

Chehalis River Fish Use - Preliminary Results

Chehalis Basin Strategy
“Reducing Flood Damage and Enhancing Aquatic Species”
Technical Workshop
October 30-31, 2013



Presentation Outline

- Fish species in the basin
- Data gaps relative to dam assessment and ASEP
- Fish and habitat studies to fill data gaps
- Information collected to date
- Next steps



Fish species in the Chehalis Basin

- Diverse fish fauna
- 27 native species (1 endemic)
- 14 exotic species
- Range of habitats for spawning and rearing
- Glacial refugia

Wydoski & Whitney 2003, McPhail & Lindsey 1986

Fish species in the Chehalis Basin

- Limited information on fish distribution, especially around and upstream of proposed dam site.
- Chehalis River upstream of Pe Ell is important habitat for salmon and steelhead.
- Upper basin is being re-colonized following large flood events.

WDFW databases, Weyerhaeuser, UW Burke Museum, OSU Ichthyology Collection

Fish species in the Chehalis Basin

Smith and Wenger. 2001. Salmon and Steelhead Limiting Factors: Chehalis Basin and Nearby Drainages.

“One major impediment to assess the fish distribution and habitat conditions in these two WRIAs is the tremendous lack of detailed field information... Without proper assessment of fish presence and abundance, it will be difficult to accurately use fish data to define impacts and recovery success and to monitor projects and recovery progress.” Executive Summary

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Data Gaps Relative to Dam Assessment

- What will be lost in impoundment area?
- What will change in river below dam?
- What will the impact be to fish spawning and rearing above impoundment?
- What kind of fish passage allowances are needed?
- How would changes in river temperature affect fish?

Data Gaps Relative to ASEP

- Limiting habitat factors
- Ecosystem-based framework to assess dam impacts
- Habitat actions to address limiting factors
- Potential effects of alternative flood control actions on status of fish and habitat
- Climate change exacerbation of existing stressors on fish populations

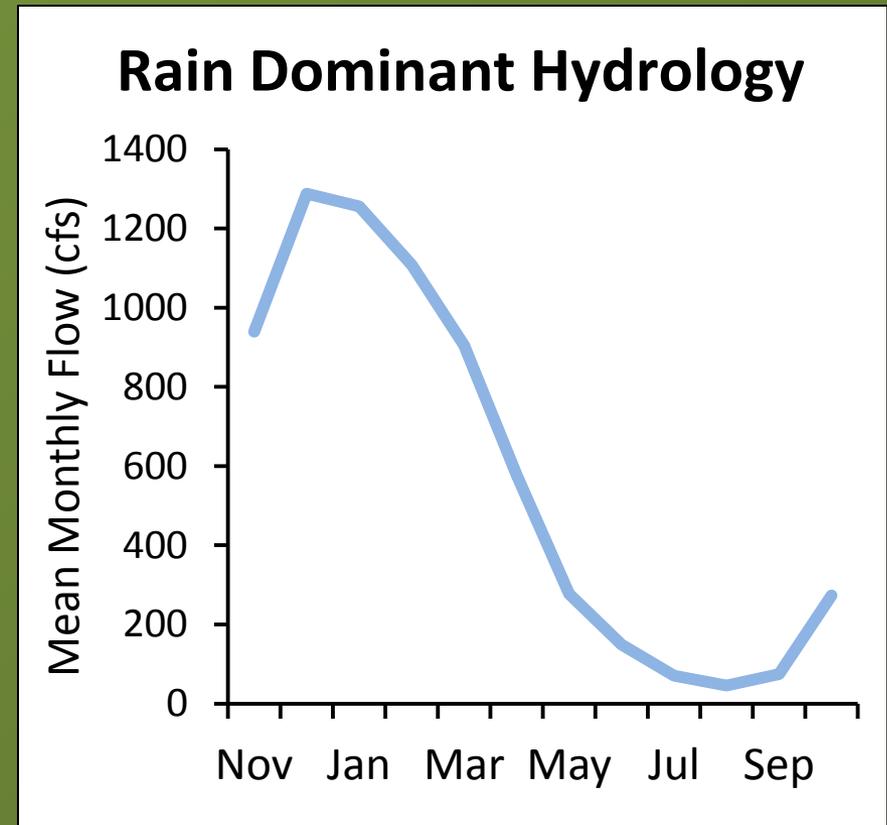
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Criteria to select fish and habitat studies

- When?
 - Fish ecology
 - River hydrology
- Where?
 - Dam impact areas
 - Reference areas
- What?
 - All fish species
 - Select habitat measures

