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Salish Sea Ecosystem Conference

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Effectiveness Monitoring - Time and Space Matter

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Environmental Monitoring in Washington State:

Focus on Effectiveness

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2014 Salish Sea Ecosystem Conference
Seattle, WA
May 1, 2014



Outline

- Past coordination efforts in Puget Sound
- Types of monitoring
- Effectiveness monitoring
 - Many approaches
 - Case studies
- Applied research nexus
- Path forward
- Summary



Past Efforts to Coordinate

- **1988** - Puget Sound Assessment and Monitoring Program (PSAMP)
 - Focus on marine long-term trends
- **2002** - Comprehensive Strategy on Monitoring
 - Legislative mandate to aid salmon recovery (SSB 5637)
- **2004** - Governor's Forum on Monitoring Salmon Recovery and Watershed Health (EO 04-03)
 - Reincarnated by legislature in 2007, disbanded in 2011
- **2011** - Puget Sound Ecosystem Monitoring Program (PSEMP)
 - PSAMP expanded in membership and scope



Puget Sound Ecosystem Monitoring Program (PSEMP)

- Coordinate monitoring across Puget Sound
 - Diverse membership
 - Steering Committee and multiple workgroups
- Staff support from Puget Sound Partnership
 - Reports to the Leadership Council
- Vital Signs are just one set of indicators
 - **Weighted towards long-term status and trends**
- Inventory, gap analysis, indicator evolution
 - **Pressure for more effectiveness monitoring**



Types of Monitoring

- Exploratory
- Source ID
- Implementation
- Compliance
- Project Effectiveness
- Validation
 - Cause and effect
- Status and trends

Effectiveness



Effectiveness Monitoring

- Most monitoring can measure effectiveness
- Differences relate to space and time
 - Intensity of effort
- Need solid implementation tracking
 - Starting point
- Look to more responsive metrics for adaptive management time frame
 - Implementation monitoring



Results Chains (aka Logic Model)

Healthy and abundant shellfishing

Ultimate Policy Intent

Implement a Strategy/Activity

Action Agenda:
Implement Shellfish Protection District plans

Outputs

...so that...

Increase on-site septic inspections

Metric: Number of on-site septic inspections
(Performance Mgmt.)

Immediate Outcomes

...so that...

Repair on-site septics

Metric: Number of septics repaired or connected to WWTP
(Performance Mgmt.)

Intermediate Outcomes

...so that...

Shellfish beds open

Metric: Increased acres of shellfish beds re-opened
(Performance Mgmt.)

Metric: Decreased bacteria counts
(Env. Monitoring)

Ultimate Outcome

Implementation monitoring

Degree of Influence/Control

Yakima River

Control Strategy for DDT and sediment

- Primarily agricultural sources
 - Erosion of soils (300 tons of sediment during irrigation season)
- TMDL established reduction targets
 - Inexpensive surrogate measure (turbidity) for TSS and DDT (implementation began in 1998)
- Irrigation districts lead implementation
 - Set specific on-farm turbidity targets
 - Conversion to drip irrigation



Yakima River



- Flows from Cascade Range over 200+ miles to the Columbia River
- Lower Yakima is an intensely irrigated and agriculturally diverse farming area
- DDT widely used in basin until banned in 1972
- In 1985, DDT levels up to 3,000 ppb (Johnson et.al., 1988)
- Fish consumption advisory issued in 1993

