

Assessing Flow Restoration Projects for Benefit: Past and Present

Kiza Gates

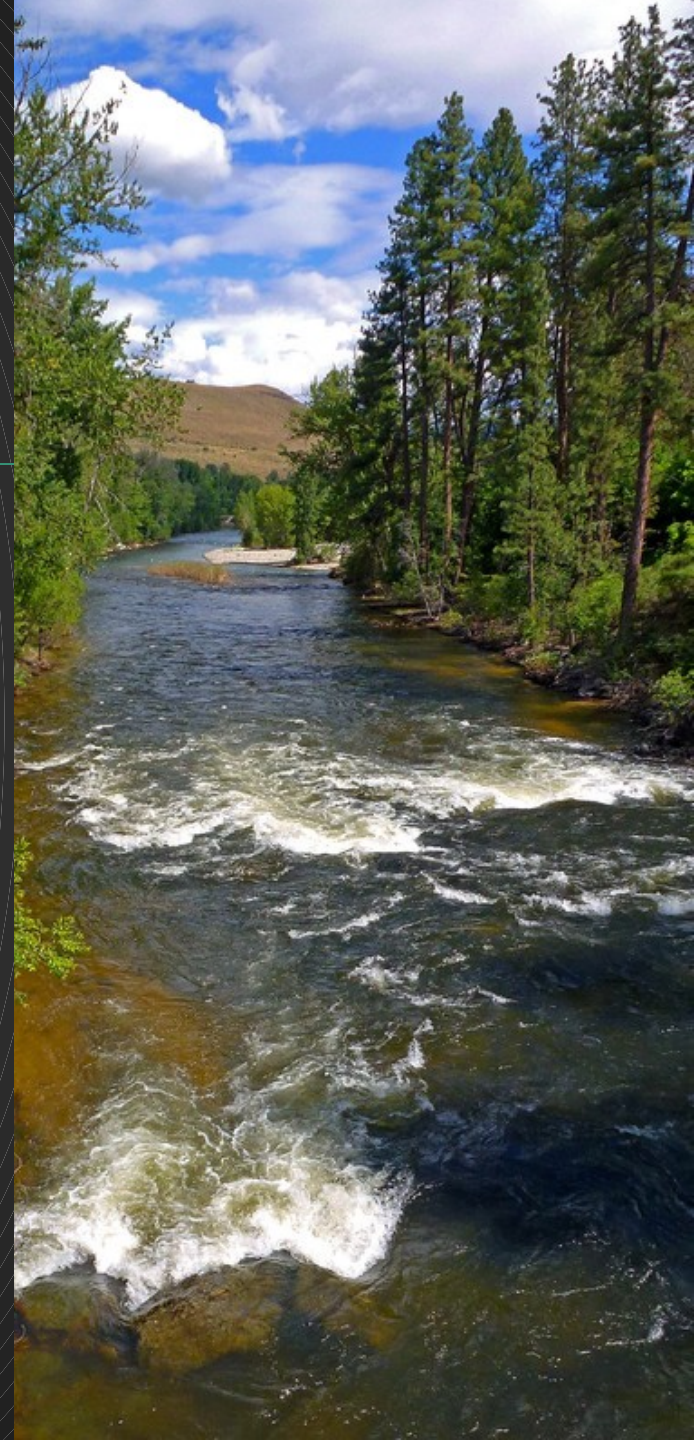
Science Division, Habitat Program

Washington Department of Fish and Wildlife

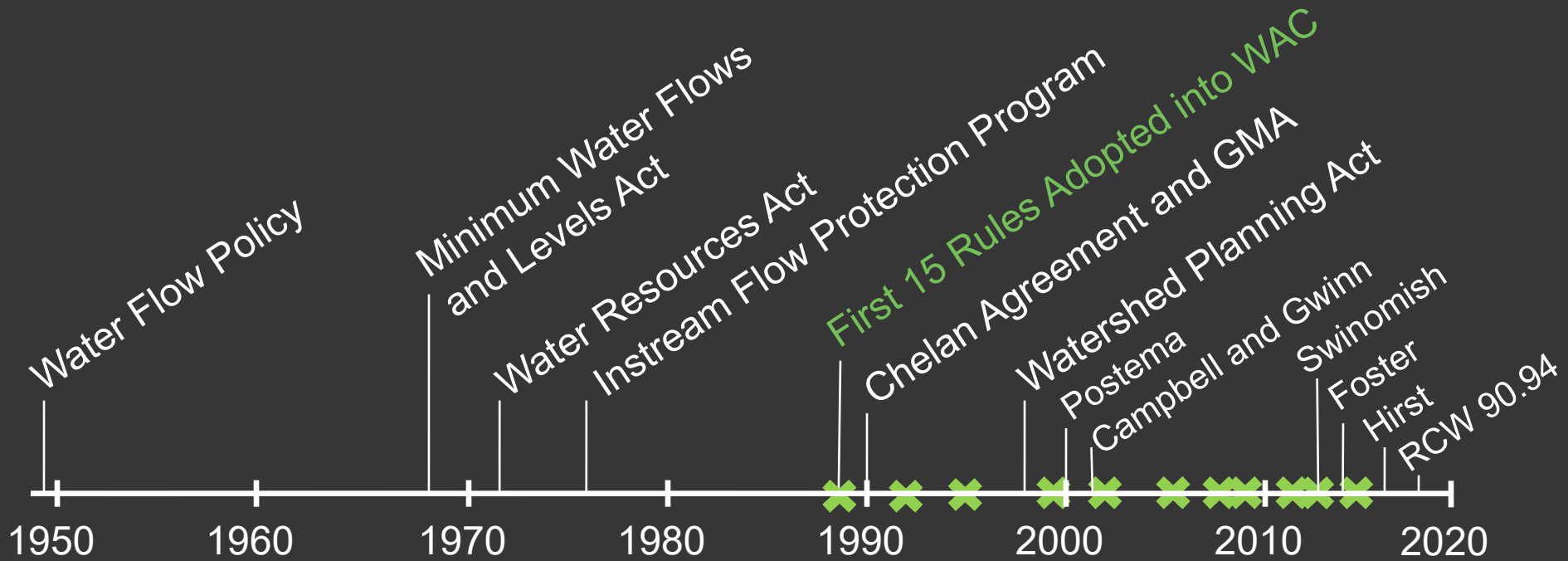
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Washington
Department of
**FISH and
WILDLIFE**