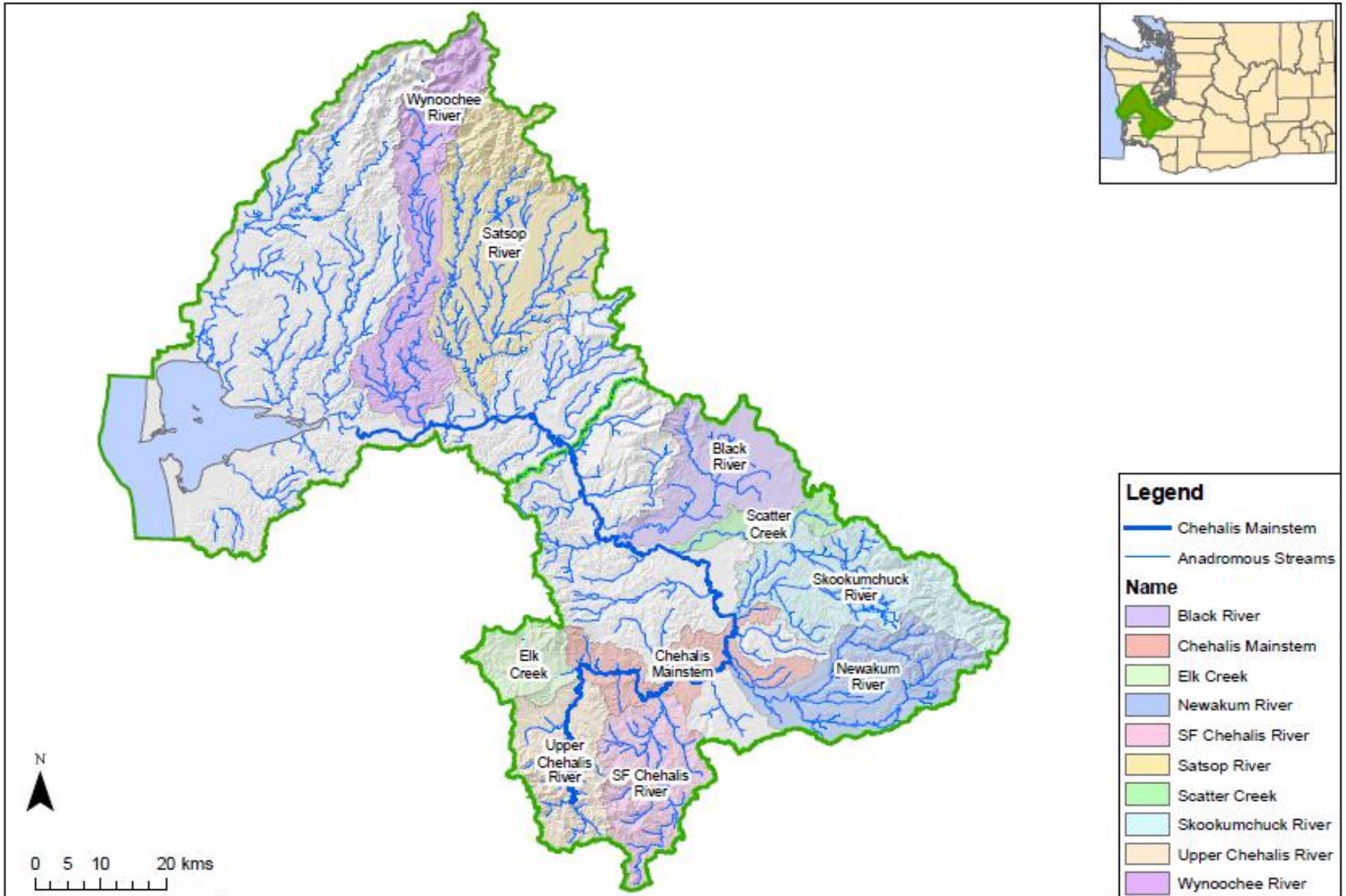


Data source: USGS 12020000 (Doty gage)

Fish and habitat studies

- Adult spawners
 - Smolt abundance
 - Riverscape fish & habitat
 - Reach scale fish & habitat
 - Fish movements (summer & winter)
- Area above dam site
- Area above Skookumchuk

Chehalis River Study Areas / Subbasins



Map by Andrew Weiss, WDFW

ADULT SPAWNER SURVEYS

What is adult fish abundance, timing, and distribution?

- August - June
- Upper Chehalis sub-basin
- Survey every 7-10 days, entire anadromous zone
- Spawner counts, timing, location, age composition
- Chinook (spring & fall), Coho, Steelhead
- WDFW Lead



SMOLT TRAP

What is outmigrant fish abundance, timing, and diversity?

- Winter/Spring
- Upper Chehalis sub-basin
- Smolt trap
- Counts, count expansions, migration timing
- All species moving downstream including salmonid smolts
- Chehalis Tribe Lead



Chehalis River smolt trap is operated near river mile 108 (Picture is not Chehalis).

RIVERSCAPE SURVEYS

Where does summer rearing occur for what species?

- Summer
- Chehalis mainstem (77 km)
- Snorkel (fish) & foot (habitat) surveys
- Continuous fish & habitat data
- Include species observable using snorkel methods
- WDFW Lead



Downstream snorkel surveys on the Chehalis River

REACH SURVEYS

Which habitats are associated with which fish species?

- Summer
- Discrete reaches in three focal areas (Upper Chehalis, Chehalis mainstem, Newaukum)
- Snorkel, electrofish, seine
- Habitat metrics
- All fish species
- WDFW Lead



Seine collections of fish in the Chehalis River

FISH MOVEMENTS (SUMMER)

Importance of cool water refugia for summer rearing

- River mile 98 to 108
- Juveniles tagged and released
- PIT tags & arrays*
- Movement into areas with cool water inputs
- Chinook, Coho, Steelhead
- WDFW Lead



PIT antenna array near RM 108 on Chehalis River



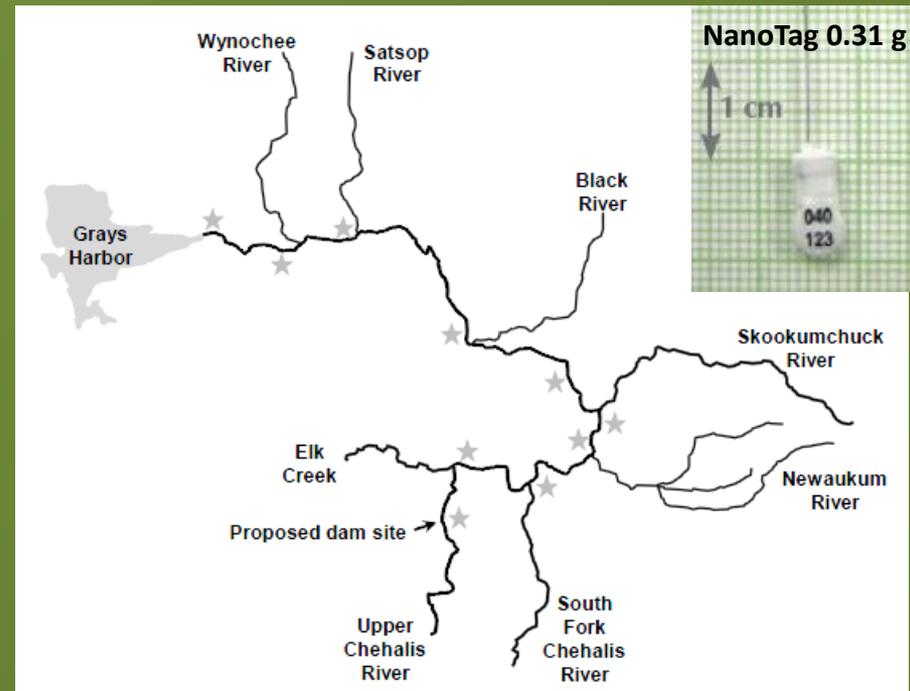
Field crew tagging juvenile salmonids

*Passive Integrated Transponder (PIT)

FISH MOVEMENTS (WINTER)

Importance of mainstem for winter rearing

- Two tagging periods – Sept/Oct and Mar/Apr
- Three release areas
- Juvenile fish tagged and released
- Radiotags & fixed receivers
- Chinook, Coho, Steelhead
- USGS Lead



Map of Chehalis watershed showing locations of radio telemetry receivers

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Fish-Habitat Studies During Summer Rearing Period