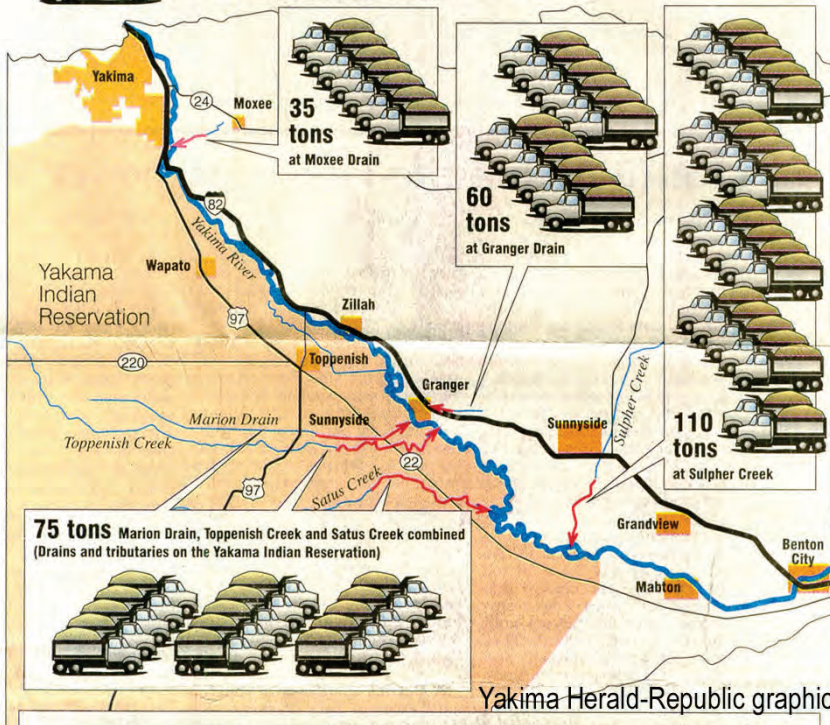
Yakima River

Sediment deposits

Total suspended sediment (TSS) loading balance at selected irrigation drains and tributaries in the lower Yakima River Basin during 1995 irrigation season



Indicates 5 tons of sediment contributed on average per day to Yakima River during later part of irrigation season.



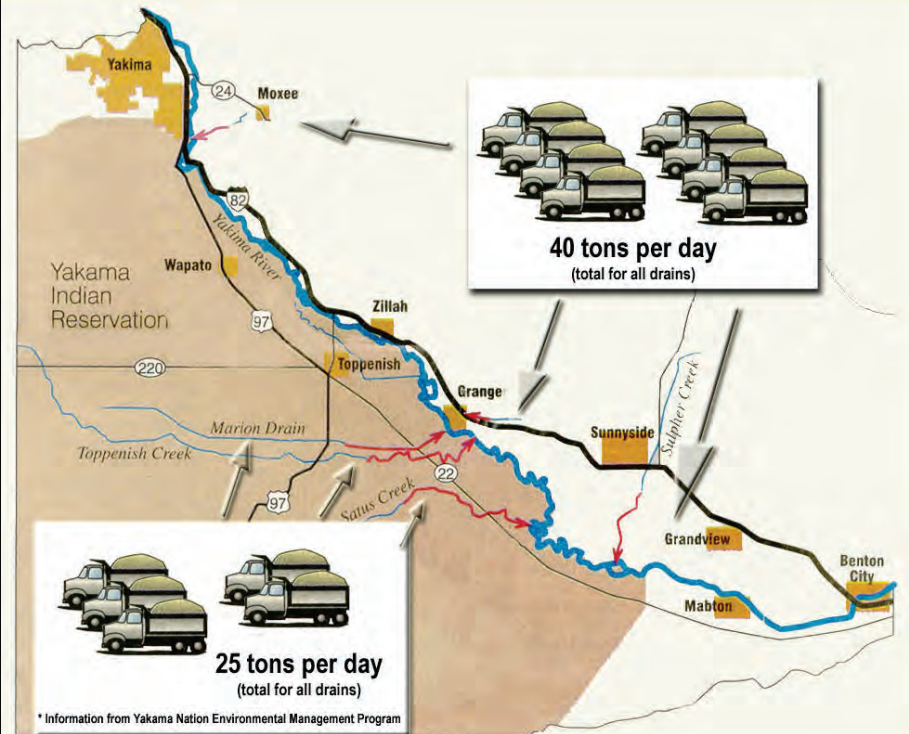
BEFORE

Sediment deposits

Total suspended sediment (TSS) loading balance at selected irrigation drains and tributaries in the lower Yakima River Basin during 2003 irrigation season



Indicates five tons of sediment contributed on average per day to the Yakima River during later part of the irrigation season.



