Spring Chinook Salmon in the Chehalis River

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Purpose of this talk

• Provide an overview of Spring Chinook salmon in the Chehalis River
  • What we know
  • What we want to know
Salmon and Steelhead in the Chehalis River

Data shown are geometric mean of spawners, 2006-2015
Life Cycle of a Chinook Salmon

<table>
<thead>
<tr>
<th></th>
<th>Spring</th>
<th>Fall</th>
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</thead>
<tbody>
<tr>
<td>Freshwater entry</td>
<td>March-June</td>
<td>September-November</td>
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<tr>
<td>Freshwater months before spawning</td>
<td>3-7 months</td>
<td>0-2 months</td>
</tr>
<tr>
<td>State of maturity at freshwater entry</td>
<td>Immature</td>
<td>Mature</td>
</tr>
</tbody>
</table>
Freshwater Phase - Juveniles

• Timing of migration to sea
  • Most juveniles migrate to sea in their first year
  • Downstream migration completed by August

• Downstream migration and freshwater conditions
  • Spawning location affects the amount of time that juveniles spend in freshwater
  • Temperature of spawning sub-basin not correlated with size at saltwater entry
  • Downstream movements increase on warmer days with higher flows

https://wdfw.wa.gov/publications/01985/
Freshwater Phase - Adults

• Upstream movement patterns
  • Two ‘pulses’ of movement – river entry (March-June) and spawning (September-October)
  • Limited movement in July and August

• Summer holding areas
  • Multiple locations (tributary, main stem)
  • Pre-spawn mortality (predation, illegal harvest, temperature)

• Summer temperature exposure is warm
  • 16-22°C (61-72°F)

http://dx.doi.org/10.3133/ofr20161158
https://doi.org/10.3133/ofr20171004
Spawning Distribution

**Spring Chinook**

**Fall Chinook**

https://ecosystems.azurewebsites.net/edt/chehalis/
Spawn Timing

Data are summed across all index reach surveys per week, 2015 spawn year
Spawn Timing of Spring Chinook Has Changed

1980s

SF Newaukum 23.1 - 30.3

Skookumchuck 18.5 - 22.1

Chehalis R 108.7 - 113.5

2010s

SF Newaukum 23.1 - 29.6

Skookumchuck 21.3 - 21.9

Chehalis R 108.7 - 113.5
Population Structure

- Weak genetic differentiation among spawning areas
- Genetic differences associated with geographic distance
- No genetic difference between spring and fall run types using neutral markers

https://wdfw.wa.gov/publications/01971/
New Tools: Evaluation of Field Assignments

- New tools to discriminate run types
  - Otolith microchemistry revealed migration history, visual assignment errors higher for spring than fall-run spawners
  - Genetic marker for premature migration (future work)
Conclusions – What We Know

- Stream temperatures affect entire life cycle
  - Downstream migration of juveniles
  - Metabolism and survival of adults
- Summer holding is a vulnerable life stage
  - Protect and restore cool water refugia
  - Limit anthropogenic disturbance
- Population monitoring is challenging
  - Spawning of spring and fall runs overlap in space and time
  - Makes traditional stock assessment challenging
Conclusions – What We Want to Know

• Field assignments and population estimates – will additional tools support or challenge our current understanding of spring Chinook salmon status?

• Big picture:
  • How is Chinook salmon diversity maintained?
  • What is the future of spring vs. fall run types in the Chehalis River?
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