- Riverscape surveys
- Reach scale surveys
- Summer movements



Data collection period July 15 – October 25, 2013

Riverscape View: Patterns of Fish and their Habitat

Scale of data collection is 200 m reach

Fish counts by snorkelers

Habitat characteristics by foot

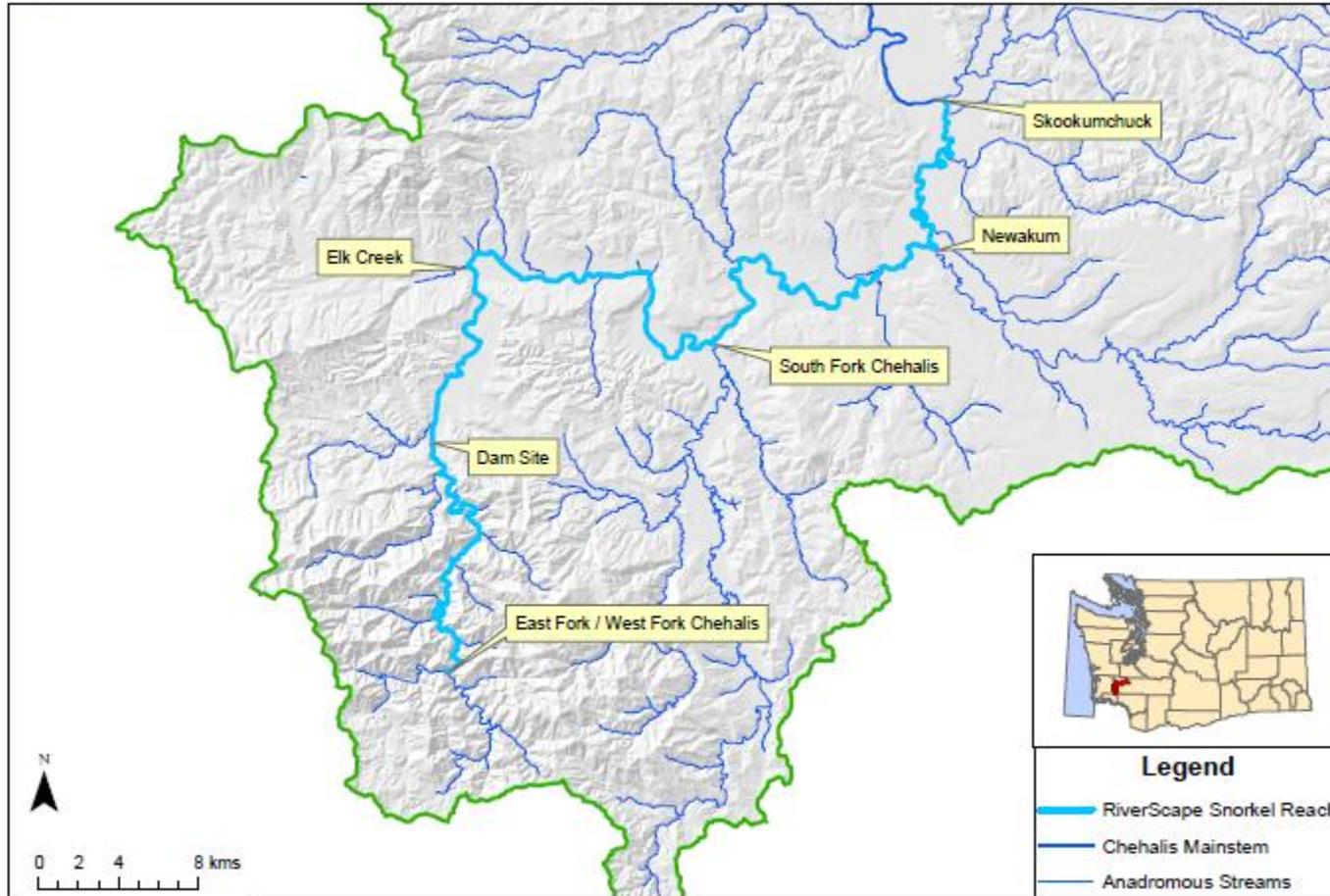


John Winkowski, WDFW
Mara Zimmerman, WDFW

Riverscape Survey Area



Riverscape Snorkel Reaches



Map by Andrew Weiss, WDFW











