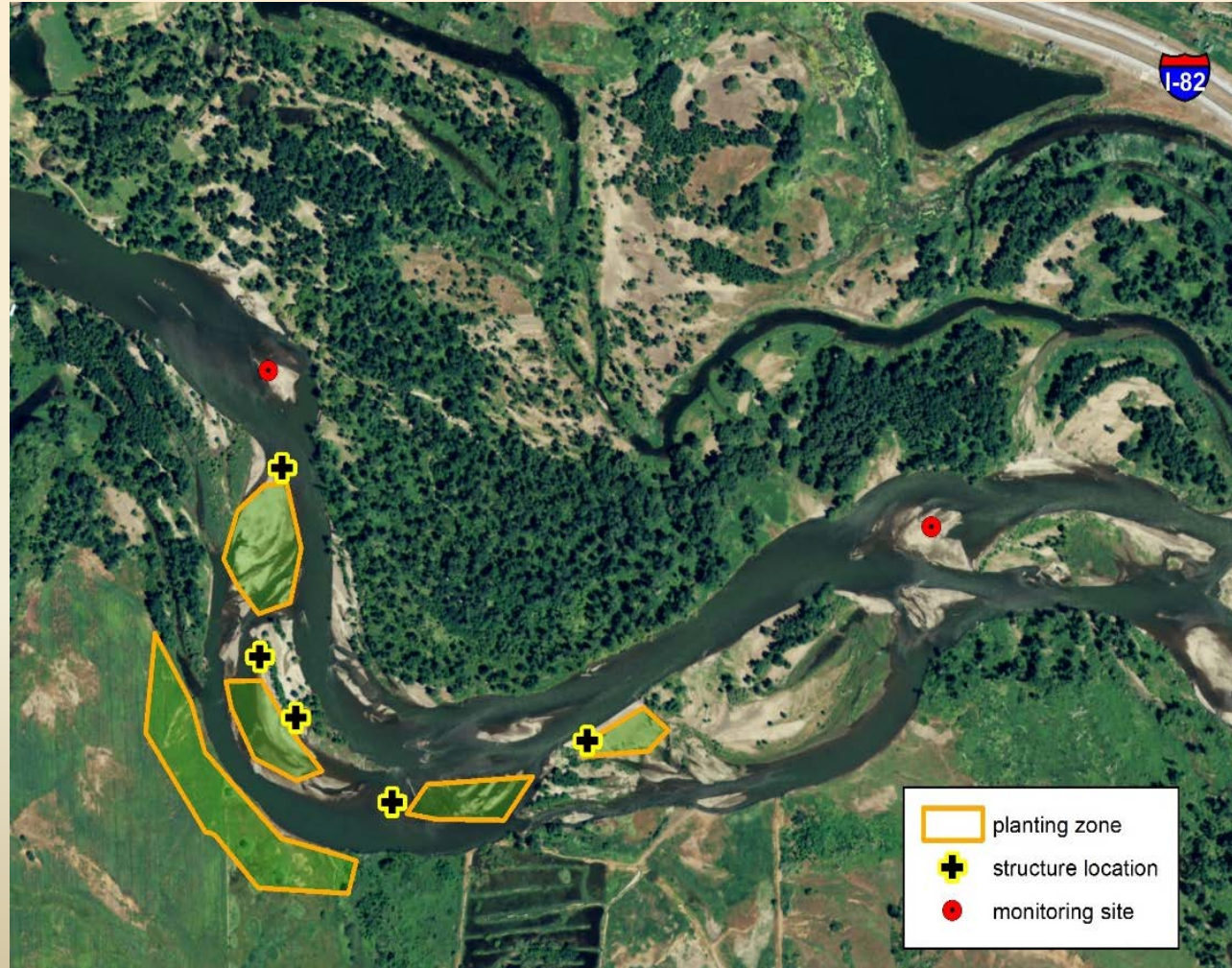
An aerial photograph showing a wide, muddy river flowing through a landscape. On the left, a multi-lane highway runs parallel to the river. In the center, a dam structure is visible, with water cascading over it. The surrounding area includes green vegetation, some buildings, and a road. The overall scene suggests a focus on water management and infrastructure.

- Long term, process based approach will be most sustainable
- Focus on incremental improvements with strong monitoring
- Stakeholder participation through TAG



# DENSE RIPARIAN PLANTINGS

- Needed to ensure the future of the riparian forest
- Drives long term habitat formation
- May require initial protection from scour





# CHANNEL ROUGHNESS ELEMENTS



- **Protect plantings from high water**
- **Collect woody debris and initiate log jams**
- **Promote bed-form diversity by causing deposition and scour**
- **Boating safety a priority**



# LEVEE BREACHING AND SETBACK



- Requires careful outreach and planning
- Breaches may be more feasible initially
- May engineer breaches to stabilize side channel connections

# PREDATION CONTROL



- **Multiple approaches are necessary**
- **Expand bounty for Pike Minnow**
- **Coordinate with USFWS for control of predatory birds**
- **Turbid flow pulse for out-migration spikes**



# LAND PROTECTION



- Willing land owners only
- Goal is increased connectivity
- Allows for future restoration

# GRAVEL PIT OPPORTUNITY

An aerial photograph showing a wide river with a large, irregularly shaped floodplain. The floodplain is mostly green, indicating vegetation, but has a large, dark, rectangular area that appears to be a gravel pit or a cleared area. To the left of the river, there are several large, rectangular agricultural fields, some of which are green and others are brown. A multi-lane highway runs along the right side of the river, curving around a bend. The background shows rolling hills and more agricultural land.

- Investigate gravel pit reclamation
- Parker and Pond 5 already connected
- Large floodplain areas, temporary off-channel habitat
- Engineer to avoid pit capture



# GRAVEL PITS



**Pond 5 connected in May 2011**

# NEED FOR A PROGRAM



- Wapato Reach is 50 river miles, >10,000 acres of floodplain, multiple jurisdictions
- Long term, stable funding required
- Commitment to the adaptive cycle
- TAG to provide guidance and coordination



# FUTURE RIVER

- Abundant complex, high quality habitat
- Increased riparian areas on gravel bars
- More floodplain acres connected
- Floodplain land protected
- Pike Minnow Millionaires!
- Healthy populations of valued fish and wildlife for future generations



# QUESTIONS?



Thanks to:  
BPA  
YN DNR  
Wapato  
TAG