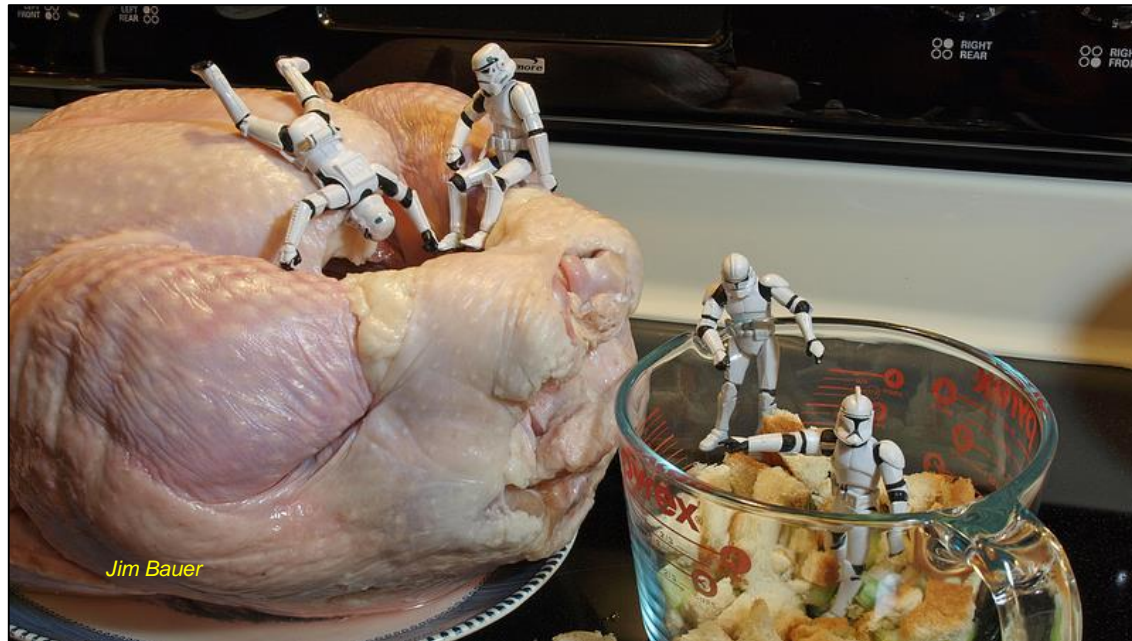
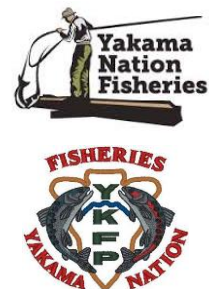


Stuff about genetic monitoring of sockeye in Cle Elum Reservoir



Andrew P. Matala, Shawn R. Narum, Peter F. Galbreath
Columbia River Inter-Tribal Fish Commission

Brian Saluskin, Mark Johnston
The Confederated Tribes and Bands of the Yakama Nation



Genetic stock distinction:

 Osoyoos stock

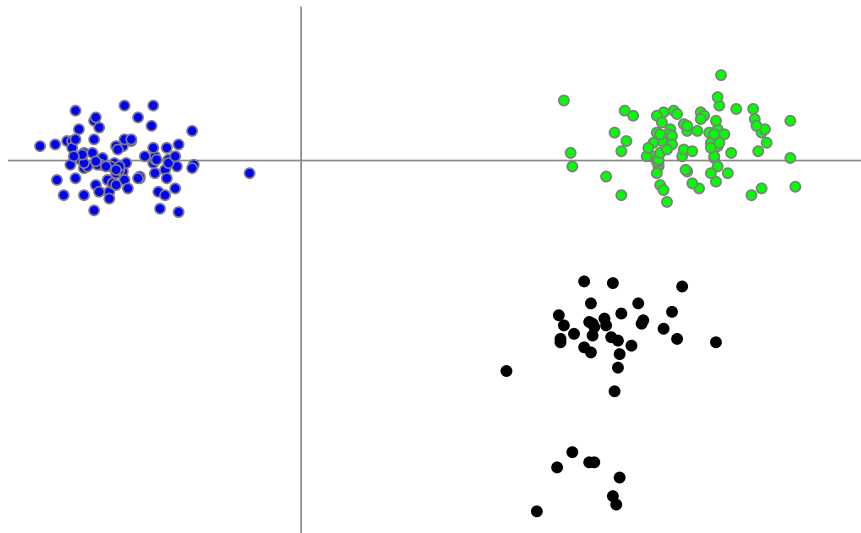
 Wenatchee stock

new marker information

(90 → 344)