2013/08/21











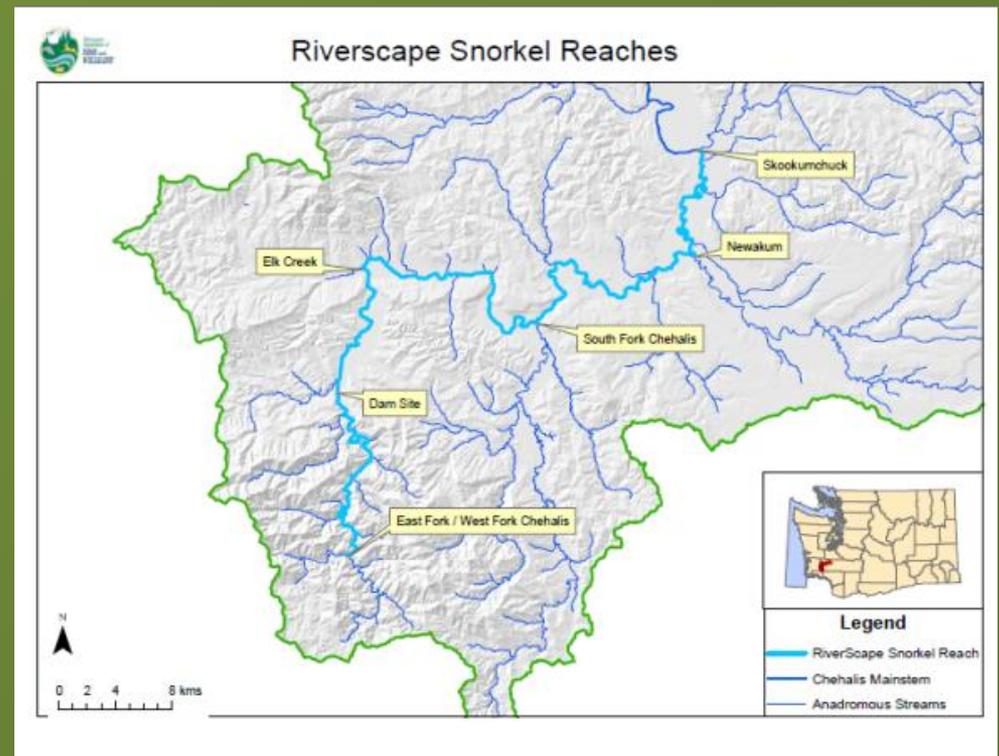




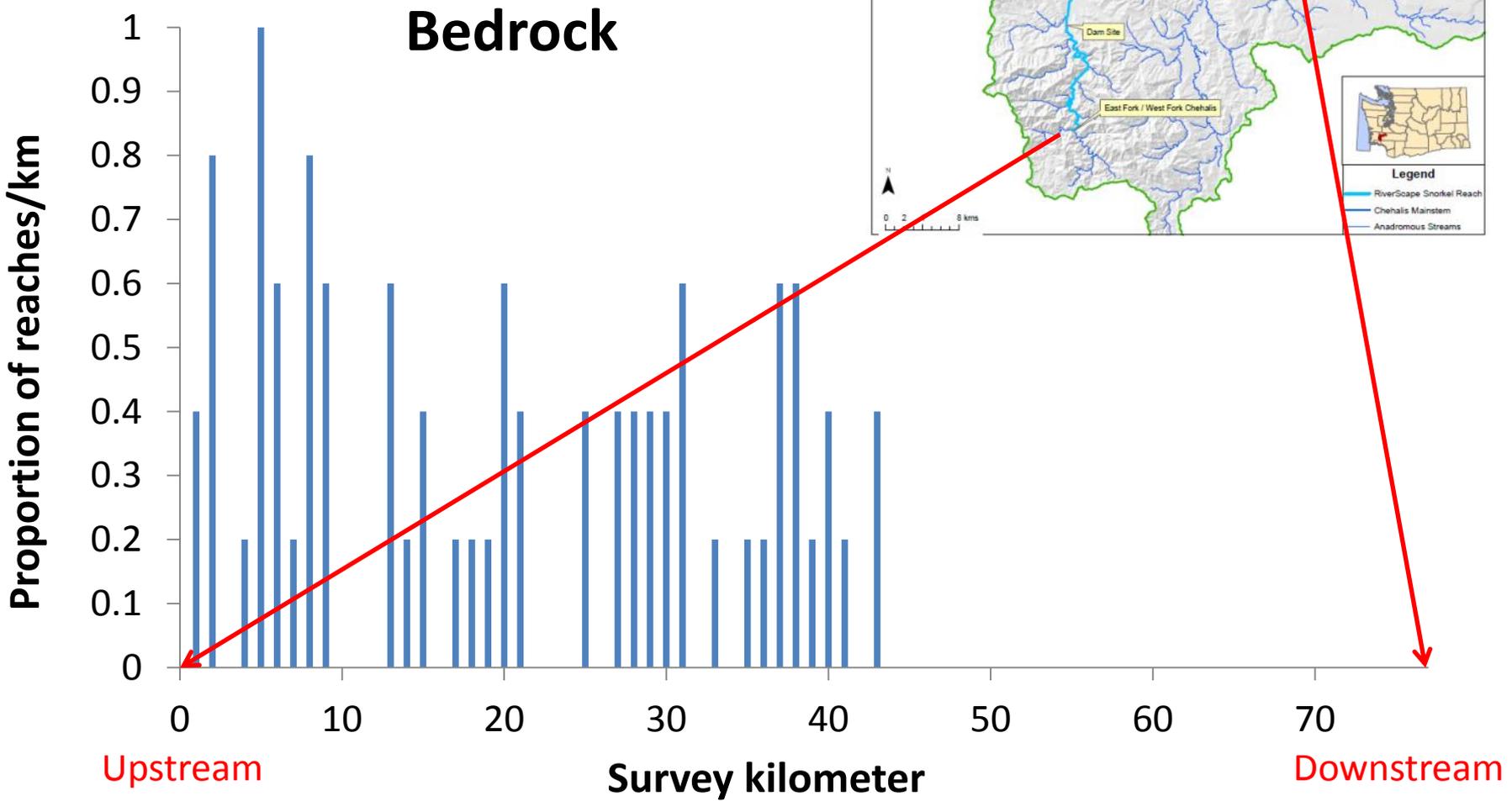


River Habitat Summary

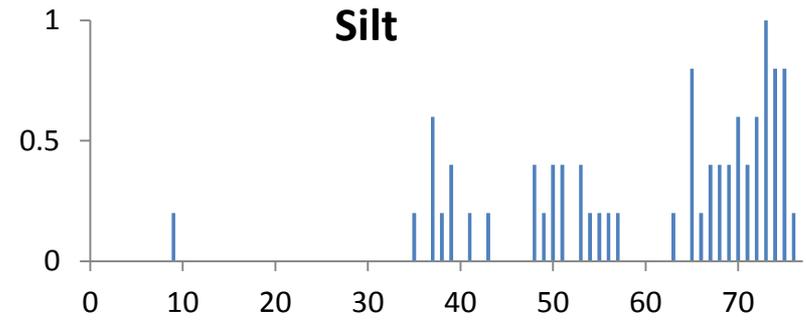
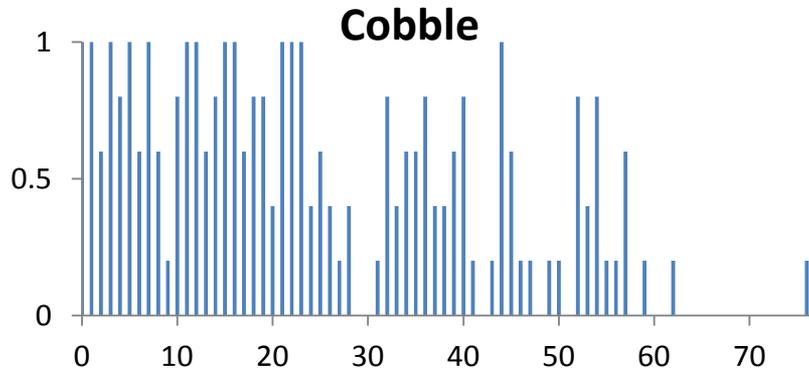
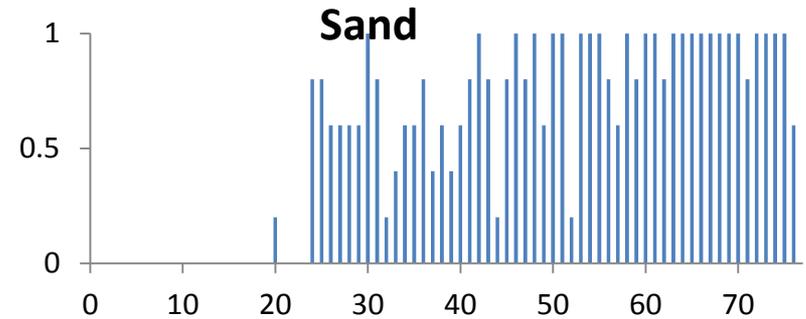
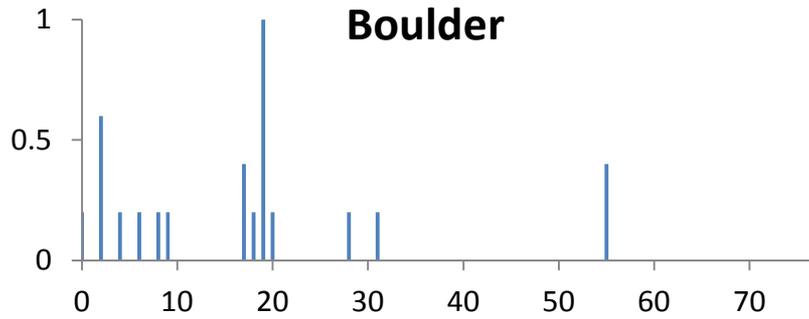
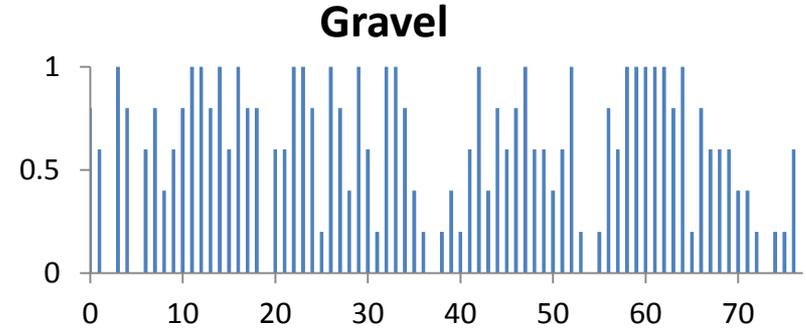
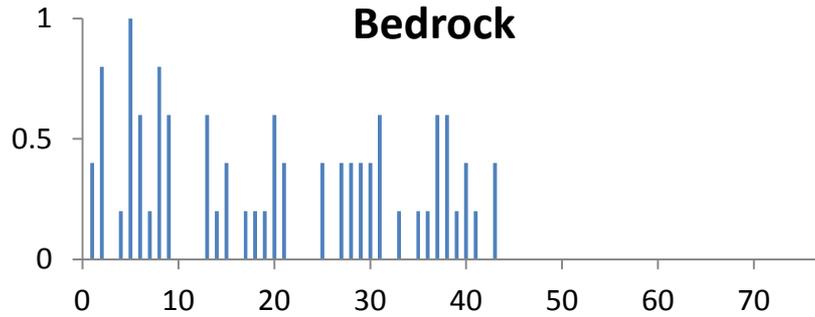
- Channel type
- Substrate
- Channel width
- Depth
- Pool counts
- Vegetation



