Spring Chinook Salmon in the Chehalis River

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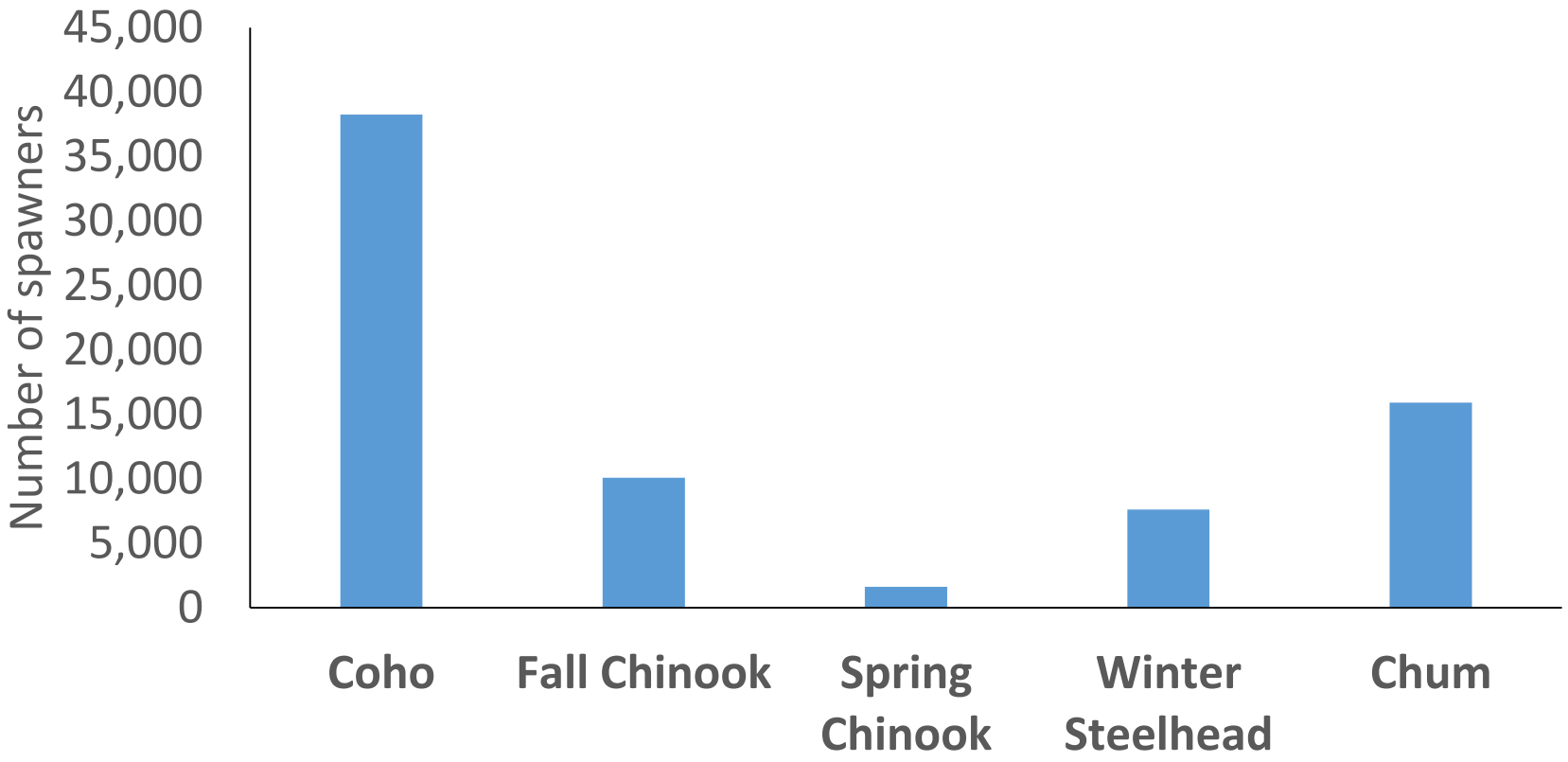
Purpose of this talk

