

# Chehalis Basin Strategy

*Synthesis of Research Study  
Finding*

Presented by

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# Juvenile Salmonids

- Habitat use
- Summer movement and distribution patterns
- Life history variation

# Juvenile Salmonid Distribution & Rearing

- Juvenile salmonid dominated system in upper part of watershed, transitioning to cyprinid dominated system in lower watershed – seen in other watersheds as well
- Upstream areas cooler in temp, higher channel complexity, higher pool frequency, coarser substrate, narrower channel
- Habitat quality (parameters listed above) are good predictors of species usage and distribution
- Overlap with potential reservoir location and highly utilized rearing areas

# Juvenile Salmonid Distribution & Rearing Upper-Chehalis (dam area)

- Juvenile Chinook usage high in June, drops off rest of summer
- Juvenile steelhead and coho usage high throughout all of the summer period
- Juvenile Chinook movement tended to be dominated by upstream to downstream movement
- Juvenile steelhead tended to move upstream and downstream

# Adult Salmonids

- Temperature and thermal tolerance
- Movement patterns in relation to temperature

# Temperature & Adult Migration

- Thermal blockages to spring Chinook migration exist for ~ 3 months in 2015 in many segments of the mainstem Chehalis
- Suitable temperatures were present in some of the tributary sub-basins (Newaukum and Skookumchuk)
- Some stratification did occur in pool areas where paired loggers were deployed; other pools did not exhibit the stratification
- Limited to no migration in July and August
- Fish are able to find micro refugia of cooler water, mostly in deeper pools

# Temperature and Adult Migration

- Bimodal opportunity windows for entry into system
- Not a snow-melt driven system, rain dominated
  - Diversity of summer holding habitats
  - Limited quantity of holding habitats (some tributaries and isolated mainstem pools)
  - Little movement mid-summer
  - Tributary systems are better temperature environments, but more vulnerable due to smaller size of the tributaries

# Temperature and Adult Migration

- Is the upper Chehalis an area where cooler temperatures can enhance holding conditions?
  - Relatively small proportion of adult Chinook utilize the upper Chehalis
- Focus on where the fish are
  - Newaukum
  - Skookumchuk
- Focus on what is important
  - Cool temperatures
  - Pools and cover



# Other fish and non-fish species

- Effects of altered streamflow on other fish species
- Habitat use by amphibians in dam footprint
- Egg mass surveys: off-channel and in-stream
- Beaver surveys
- In-creek amphibian surveys
- Monitoring Porter restoration site

# Other Fish Study Results

- High variability between WUA and flow requirements between species and life stages
- Higher summer flows from dam operations generally decreases WUA for most species
- Mountain whitefish tended to be only species with increased WUA with dam project
- Important to keep species and life stage resolution to fully understand restoration options

# Other Fish Study Gaps

- Temperature not incorporated into PHABSIM model
- Need to validate HSI curves for Chehalis
- Climate change should be expanded to entire year (increased winter flows)
- Anticipated substrate changes
- Understanding reservoir impacts

# Non-Fish Study Results

- Two key salamander species present within proposed footprint
- At least 10 amphibian species found in reservoir footprint; amphibian-rich system
- Restoration actions associated with managed land acquisitions could be beneficial since all species present in that area

# Off-channel Habitat

- Stickleback and mud minnow declined as you proceed upstream in the basin
- Two of six target species detected
- Northern red-legged frog widespread
- Three of target species not detected (incl Western Toad)
- Bullfrog was widespread (exotic) except at tails of floodplain
- Restoration perspective is to select an exotic-rich site with goal of suppressing exotics to benefit natives – consider use of hydrological manipulation

# Off-Channel Habitat

- Beaver are widespread in Basin
- Western Toad present in the instream surveys within the footprint of the dam
- Porter Restoration site reviewed
- Non-permanent hydroperiod (ponds A & B) is good for native amphibians, limiting exotics

# Water Quality

- Addressing data gaps
- Temperature, DO, pH, nutrients, groundwater temperature, riparian shade, precipitation
- Critical low flow conditions, Develop a dynamic WQ model (CE-QUAL-w2) for flood control alternatives

# Water Quality Results

- Upper reaches of Chehalis River exceeded Ecology's temperature criteria
- Tributary mouths also had increased temperatures
- Limited riparian shading
- Some thermal stratification occurred in the Centralia reach
- DO potentially problematic in upper reaches and some tribs during summer
- Established a baseline for water quality modeling of future scenarios



# Water Quality Results

- Modeling to evaluate temp, DO and turbidity conditions for:
  - Dam structure and operations
  - Cumulative effects of ASRP
  - Climate change impacts
  - Other potential projects affecting water quality

# Discussion Questions

- How does the information you've just seen influence your thoughts on restoration actions?
  - What information is most influencing your opinion on restoration
  - What specific restoration actions
  - Where should the actions occur
- How do on-the-ground observations differ from or corroborate some of the restoration opportunities?
- What data types are still missing from the system?