River Habitat Summary



River Habitat Summary



Summer Fish Distribution

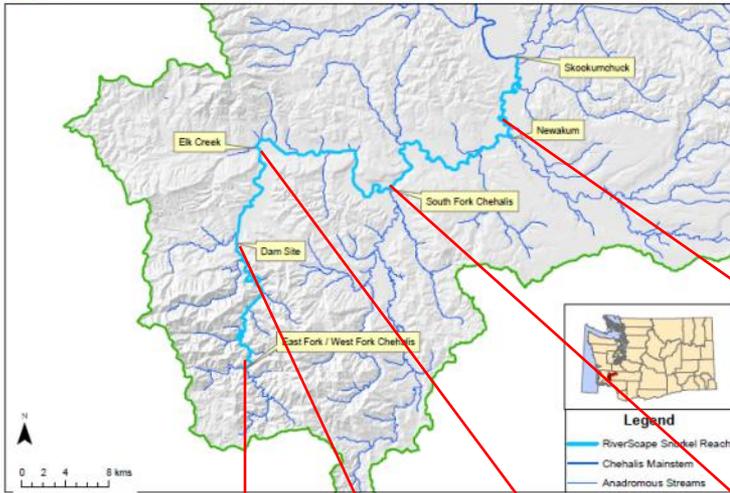
- Counts by species and life stage
- Limited to pelagic species