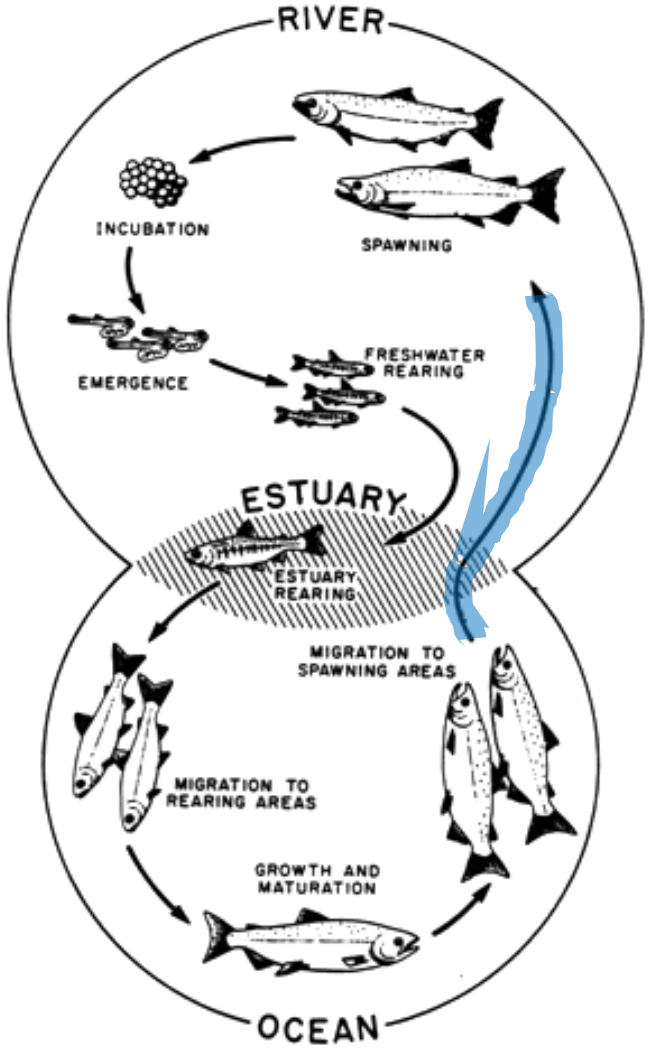
- Provide an overview of Spring Chinook salmon in the Chehalis River
  - What we know
  - What we want to know

Salmon and Steelhead in the Chehalis River



Data shown are geometric mean of spawners, 2006-2015

Life Cycle of a Chinook Salmon



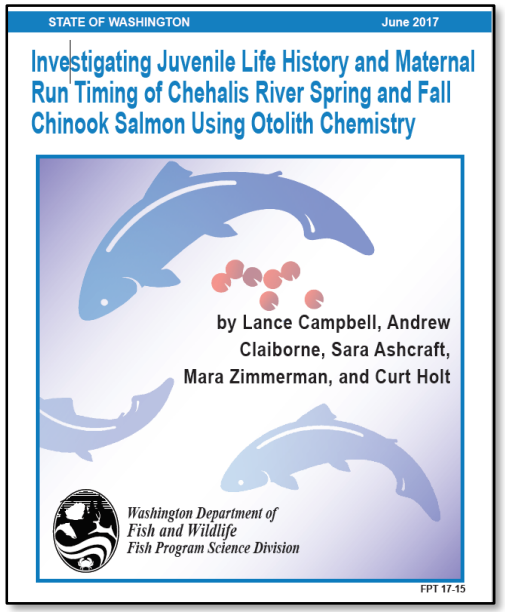
	Spring	Fall
Freshwater entry	March-June	September-November
Freshwater months before spawning	3-7 months	0-2 months
State of maturity at freshwater entry	Immature	Mature

Freshwater Phase - Juveniles

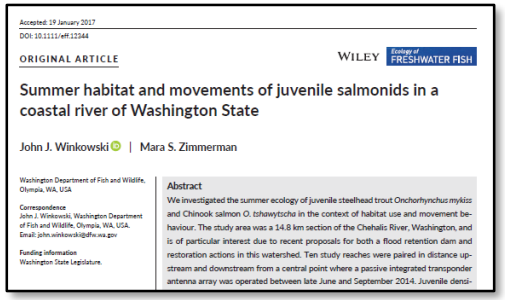
- Timing of migration to sea
  - Most juveniles migrate to sea in their first year
  - Downstream migration completed by August