History



✕ = One or more instream flow rules adopted into WAC

Instream Flows in Washington



- Water right for the stream
- Set by WDOE for water allocation and major projects
- Protect and restore habitat for fish and wildlife

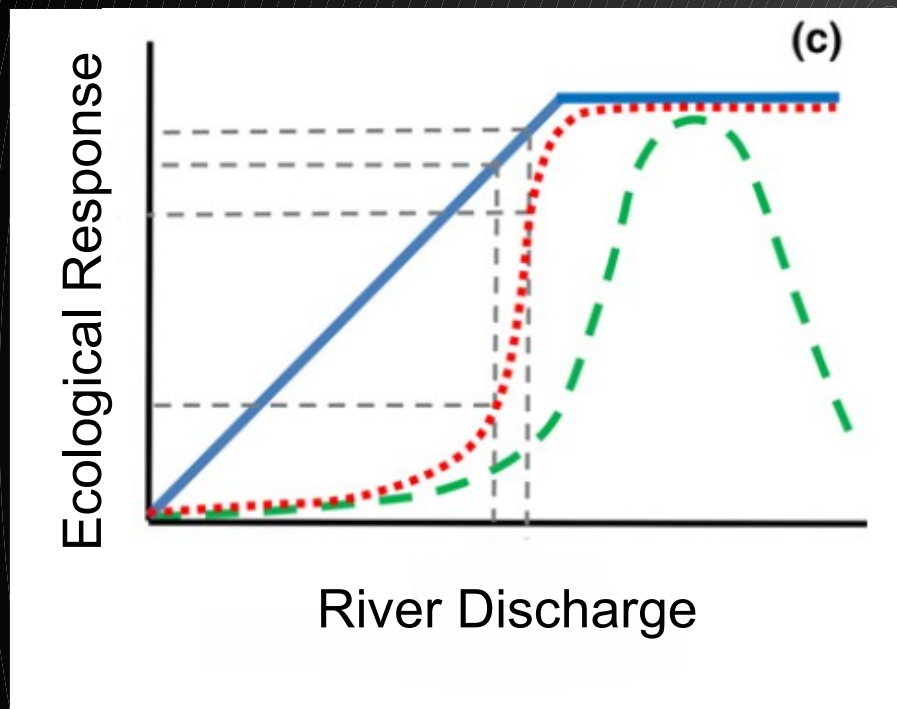


Questions surrounding NEB

- What are the relationships between exempt wells and instream flows?
- What is the relationship between instream flows and ecosystem function, focused particularly on salmonids?
- How can water offsets and other mitigation projects compensate for the effects of future groundwater use?
- How do the above relate to the NEB concept?



What is the relationship between instream flows and ecosystem function, focused on salmonids?



From: Rosenfeld. 2017. Developing flow-ecology relationships: Implications of nonlinear biological responses for water management. *Freshwater Biology*.

Proportion of flow effect

- Reduction in flow leads to a similar and proportional change in ecological function

Threshold effect

- Large change in ecosystem function occurs over small change in flow

What is the relationship between instream flows and ecosystem function, focused on salmonids?