Photo by Pete Caster, The Chronicle

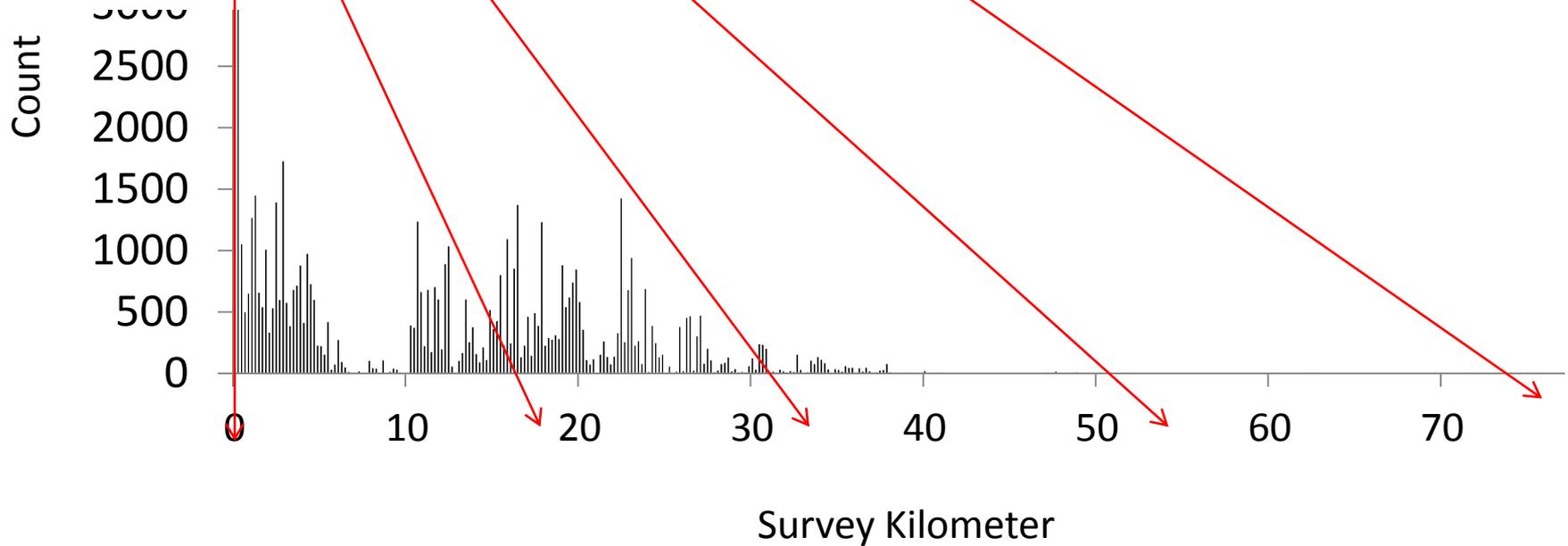


Riverscape Snorkel Reaches

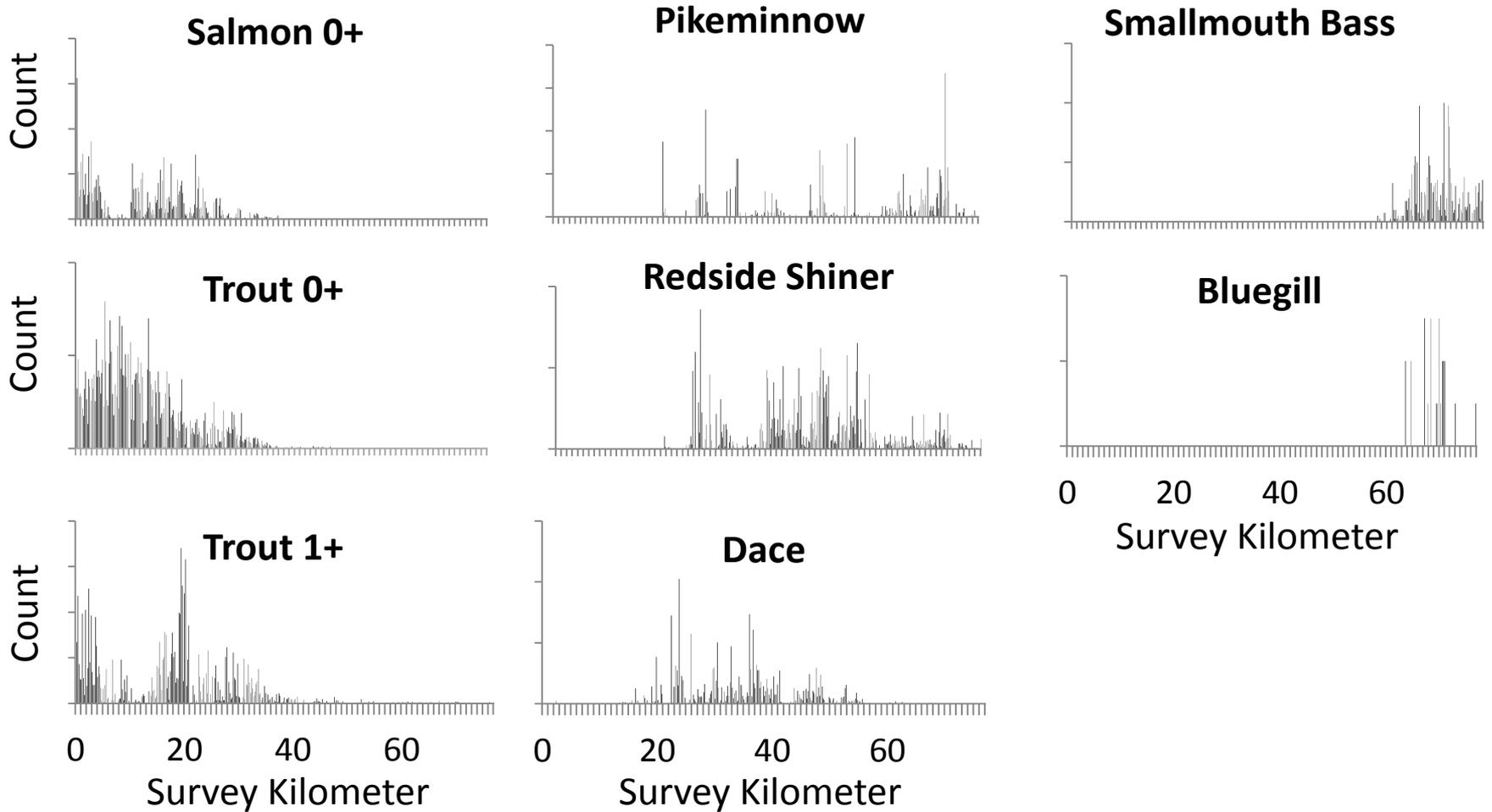


Summer Fish Distribution

Salmon 0+



Summer Fish Distribution



Improved Understanding from Riverscape Study

- Continuous measure of fish and habitat above, within, and below impoundment area.
- Other aquatic species (amphibians, mussels).



- Synthesis: General distribution and habitat characteristics to predict fish occupancy and relative abundance.

Reach Scale View: Fish Use of Habitat Units

Scale of data collection is habitat unit

Fish densities and biological (snorkel, electrofish, seine)