AFTER

Yakima River

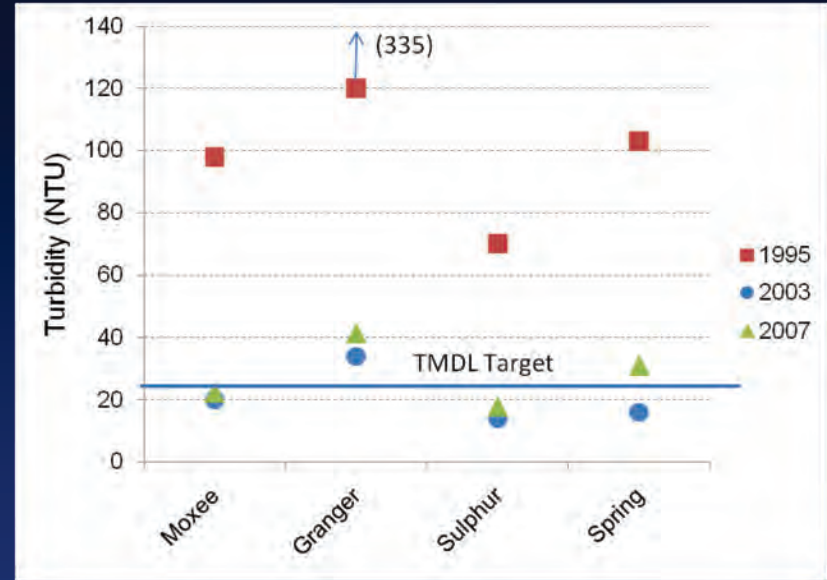
Suspended Sediment Reductions

Tributaries

Sulphur Creek 1997

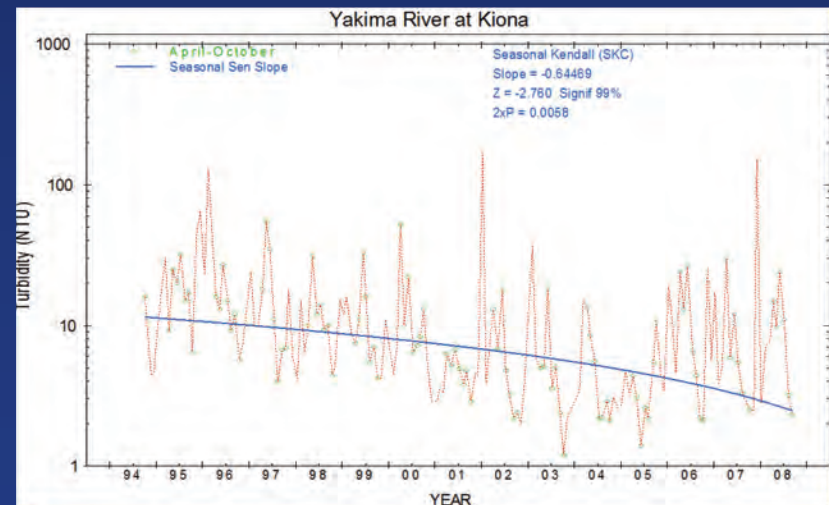