Physical habitat

- Wetted width, depth, velocity

Water quality

- Stream temperature

Energy flow

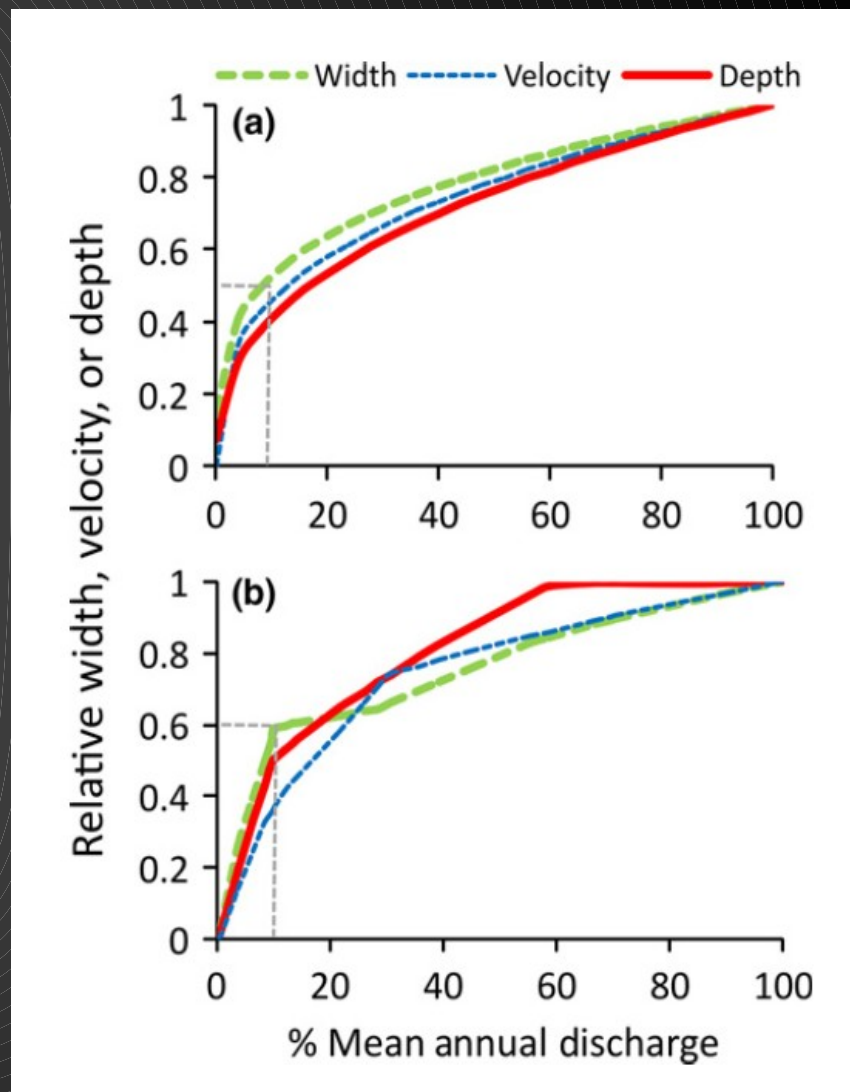
- Food sources, food web complexity

Salmonid metrics

- Growth, movement, survival

Community structure

- Species and functional diversity



Rosenfeld, 2017, Freshwater Biology

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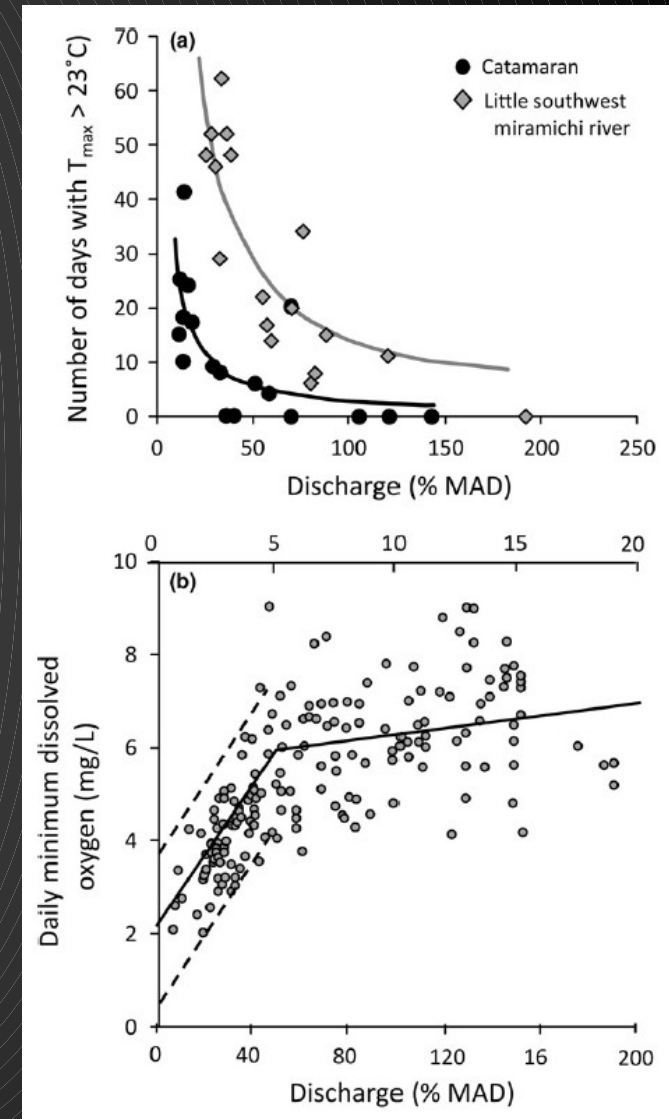