Reference collections

*PCoA based on
pairwise genetic distance*



● mixed kokanee stocks

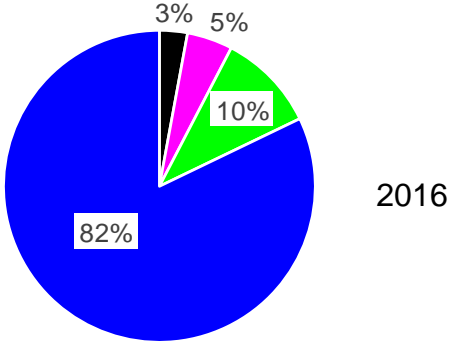
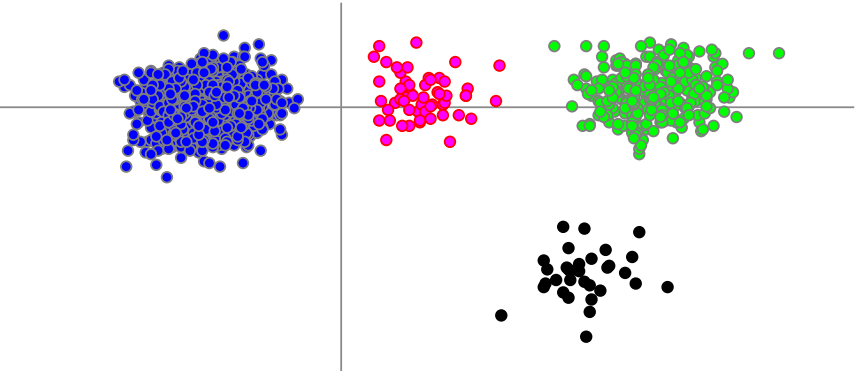
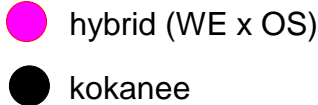
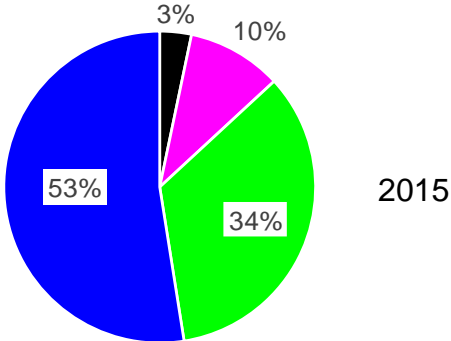
● Lake Wenatchee



● Osoyoos Lake



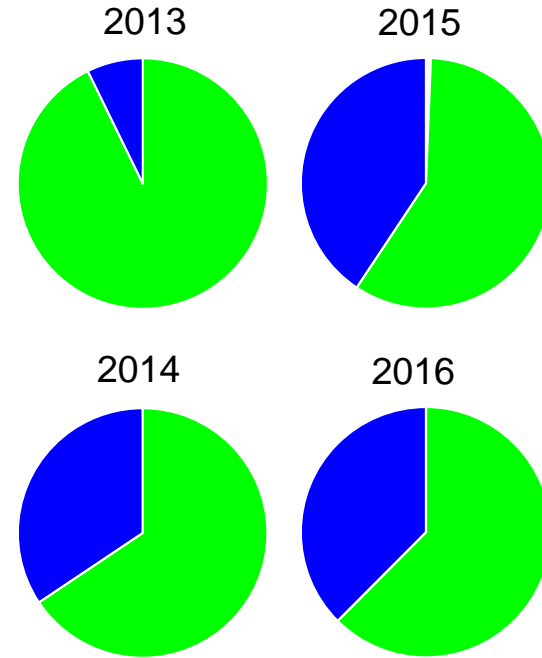
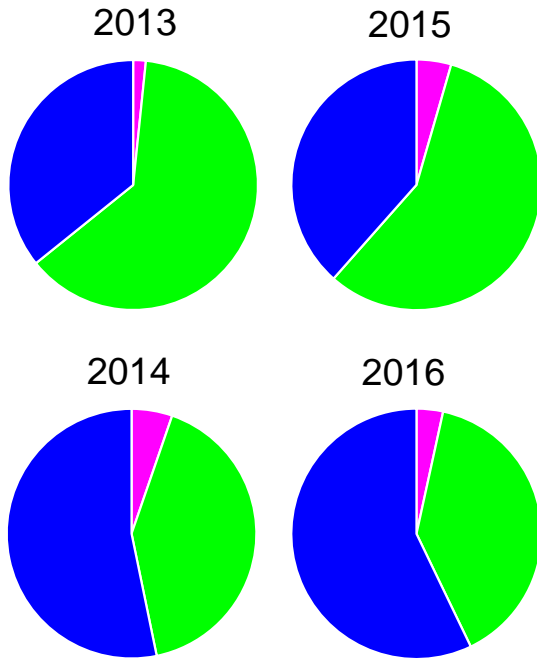
Cle Elum smolt emigrants