Sulphur Creek 2000



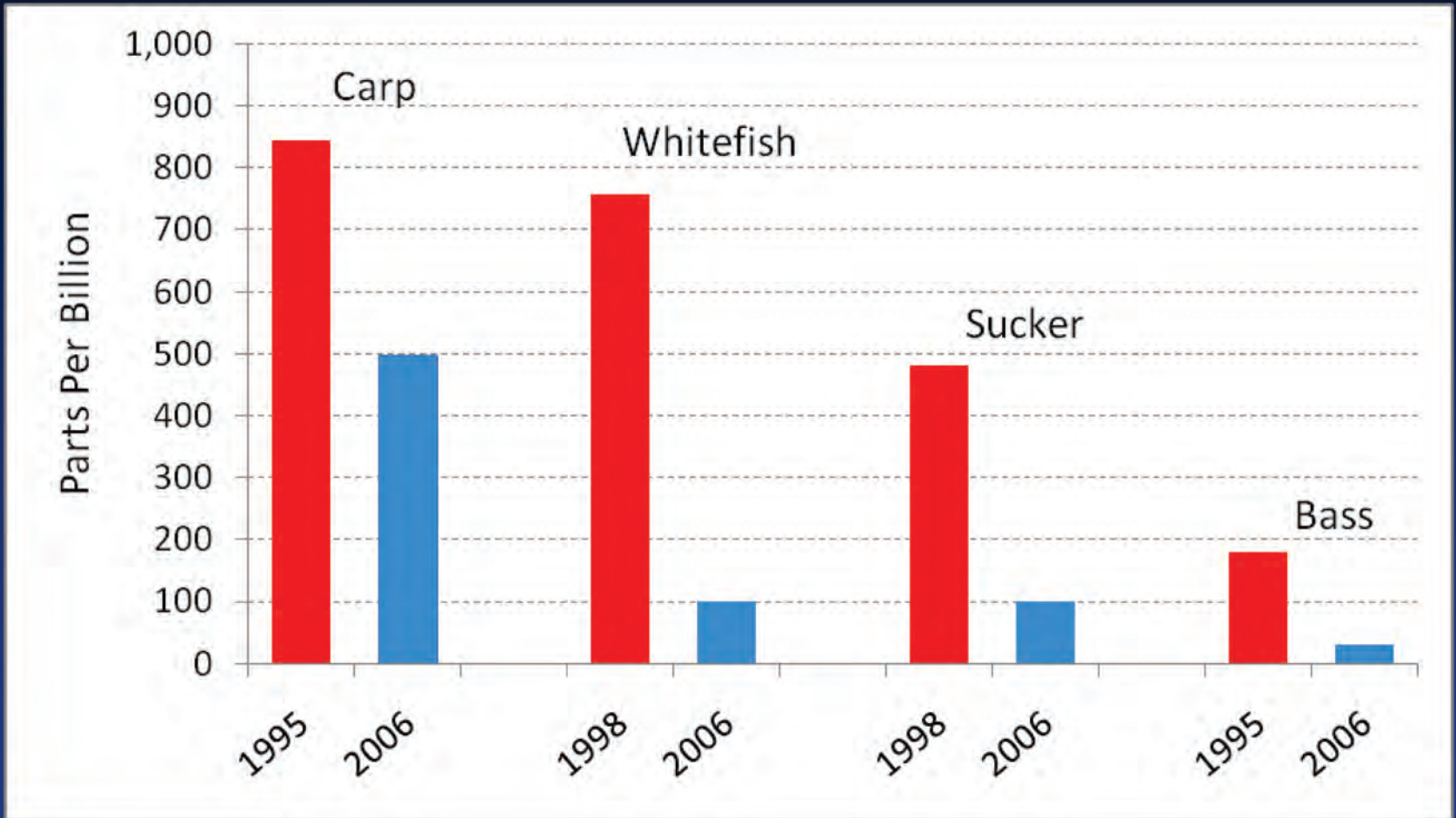
Mainstem

Total suspended solids in mainstem decreased by 50 to 70% (2003)