Habitat metrics

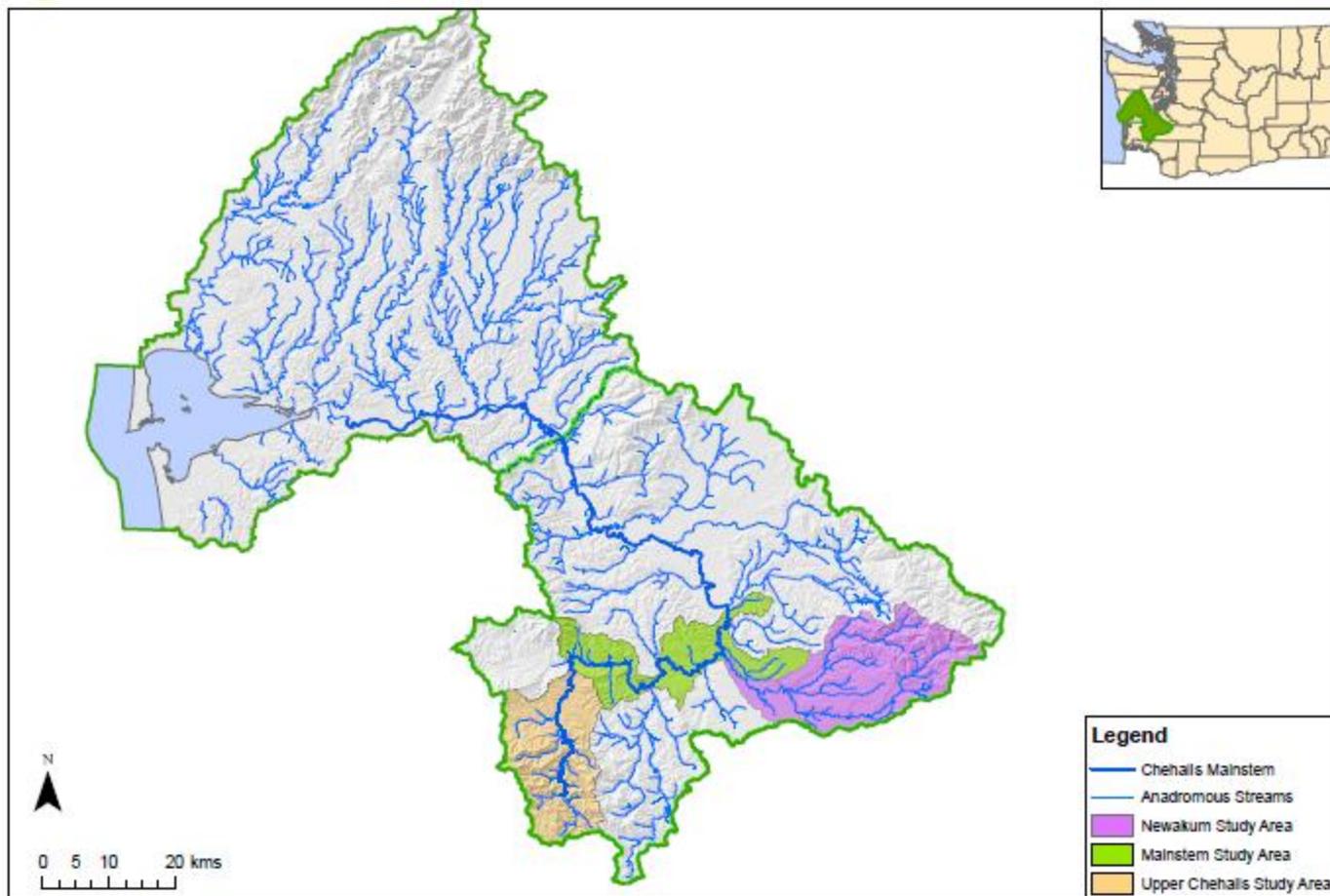


John Winkowski , WDFW
Mara Zimmerman, WDFW

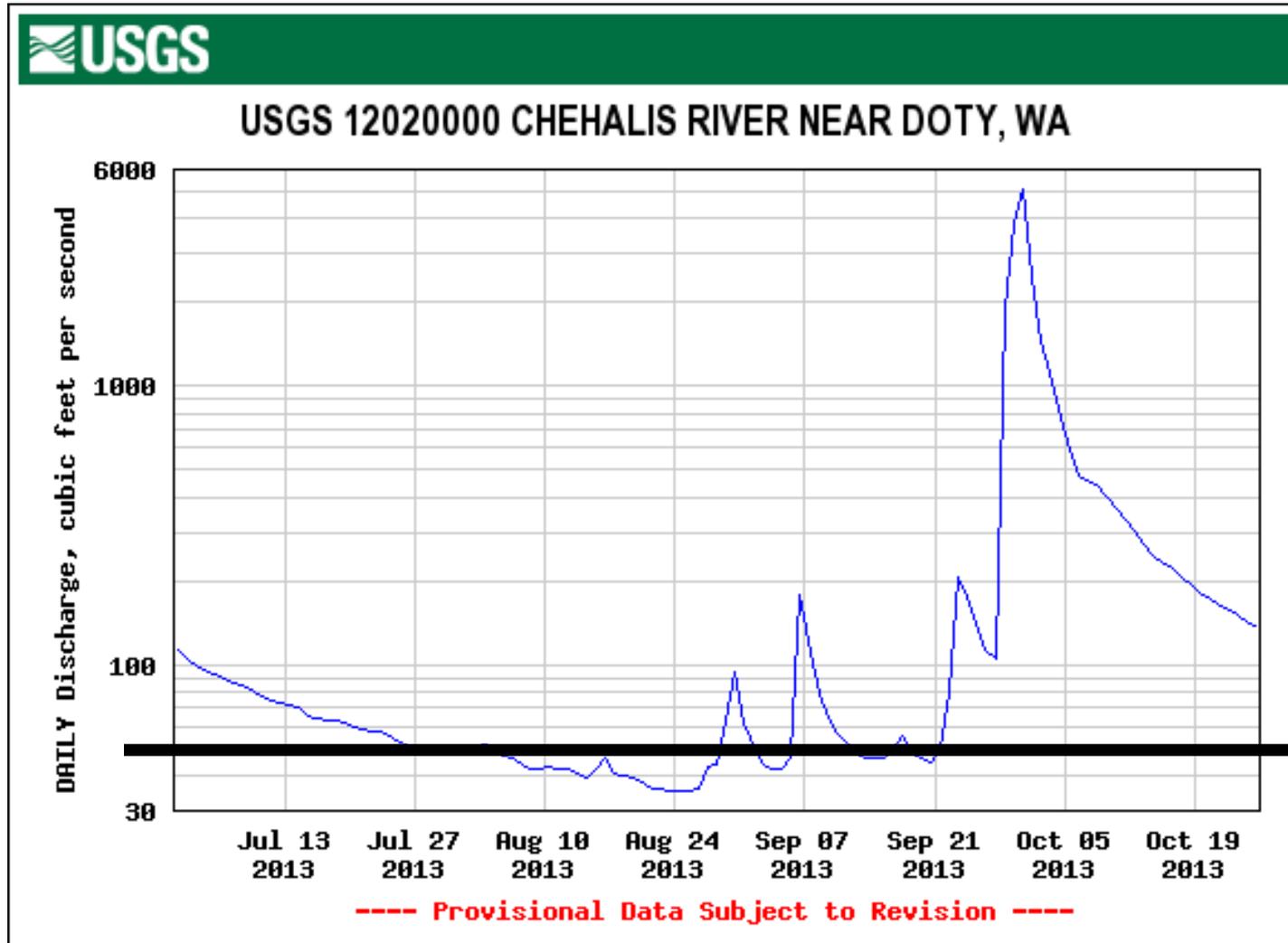
Reach Survey Sites



Chehalis River Study Areas



Reach Scale Results



Disconnected Off Channel Habitats



Three-spine stickleback
Largescale sucker
Olympic mudminnow
Northern pikeminnow
Sculpin sp.
Brown bullhead
Yellow perch
Sunfish sp. YOY
Largemouth bass
Bull frog



Improved Understanding from Reach Scale Surveys

- 2013 – Fish use of disconnected off-channel areas

- How does occupancy differ among habitat units?
- How are relative densities correlated with habitat unit characteristics?

