2012 Columbia River Estuary Conference

New Scientific Findings and their Management Implications
Diversity, Diversity, Diversity

- **Diversity of habitats** – including shallow water edge habitat, tidal shrub habitat

- **Diversity of hydrology and inundation patterns** - drive vegetation community assemblages, cover, and biomass

- **Diversity of vegetation** – greatest diversity in mid-river

- **Diversity of salmon stocks** –
  - greatest diversity in reaches F and G
  - Stock composition varies by reach and type
  - Stock diversity and composition vary by reach and throughout the year

- **Diversity of life history strategies** –
  - resilience
  - contribution to returning adults
  - Size of fish relate to estuary habitat use
  - Timing of estuary entry
  - Residence times – including energetic implications

- **Diversity needed in monitoring** – sample throughout year, not just peak migration times
Diversity Implications

• Estuarine restoration of diverse habitats has potential to help multiple stocks, especially lower river stocks
• What are consequences for loss of diversity? How does this affect resilience?
  • Reference wetlands are stable and resilient
• How will resilience relate to effects of climate change, sea level rise, and geologic events?
• How do invasive species contribute to the loss of diversity?
• What are implications for habitat restoration?
Landscape

- **Landscape processes** create habitat and template for diversity
- **Landscape planning**
  - Put projects into context, both spatially and temporally
  - Look at functional tidal systems to identify what to restore and why (i.e. remnant tidal shrub habitat)
  - Landscape Planning Framework using the Ecosystem Classification
- **Landscape prioritization**
  - Habitat Restoration Prioritization Strategy
- **Landscape project development**
  - Consider processes upstream such as sediment input and transport
  - Role of surrounding landscape in long-term function and maintenance of restoration projects
  - Consider up river management – >LWD->plants->beavers->pool habitat->salmonids
- **Landscape RME**
Multiple Management Considerations

*Are habitat restoration objectives compatible with other management objectives?*

- **Hatchery management**
  - Do hatchery fish limit the effectiveness of estuary restoration
  - Do hatchery fish change food webs, predation pressure, and capacity
  - How do hatchery and wild fish interact in the estuary
  - Hatchery practices confound geographic sources of genetic stocks

- **Harvest management**
  - Effects of hatchery and harvest intensity on escapement of fish into places like Youngs Bay

- **Agricultural management**
  - How to evaluate effectiveness of agricultural bmp’s on water quality
Multiple Species Considerations

How to balance salmonid objectives with broader ecological and social community objectives?

• Beaver
  – More pools, deeper and longer pools in tidal shrub habitat
  – Interaction with food webs (detritus), fish communities, and salmon habitat
• Mollusks
  – How to incorporate needs of other species into restoration projects to minimize risks
  – Add cobble habitat to restoration plan
  – Careful monitoring
• Columbian white-tailed deer
• Waterfowl
• Smelt
• Turtles
• Culturally-significant species
• Maintain biodiversity
Emerging Tools and Potential Uses

• Guidelines for beneficial use of dredge material
  – Experimental – need for effectiveness monitoring and adaptive management

• Habitat Restoration Prioritization Strategy
  – Habitat change analysis

• Landscape Planning Framework using the Ecosystem Classification
  – Predict metrics for habitat restoration scenarios

• Identified vegetation zones
  – Stratify sampling
  – Inform restoration actions (elevations, predict vegetation communities, help with invasive treatment strategies, etc)

• SATURN and Data Explorer
  – Water chemistry, circulation patterns, salinity intrusion, influence of river and ocean, effects of biological processes
  – Understanding of natural variability in the system
  – Potential areas of concern for benthic and migrating species

Strategic identification of restoration projects
Use of preliminary data in adaptive management

~Making decisions in an imperfect world
~How much certainty is enough

• Limited sample size and location for tying contribution of various life history strategies to adult returns

• Increasing sampling across year may produced different answers than just sampling at peak migration times

• Look at bioenergetic impacts across multiple habitat types in the estuary
New findings with obvious management implications (examples)

- **Modeling of dike breach to wetted area relationship**
  - Synergistic effects up to certain point, then diminishing returns
  - Can it transfer to other basins; does it reflect actual on-the-ground response?
  - Is wetted area the correct metric – what other metrics should be considered?
  - Potential value of upstream habitat with less frequent inundation
  - Could inform restoration designs, cost-benefit analyses, estimate of restoration benefits
  - Would results differ if didn’t select breaches randomly?

- **Pile dikes protecting shallow water habitat**
  - Need to maintain/repair existing pile dikes to maintain their dual function
  - How does this impact RPA recommendations?
  - How to improve or modify pile dikes to decrease predation, improve salmonid access, and improve complexity of shallow water habitats?
  - Combine with dredge material placement to create and maintain habitat?
  - Potential temperature and toxic contaminant issues would need to be considered
Social Engagement

- Importance of broadening social engagement
- Science/research exchange with other areas
- Landowner exchange
- Invite early public participation, results in better support and advocacy
- Better public support for diversity, improve resilience of populations
- Engage the public in trans-disciplinary science, build adaptive capacity, collaborate at a landscape scale
- Opportunities to influence political process (land use planning) through social engagement
- Awareness of water quality impacts
- Relationship to human health
- Tools for visualization
Where are we, and where do we go from here?

– Chum reintroduction efforts/strategies in OR
– ERTG uncertainties list and SBU estimates
– Longer-term effectiveness of restoration projects
– Hatchery interactions
– Program effectiveness
My favorite knowledge gaps and needs

• Role of invasive species
  – What is the ecological role of RCG in salmonid feeding behavior?

• Toxicity and synergistic effects of contaminants
  – What are the impacts of toxics and water quality on effectiveness of restoration?

• What is the impact of hatchery interactions with wild juvenile salmonids?

• Need to broaden monitoring base – more locations, across year(s), etc.
  – Life history strategy diversity year round

• Role of diversity in maintaining resiliency (human impacts, climate change, sea level rise, natural variation in conditions)

• Food web
  – Heard about its importance, and shift in dynamics from historic
  – How can we use this information to apply to restoration strategies?
  – Relate to landscape framework and couple with hydrodynamics
Discussion