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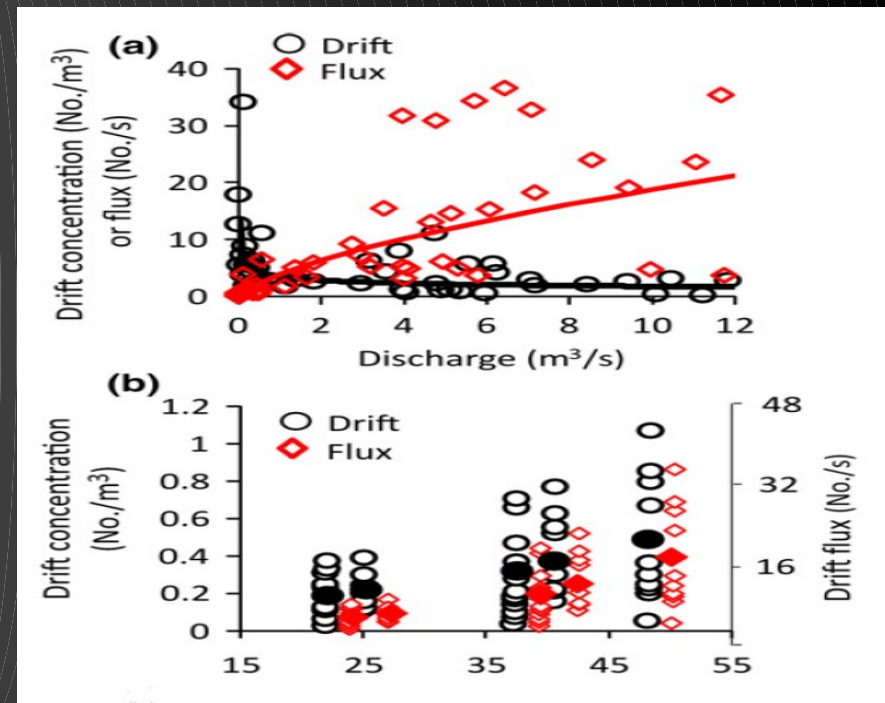
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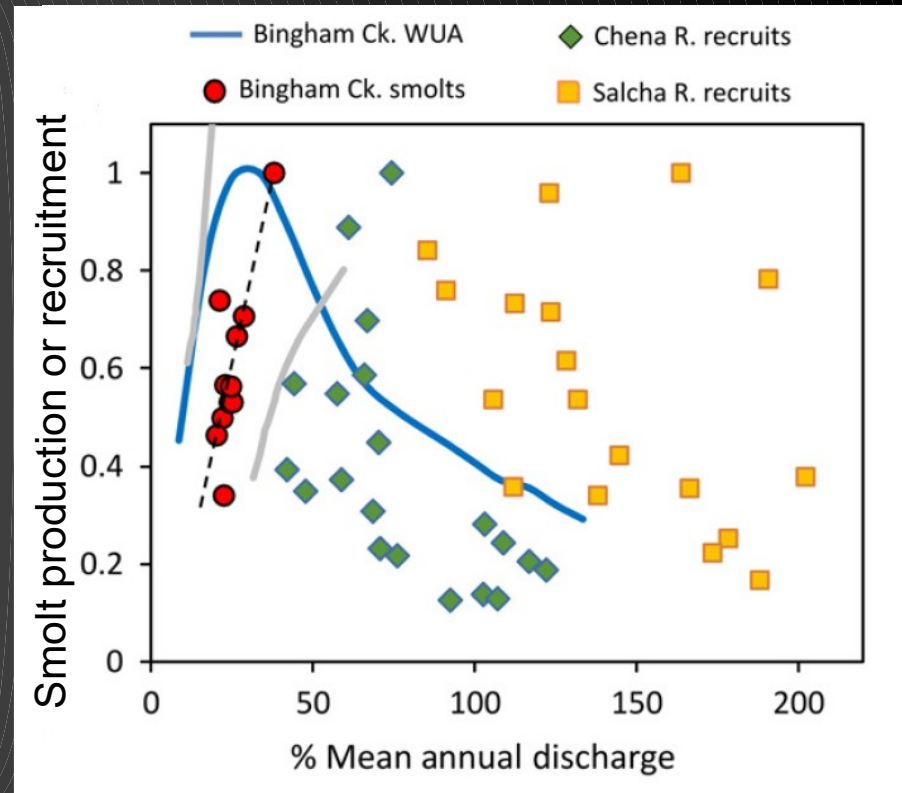
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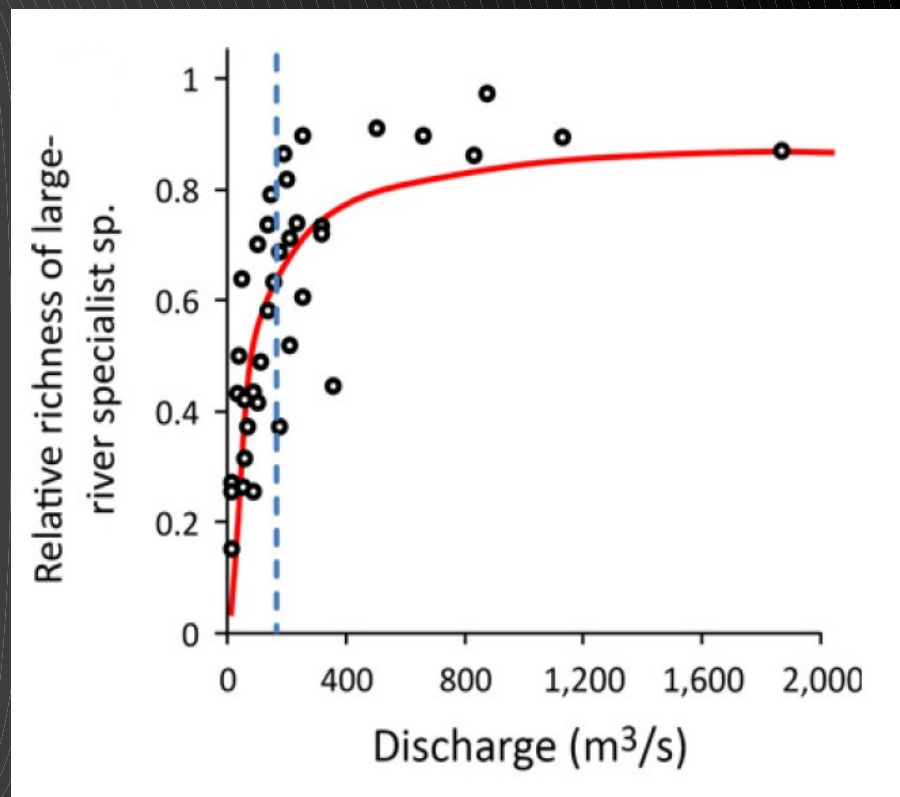
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WDFW Water Science Team



Protect and restore fish and wildlife habitat that depends on water quantity through water use management