Adult spawner proportions

Roza returns:
2 - 5% hybrid proportion

PRD outplants:
NO hybrids observed

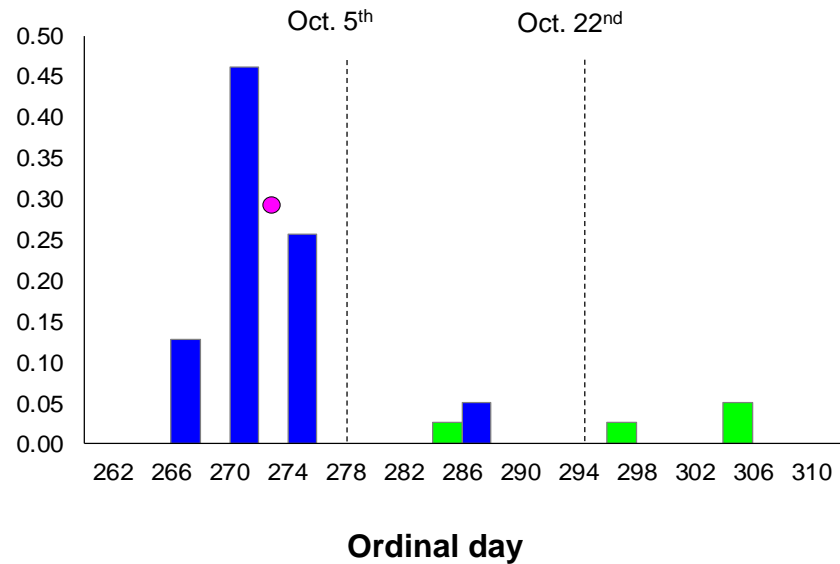
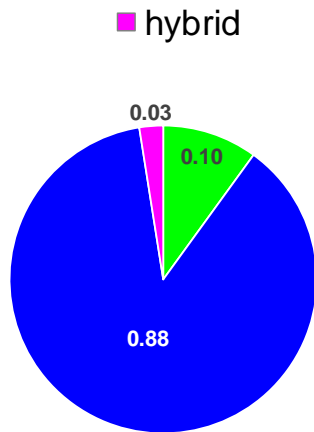
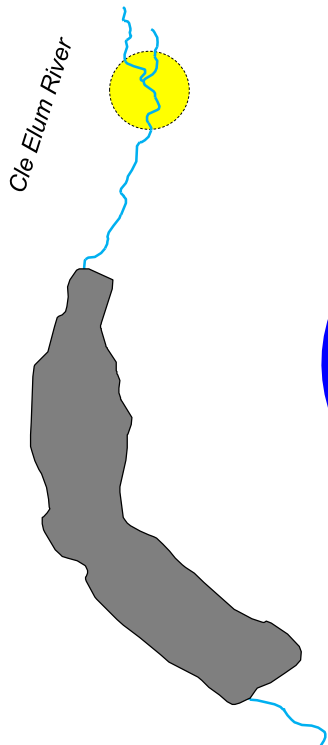