# Discussion Items

- Source of water to off-channel habitats, how does that relate to gaining and losing reaches
- Lot of focus on summer habitat and fish distribution, yet project will be designed to affect winter flows – so is there a need to learn more about distribution and use in winter?
- Consistency in terminology (eg. off-channel habitat)
- Winter off-channel habitat is important factor – need to get solid definition of extent of that
- Restoration focus has been on species to date; at some time need to translate species info into process-based approach

# Discussion Items Cont'd

- Re-connection of off-channel habitat is a process-based change, linkages include flow variability changes and temperature profile changes – need to integrate how climate change will affect these
- Climate change in general needs to be integrated across a number of factors
- Upland uses (eg. logging) need to be factored into plan
- Protection in addition to restoration needs to be considered – identify those things functioning well
- How do all of the conflicting species get reconciled

# Discussion Items Cont'd

- Need basin-wide life history perspective to be developed, and then look at how dam and restoration actions affects that perspective
  - Example is what is going on between spring and fall chinook in the Chehalis Basin – how do they operate today and how do we want the project and/or restoration to affect that structure
- Comparison of EIS Alternatives – how do you differentiate between a no action, restoration, with dam, and the permutations in between? Reach between Pe El and Newaukum was example of where that becomes important

# Discussion Items cont'd

- Freshwater mussels – presence/absence?
- Lessons learned from past projects including dam removals
- When do we do a mapping exercise that addresses where in the basin restoration should be targeted?
- Will the restoration program look at likely anthropogenic changes in the watershed? (eg. impermeable surfaces in the built-out future)
- Need to be sure we develop a basin-wide perspective that accounts for holistic picture of fish distribution and use and that as what drives the restoration picture

# Discussion Items cont'd

- Aquatic invertebrates – no bug left behind
- Separating out specific questions answered by studies in terms of addressing dam impacts versus restoration opportunities
- Understanding of processes that are impaired, and consider focusing restoration actions on repairing those processes, consider substitutions for certain processes
- Addition of exotics to the system, what are we potentially missing in terms of natives that are in conflict with those exotics

# Discussion Items cont'd

- Keep tracking invasives and their impact to restoration
- ASRP needs to keep focused on premise that diversity of habitat will yield to a diversity of species – different approach than a chinook-centric restoration plan for example. Look at processes that will yield to diversity.
- Process-based approach that incorporates natural disturbance processes – include climate change considerations
- Evaluation of alternatives comment magnified around measures of benefit – expansion of thought to include other flood control measures that are not building a dam



# Discussion Items cont'd

- View this as long-term program and define metrics that could be indicators of what has made the basin healthier
- Need to have balance of process-based restoration that yields diversity as well as key species that are targets of restoration benefit
- Need to define planning framework and baseline so we model restoration benefits against an appropriate metric
- Need to look at restoration plan in the context of how much we are willing to let the river be a river (natural processes issue)
- Don't forget escapement and harvest – need to have the fish coming back

# Discussion Items cont'd

- Process-based philosophy – what does it really mean, who has done it, where has it worked, what are the lessons learned
- Elwha removal as example of lessons learned – what does that tell us
- Chinook usage in upper watershed – fall chinook are larger than springers and spawning lower in the watershed
- Upland management, forestry practices, landslides, LWD back into the system
- Do outreach and education strategies fit into ASRP – can it stick? (outreach is part of BE strategy in the ASRP)

# Discussion Items cont'd

- Concern about realistic effectiveness of outreach as it pertains to wood in the channel
- No beaver left behind – beaver restoration
- Still see increased turbidity loads due to slides, roads, etc. (area above Pe Ell)
- What do we know about genetics of isolated populations within the Basin, is there a risk associated with potential loss of upper Chehalis stocks to the broader Chinook population as a whole (note: WDFW doing population structure analysis on Chinook and steelhead to address this issue)

# Discussion Items cont'd

- Landowners need to see an economic benefit (or ameliorate an economic loss) to restoration activities on their property