- Instream flow science and assessment
- Water right review
- Flow restoration
- Flow acquisition monitoring

Flow restoration

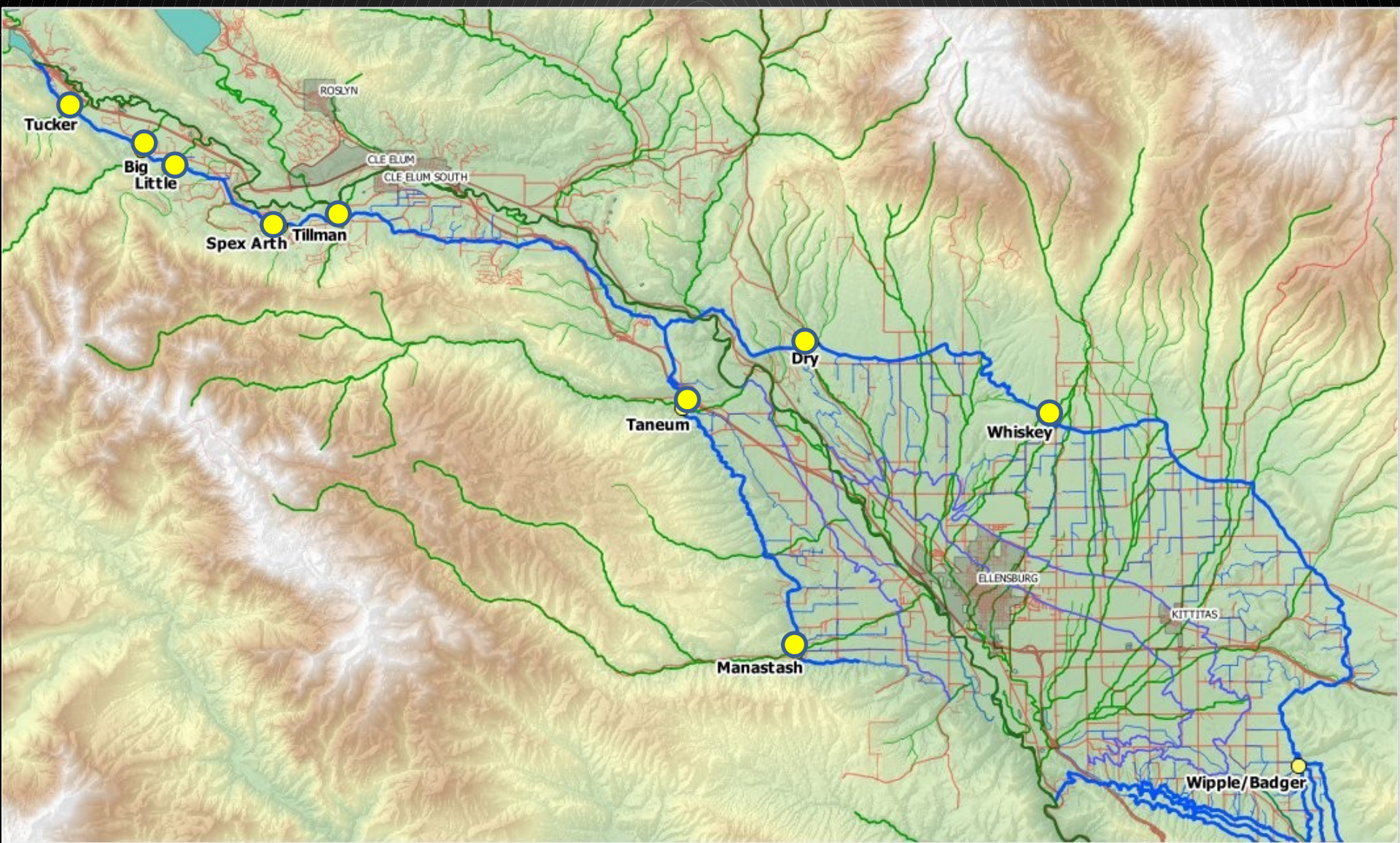


Evaluate flow enhancement strategies for the State and NGOs including:

- Water right acquisitions
- Flow enhancements
- Water efficiency projects



Flow restoration: Kittitas Reclamation District canal supplementation

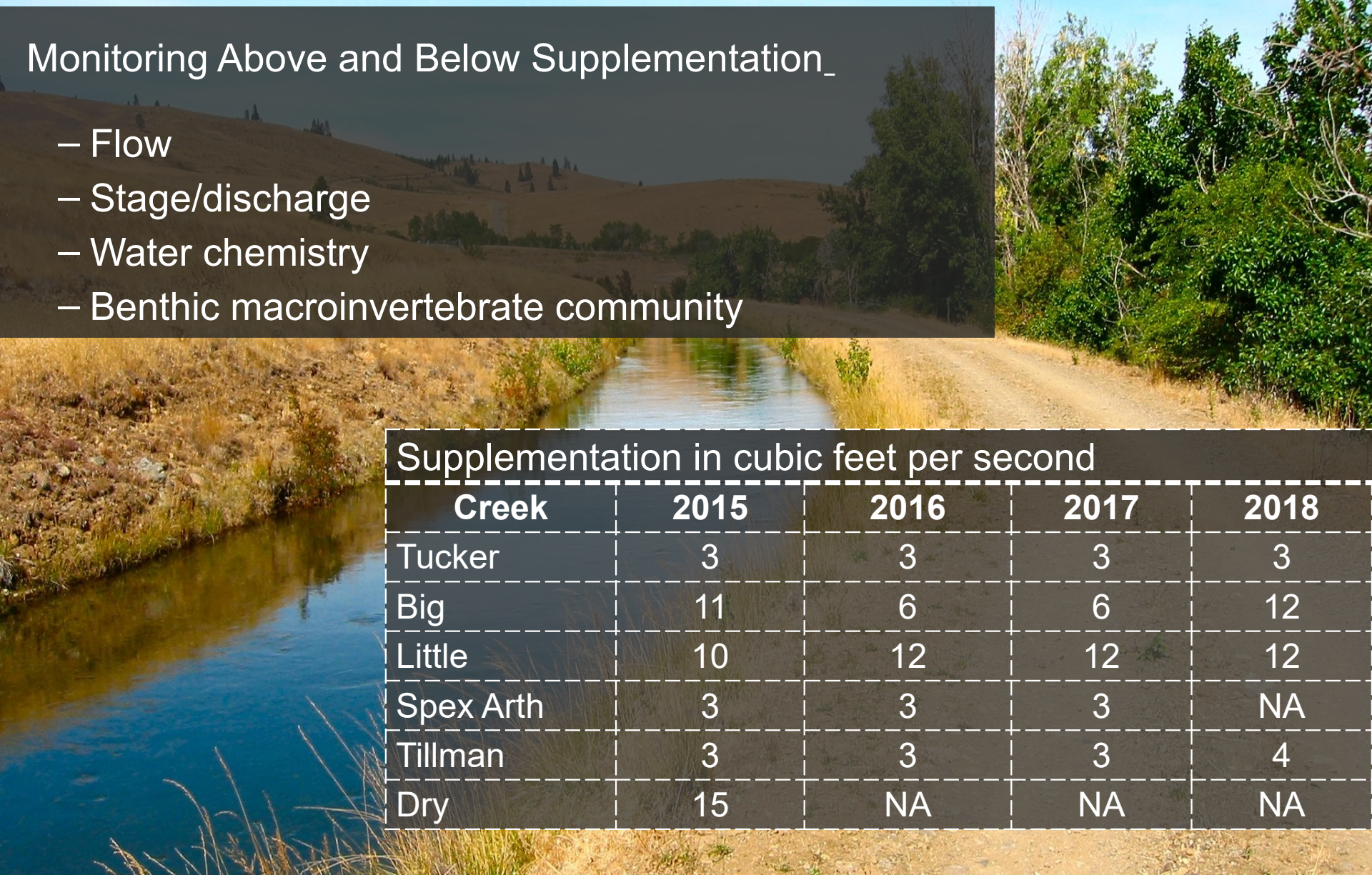




KRD Stream Supplementation

Monitoring Above and Below Supplementation_

- Flow
- Stage/discharge
- Water chemistry
- Benthic macroinvertebrate community



Supplementation in cubic feet per second

Creek	2015	2016	2017	2018
Tucker	3	3	3	3
Big	11	6	6	12
Little	10	12	12	12
Spex Arth	3	3	3	NA
Tillman	3	3	3	4
Dry	15	NA	NA	NA

Water right review



Types of mitigation



Examples of In-Kind

- Replacing water for water, in time, in place
- Relinquish existing water rights into trust
- Conserving water from existing uses
- Flow augmentation from non-water right sources
- Storing or recovering surface or ground water
- Using reclaimed water

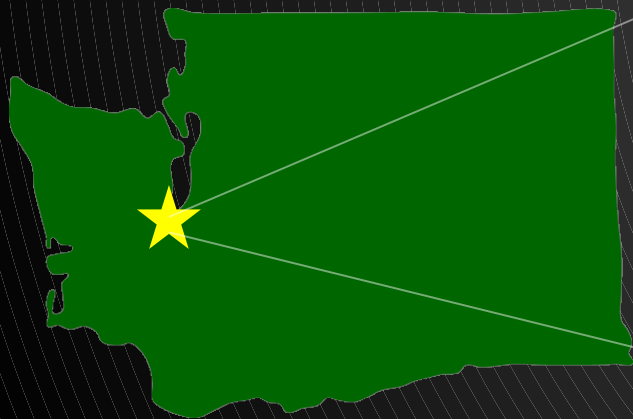
Out-of-kind

- Restoration and protection of critical habitat when water is not the primary limiting factor

Lacey/Olympia/Yelm municipal water



- Over-mitigation of some streams, modelled small depletion of others
- In-kind and out-of-kind projects
- Three cities, three state agencies, & two tribes agreed on wide ranging mitigation package for municipal water
- Yelm water right appealed and lost in state supreme court



Things to consider

- Empirical, regional, and modeling efforts in each watershed
- Flow-ecology relationship functions can affect management decision outcomes
- Context and complexity are important: landscape, geomorphic, environmental



Steps toward assessing watershed benefit

- What are the historic monitoring databases?
- Can you use metadata to understand local flow-ecology relationships?
- What sensitive metrics can you track with extensive low intensity monitoring?
- Can you incorporate long-term reference areas?