Spawning ground surveys: carcass recovery

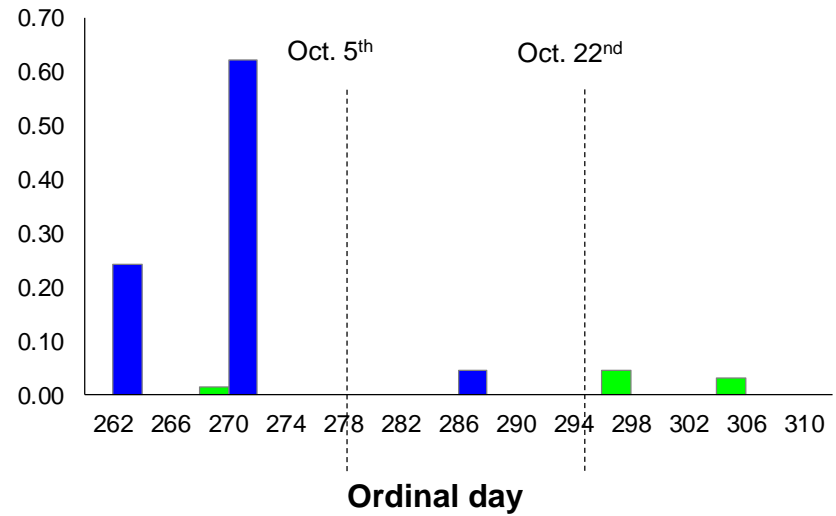
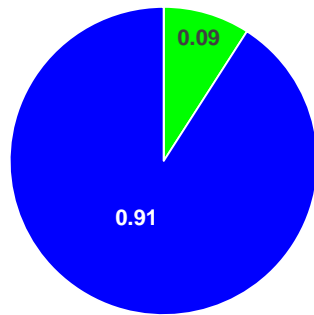
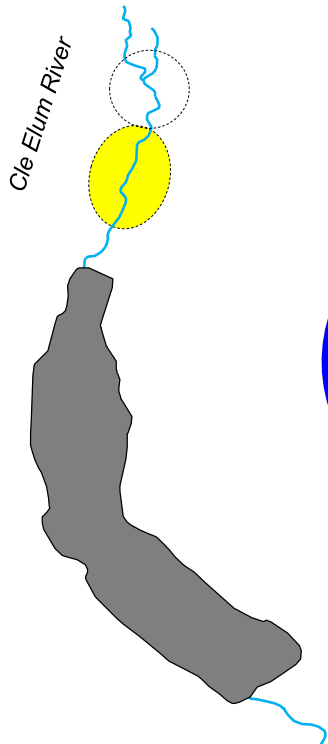
 Osoyoos stock

 Wenatchee stock

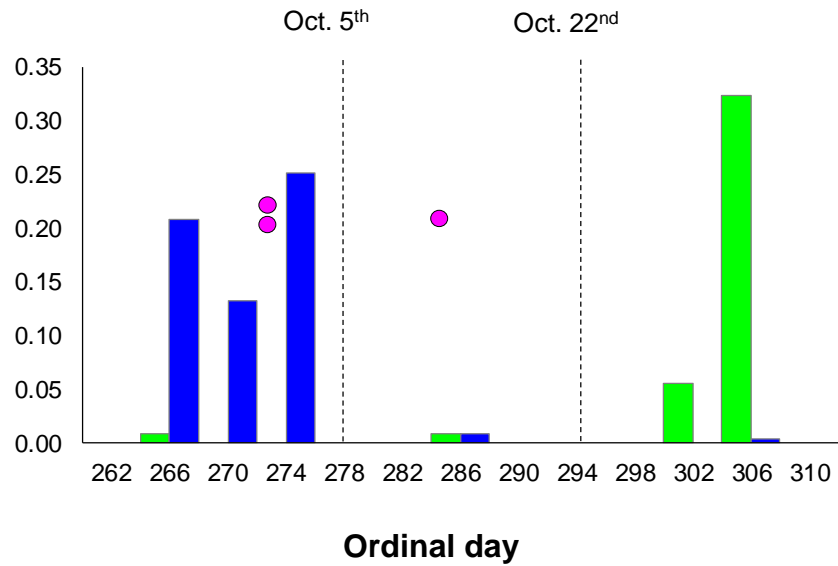
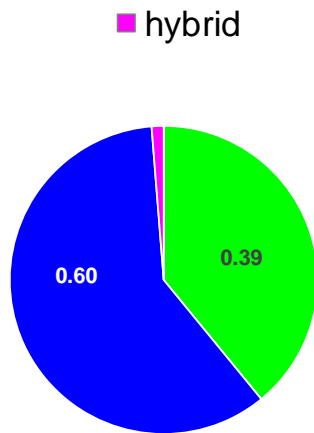
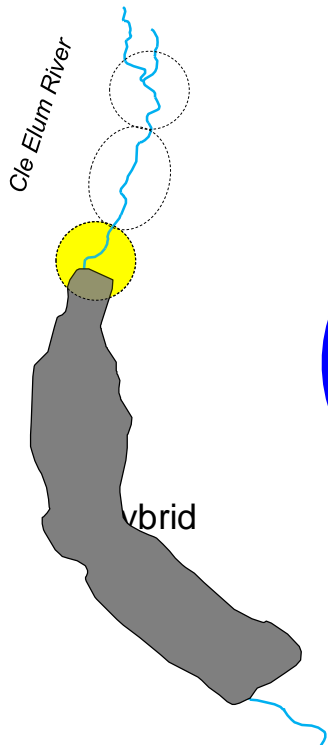
Section 1: farthest upstream