Summer Movement of Juvenile Salmonids

Juveniles tagged in mainstem

Mainstem and tributary detection arrays

Mainstem and tributary temperature loggers



John Winkowski , WDFW
Mara Zimmerman, WDFW

PIT Arrays Detect Tagged Fish



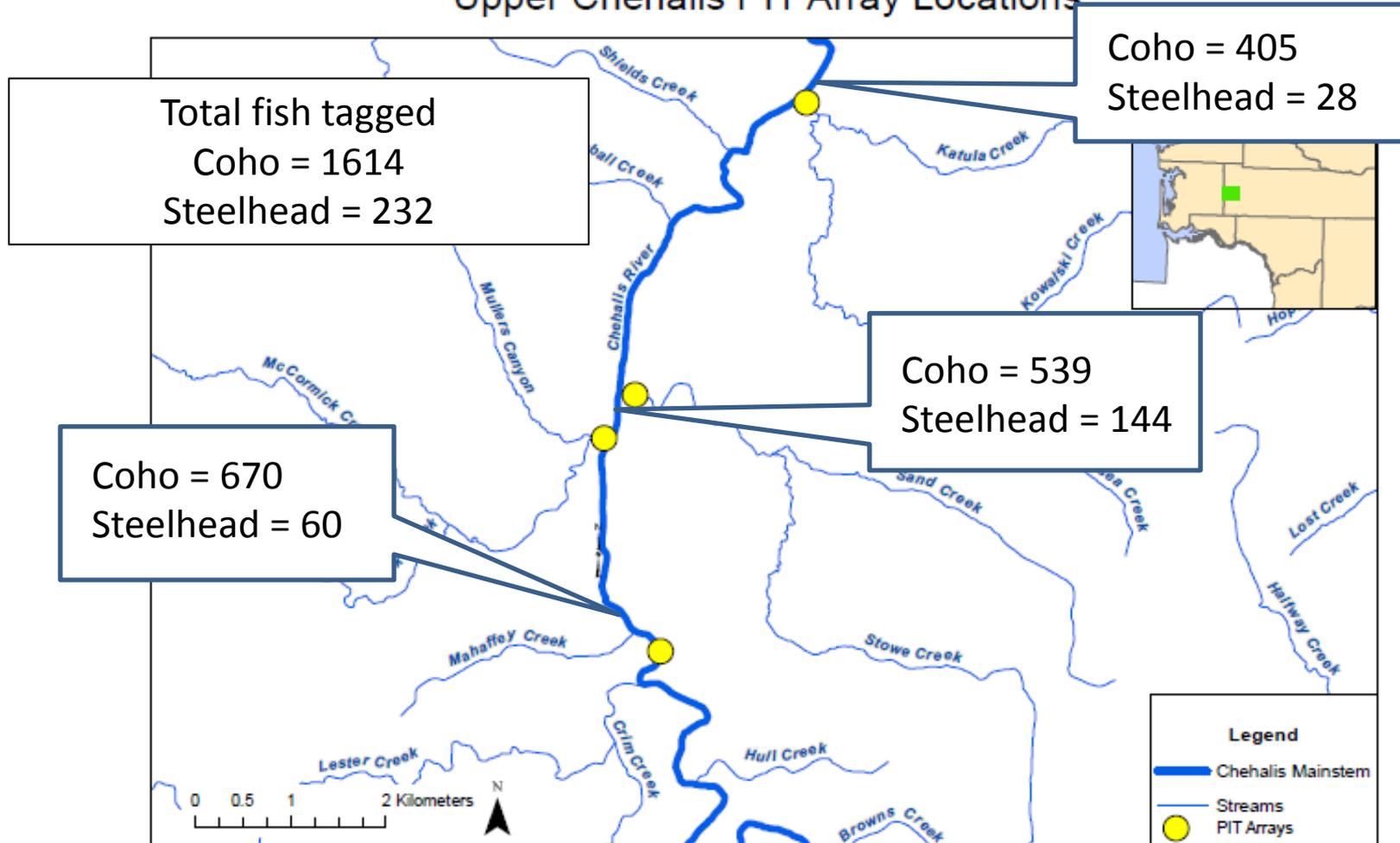
Mainstem PIT Antenna Array near potential dam site



Rock Creek PIT Antenna Array

Locations of PIT Arrays

Upper Chehalis PIT Array Locations



Improved Understanding from Summer Movement Study

- Do fish move upstream through the dam site during summer months?

Summer fish movement observed upstream and downstream through the dam site

- How much movement occurs during summer low flow period?
- Is movement correlated with river temperature?



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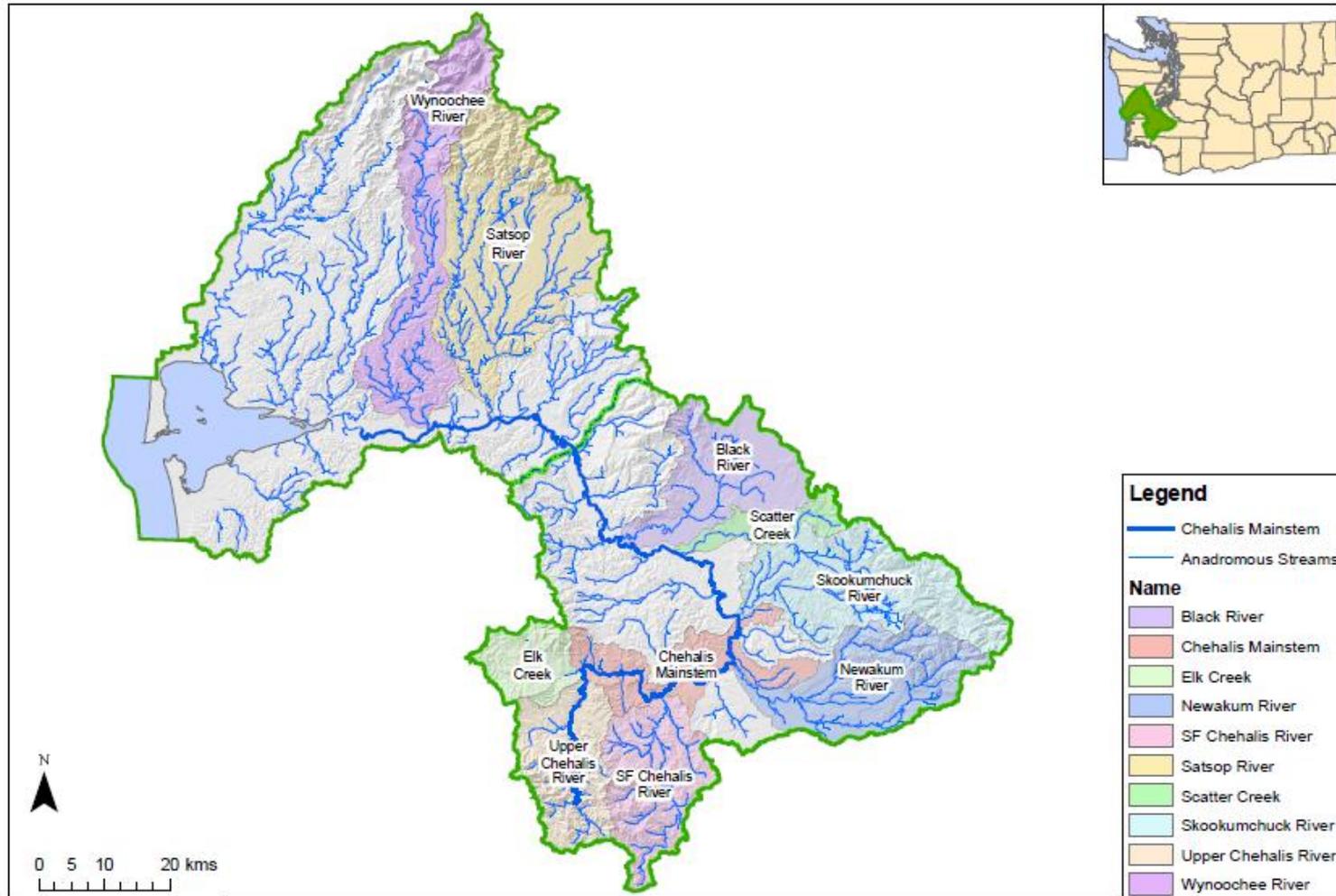
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What do we know about fish in the Chehalis River?



Chehalis River Study Areas / Subbasins



Map by Andrew Weiss, WDFW

Next Steps

- *Improve understanding of fish distribution and fish-habitat interactions in the basin.*
- *Use of information for Dam Assessment/ASEP will require selection of an output format.*