- 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/



https://onlinelibrary.wiley.com/doi/abs/10.1111/eff.12344

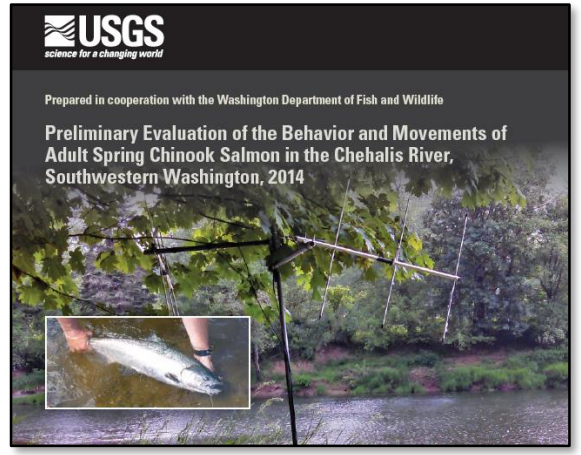


Freshwater Phase - Adults

- 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)

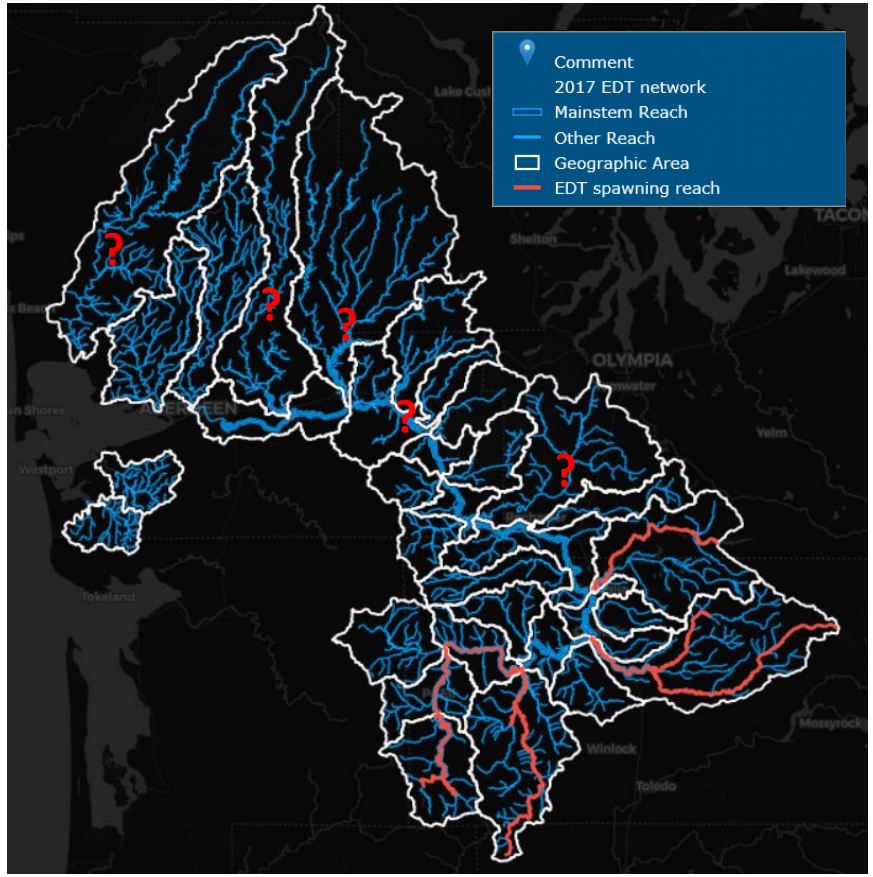
http://dx.doi.org/10.3133/ofr20161158

https://doi.org/10.3133/ofr20171004

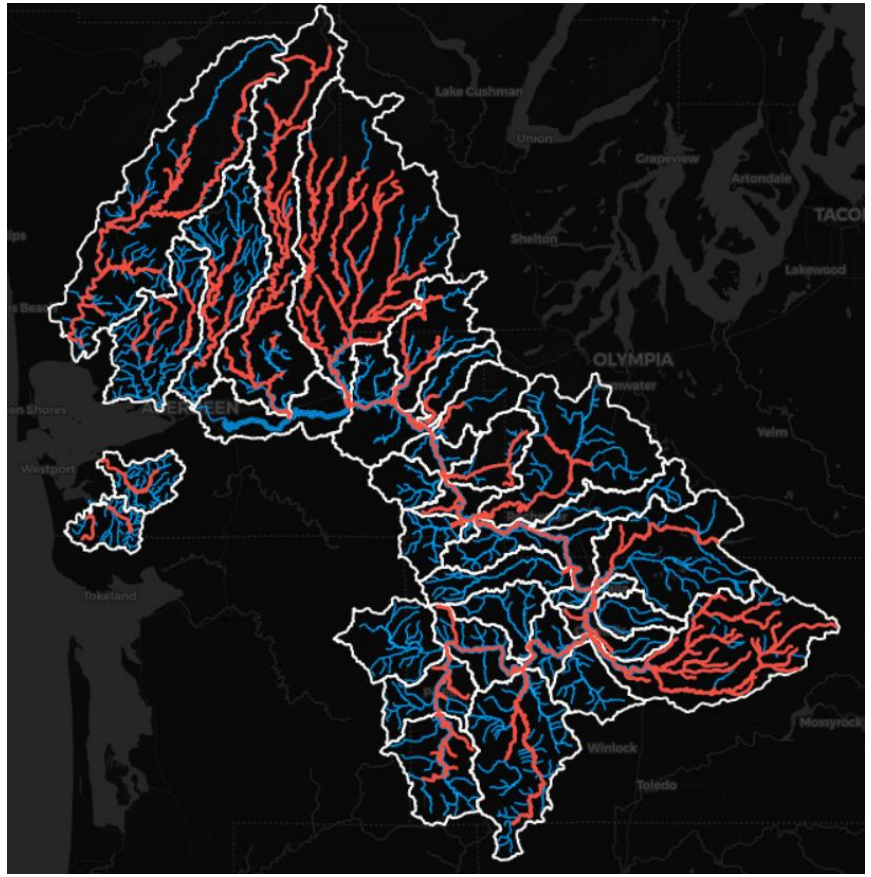


Spawning Distribution

Spring Chinook

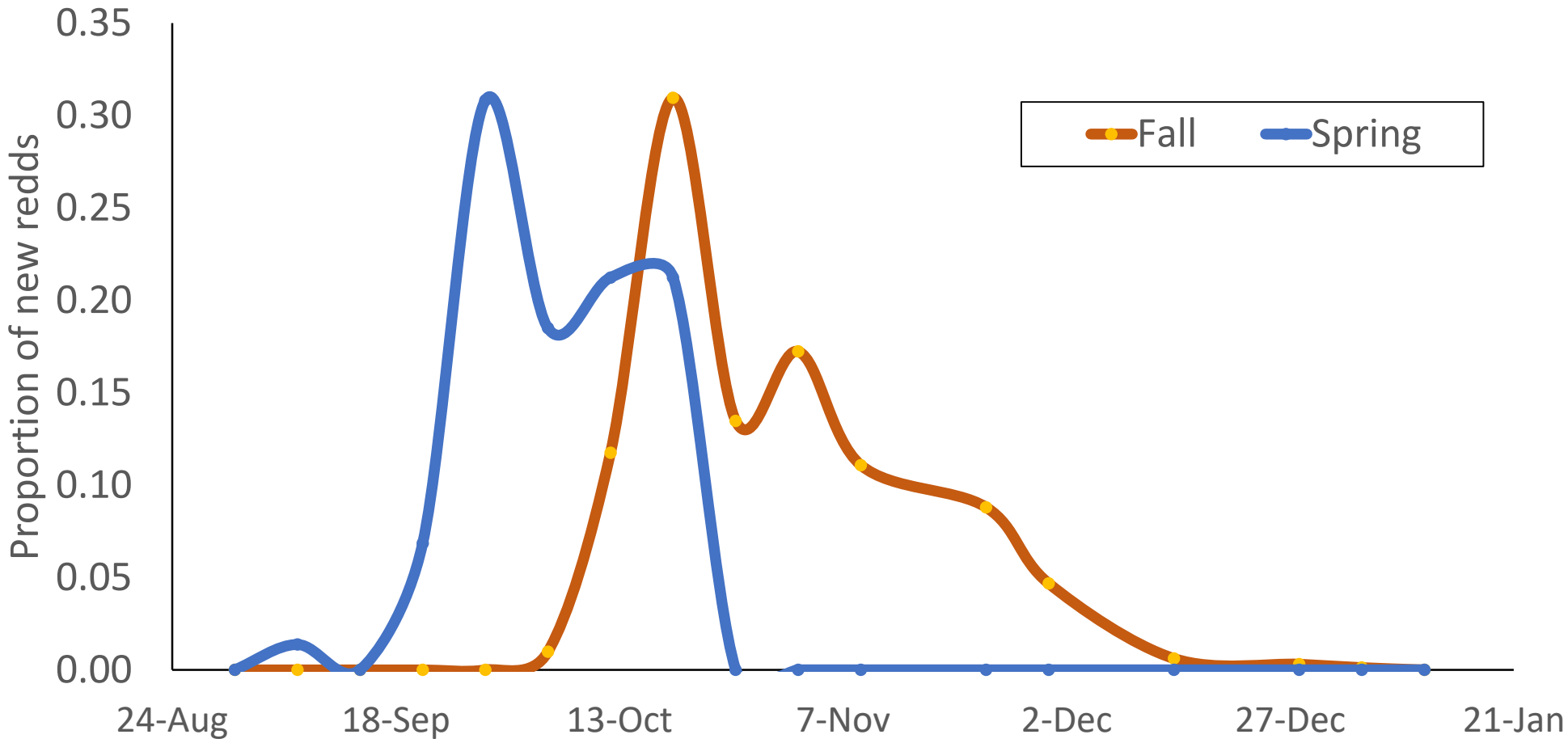


Fall Chinook