Yakima River

DDE in Toppenish-Prosser Reach

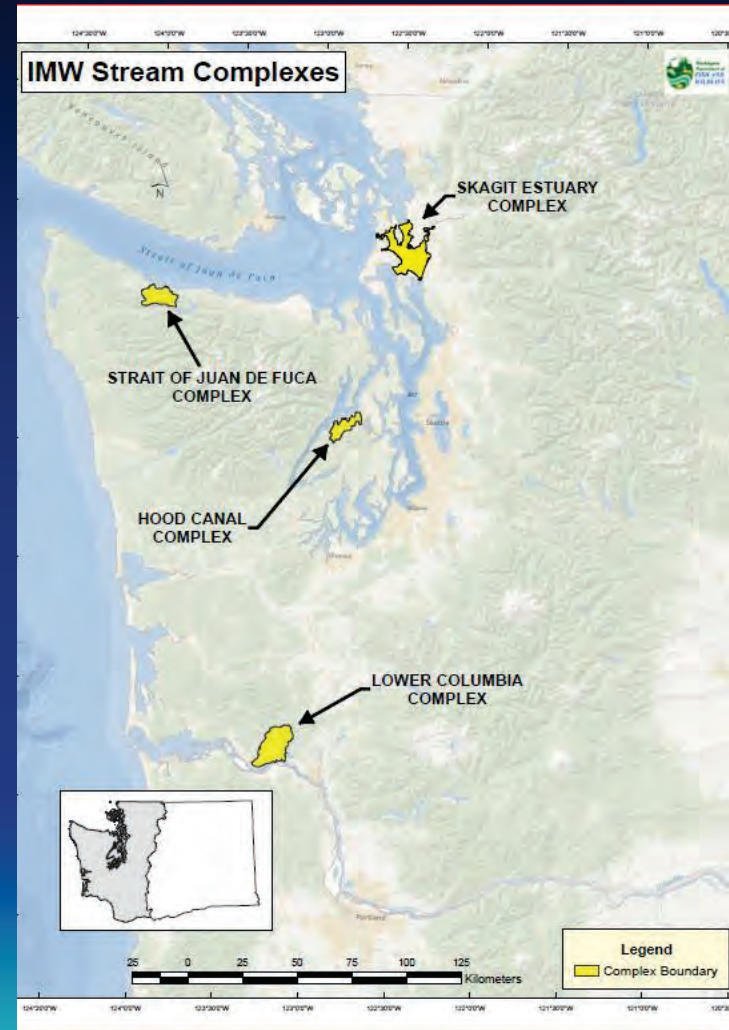


Fish advisory for DDT lifted in 2009 (except carp) due to drop in DDE levels

Salmon Recovery

Intensively Monitored Watersheds

- Skagit Estuary
- Strait of Juan de Fuca
- Lower Columbia
- Hood Canal



Intensively Monitored Watersheds

- A high percentage of the watershed must be restored.
- Projects are staggered over several years because of limited funding and staffing limitations.
- It likely takes several years for projects to produce the intended habitat changes and additional time for fish to respond.



Intensively Monitored Watersheds

- Natural variability in fish populations can mask changes.
- Changes in fish numbers may vary among the different life stages (parr, smolts, adults).
- Estimated 7-10 years of post-restoration monitoring needed to detect 20-60% change in smolts



Intensively Monitored Watersheds

- Measures implementation of restoration, intermediate outcomes and long-term changes
- Restoration includes
 - large wood, estuary restoration, side channel habitat, nutrient enhancement, culvert replacement
- Measures not only short and long-term change but also seeks to “validate” effectiveness of restoration
 - Utilizes reference streams for comparison



Intensively Monitored Watersheds

Smaller questions first then the **BIG** one

- Restoration projects implemented?
- Were the restoration projects effective at creating more habitat?”
- “Are there more fish at the intermediate life stages?”
- “Are more smolts being produced?”
- **“Are more spawners returning?”**



Intensively Monitored Watersheds

Skagit Estuary

- Over 750 acres of estuary restored
- Does estuary restoration result in local increases in density?
 - **YES**
- Will planned restoration increase the system-wide number of delta fry?
 - **YES**
- Will planned restoration increase marine survival and adult returns?
 - **TOO SOON TO TELL**

Straight to Implementation

- BMPs that have a proven track record
 - Shade for warm streams, culverts for salmon, riparian fencing, drip irrigation
- Shift from full studies to identification/ verification, then “straight to implementation”
 - Use implementation and limited compliance monitoring
 - Few select effectiveness studies
 - Rely on status and trends for ecosystem change



Research Nexus

- Research supports monitoring
- Experimentation can point us to stressors
 - NOAA – stormwater and pre-spawn mortality in urban streams
- Experimentation can point us towards effective BMPs
 - Prove out BMPs prior to effectiveness monitoring in the field
 - Washington Stormwater Center – rain gardens and removal of metals from stormwater



Path Forward

- Coordination efforts need to continue
 - PSEMP
- Increased “project” effectiveness monitoring
 - Identify best metrics for effectiveness
 - Don’t always need full blown validation studies
 - Short-term evaluation of actions
- Uncertainty and complexity of ecosystem
 - Manage expectations for adaptive mgmt.



Summary

- Monitoring is crucial to guide action and evaluate success
- A matter of scale and time
 - Many types of monitoring can be considered “effectiveness”
- Adaptive management
 - Policy makers calling for shorter response times
 - Implementation monitoring is critical
- All types of monitoring are needed to measure effectiveness