Reclaimed water



SENSIBLE | SUSTAINABLE



**We're using
water wisely by
irrigating with
reclaimed water**

The Right Water for the Right Use



Do Not Drink
from the Irrigation System



WDFW Water Science Team

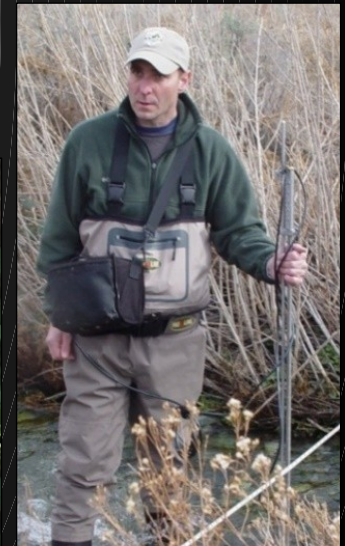


- Kiza Gates, Olympia
- Steve Boessow, Olympia
- Tristan Weiss, Olympia
- Robert Granger, Pasco
- Jonathan Kohr, Yakima
- Cole Provence, Yakima
- Luke Stilwater, Yakima

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Washington
Department of
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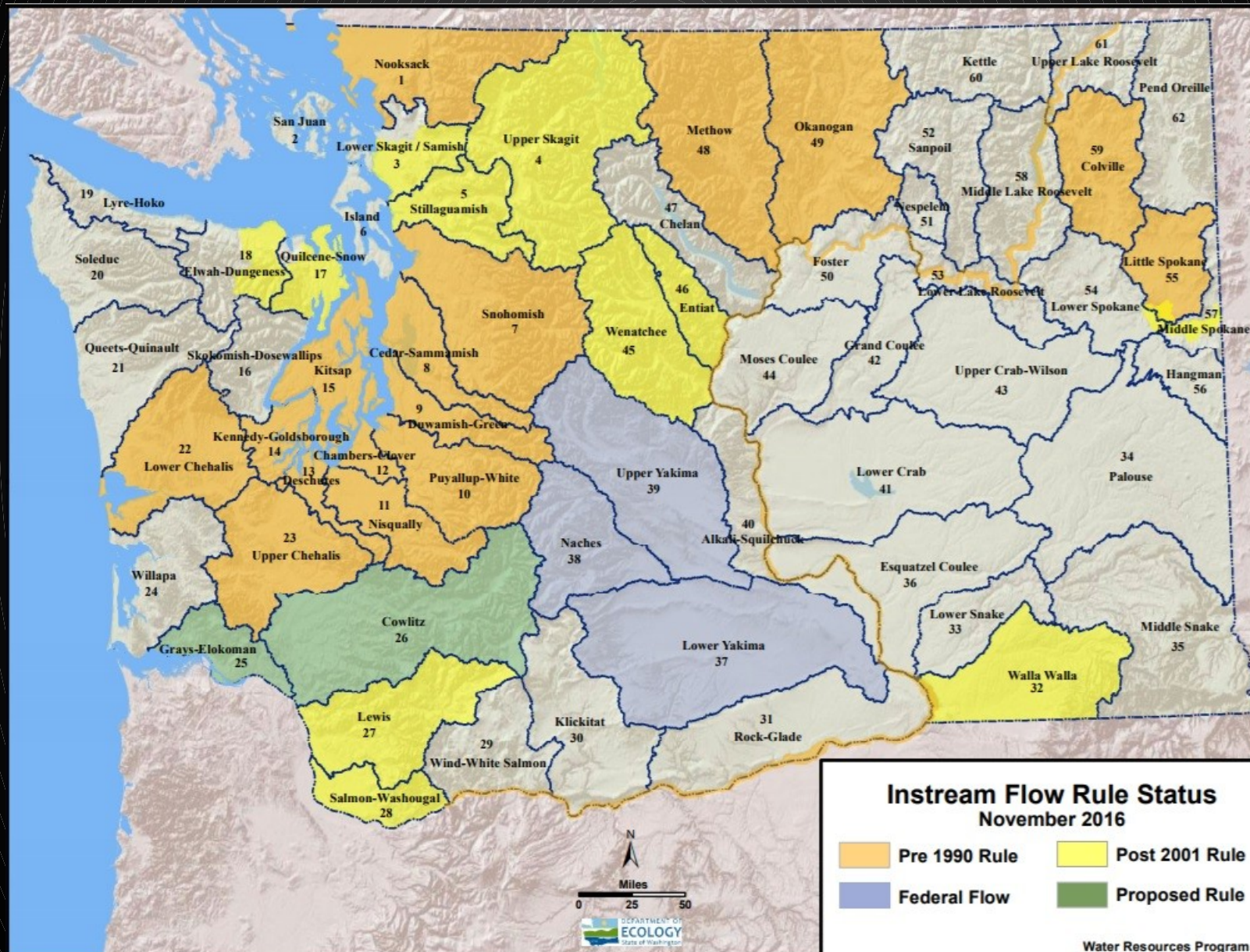