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

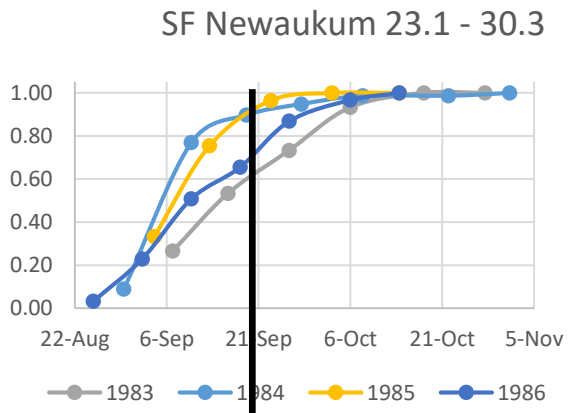
Spawn Timing

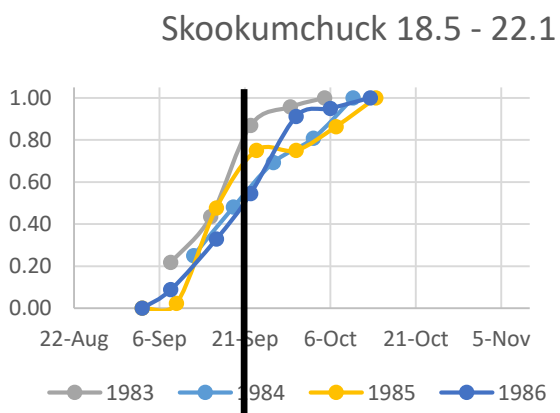


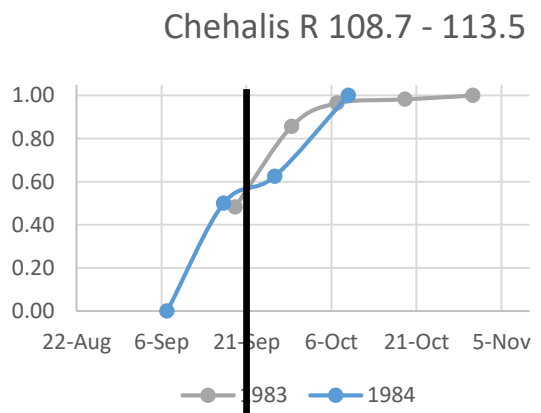
Data are summed across all index reach surveys per week, 2015 spawn year