Section 2: intermediate



Section 3: farthest downstream

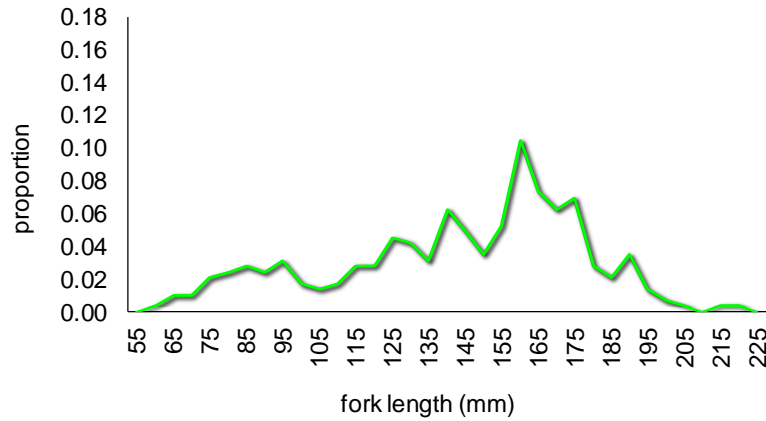


Smolt size & age

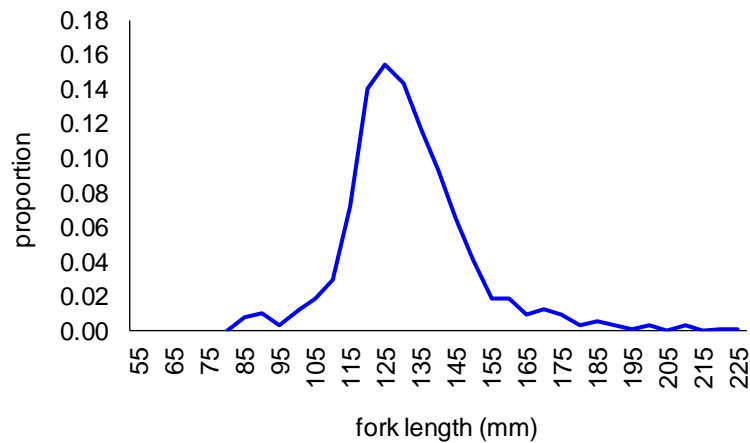
 Osoyoos stock

 Wenatchee stock

Cle Elum emigrants: 2015-2016

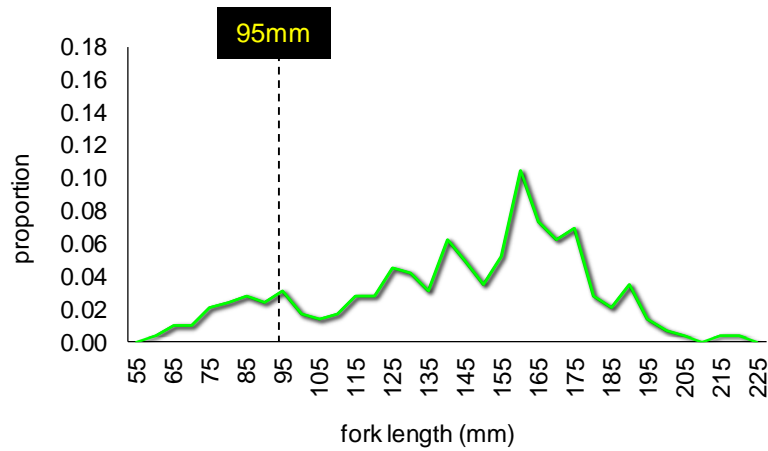


- broad size range
- 2 age classes likely



- condensed distribution
- one dominant age class