Assumptions relating to NEB

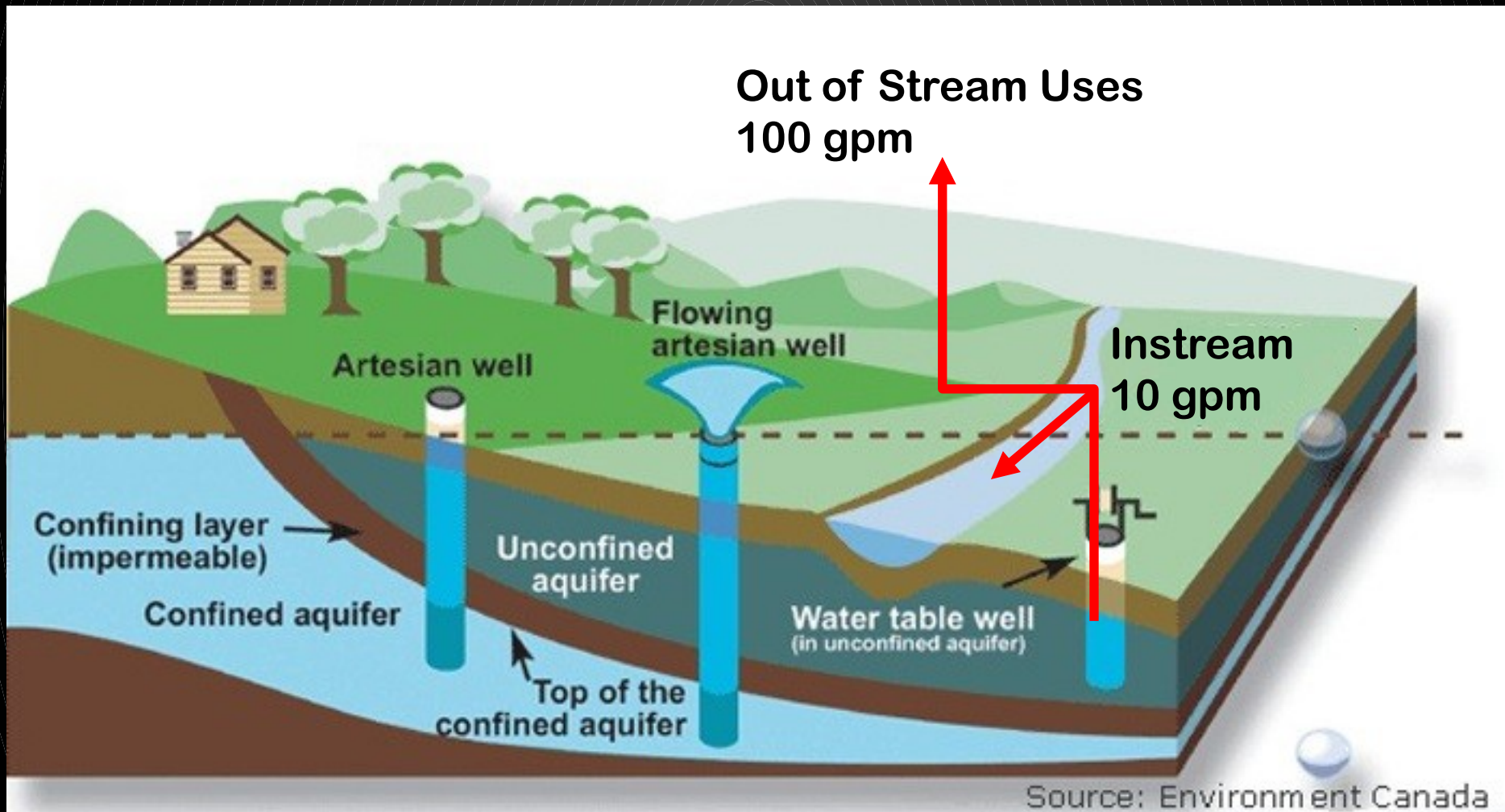
- Measure the impact/benefit of actions and link them to the management decisions
- Implement mitigation at the appropriate scale for the system to maintain its current function and be enhanced



Basins with Instream Flow Rules



Pump & dump



In-kind mitigation



Problematic alternatives

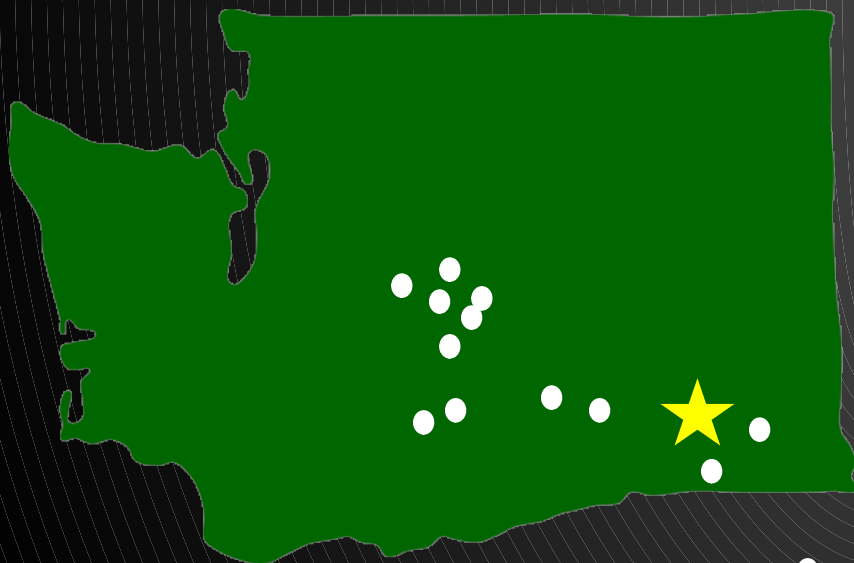
- Transferring water rights that are:
 - In open basins
 - Junior to instream flows
 - Without property restrictions
- Abandoning questionable water rights
- Temporary mitigation measures



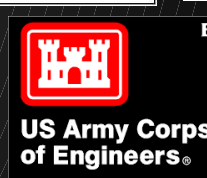
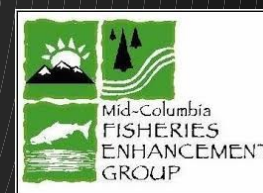
Kennewick general hospital



- Cash in lieu of mitigation
- Annual fee over 40 years to fund 13 projects
- Mostly out-of-kind, out-of-place
- Requires long-term commitment from agencies
- Appealed, settlement favorable to environment



\$6.5 M in restoration
\$6.5 M to purchase senior rights





Water Science Team

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Out-of-kind mitigation



Restoration and protection of critical habitat when water is not the primary limiting factor



Riparian Planting

Large Woody Debris

Meanders