Spawn Timing of Spring Chinook Has Changed

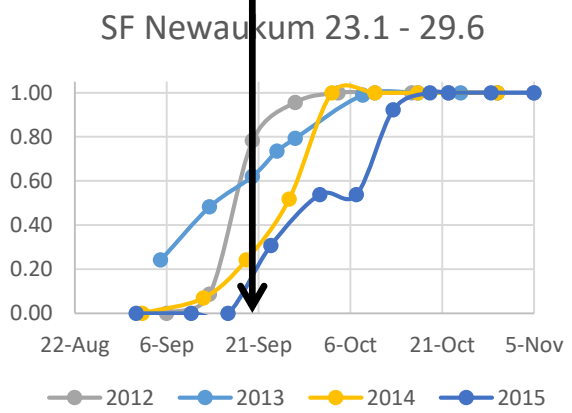
1980s

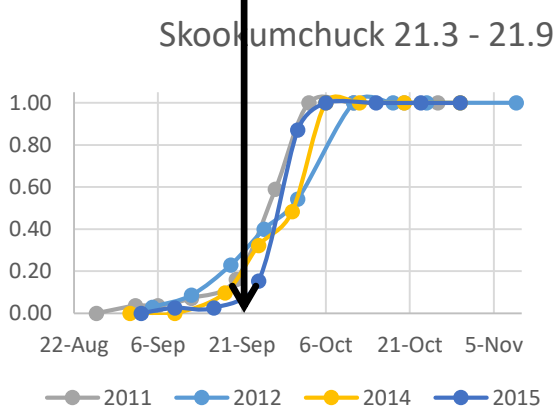


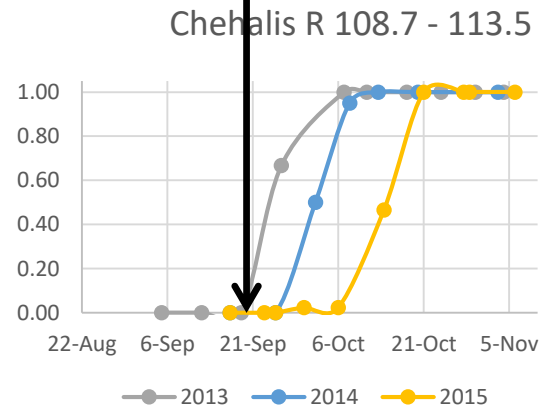




2010s



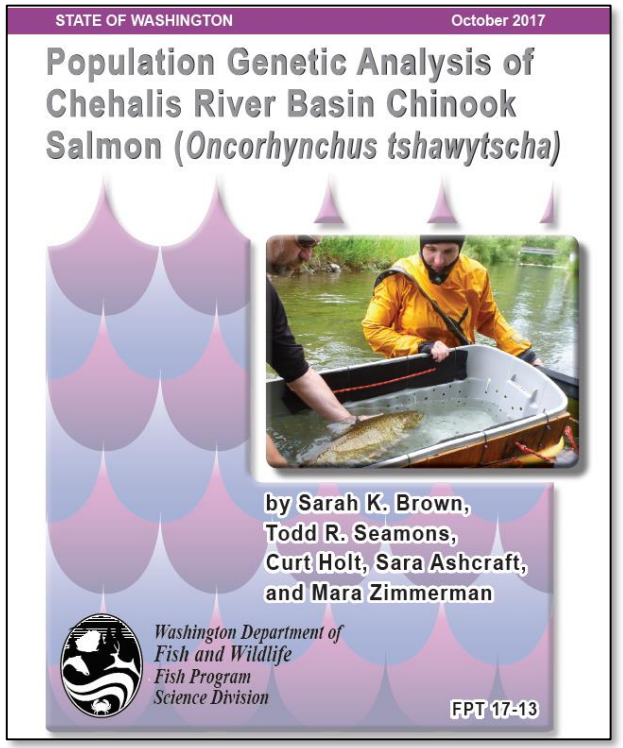




Population Structure

- 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)

SCIENCE ADVANCES | RESEARCH ARTICLE

EVOLUTIONARY GENETICS

The evolutionary basis of premature migration in Pacific salmon highlights the utility of genomics for informing conservation

Daniel J. Prince,[1,2] Sean M. O'Rourke,[1]* Tasha Q. Thompson,[1]* Omar A. Ali,[1] Hannah S. Lyman,[1] Ismail K. Saglam,[1,3] Thomas J. Hotaling,[4] Adrian P. Spidle,[5] Michael R. Miller[1,2]†

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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