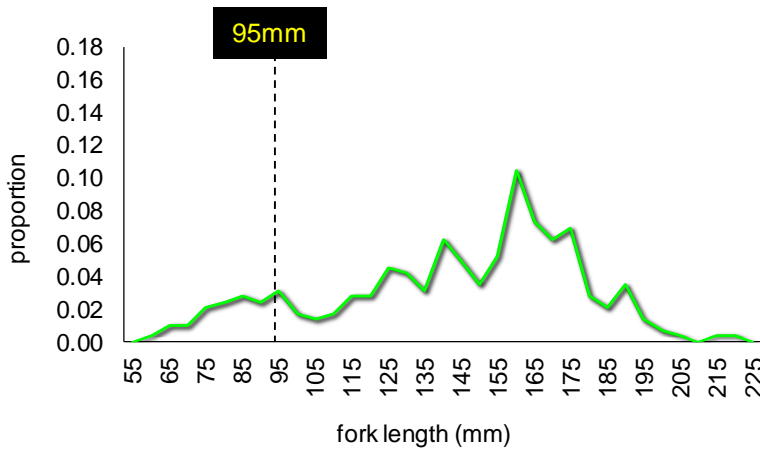
Donor population comparison



- Lake Osoyoos emigrants
- ~98% age-1
- ~95mm mean FL

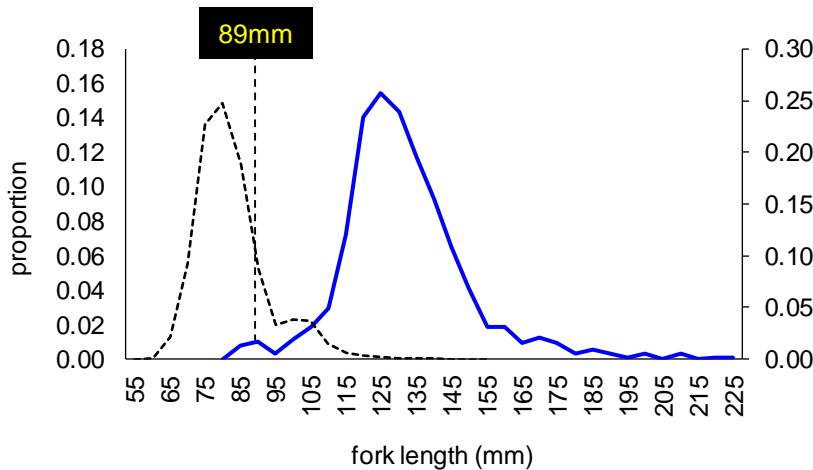
- Richard Bussanich
Okanogan Nation Alliance
(2004-20 12 data)

Donor population comparison



- Lake Osoyoos emigrants
- ~98% age-1
- ~95mm mean FL

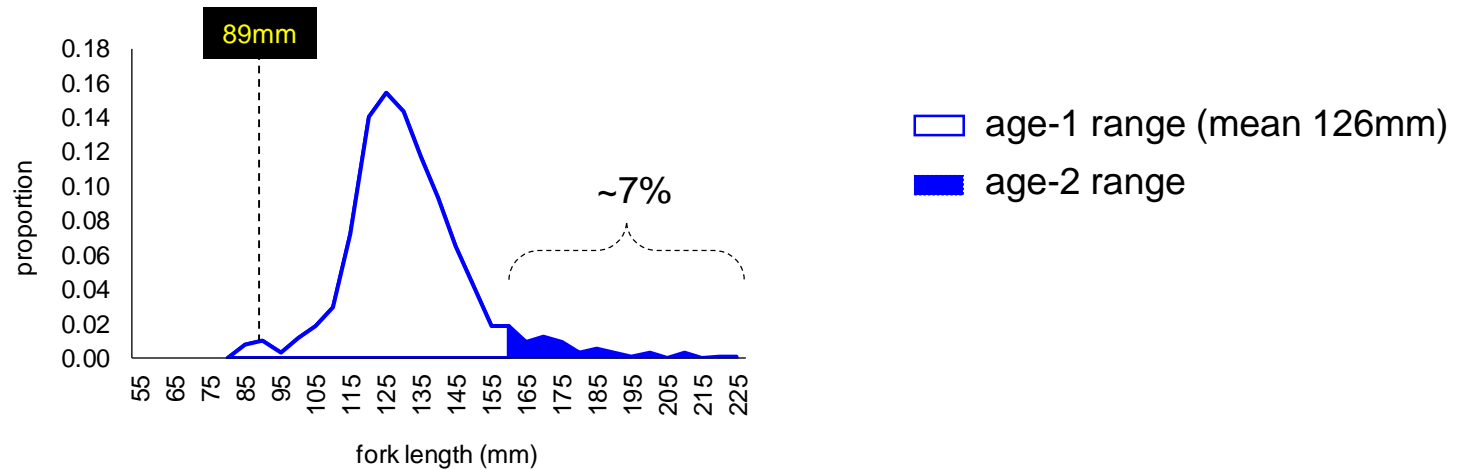
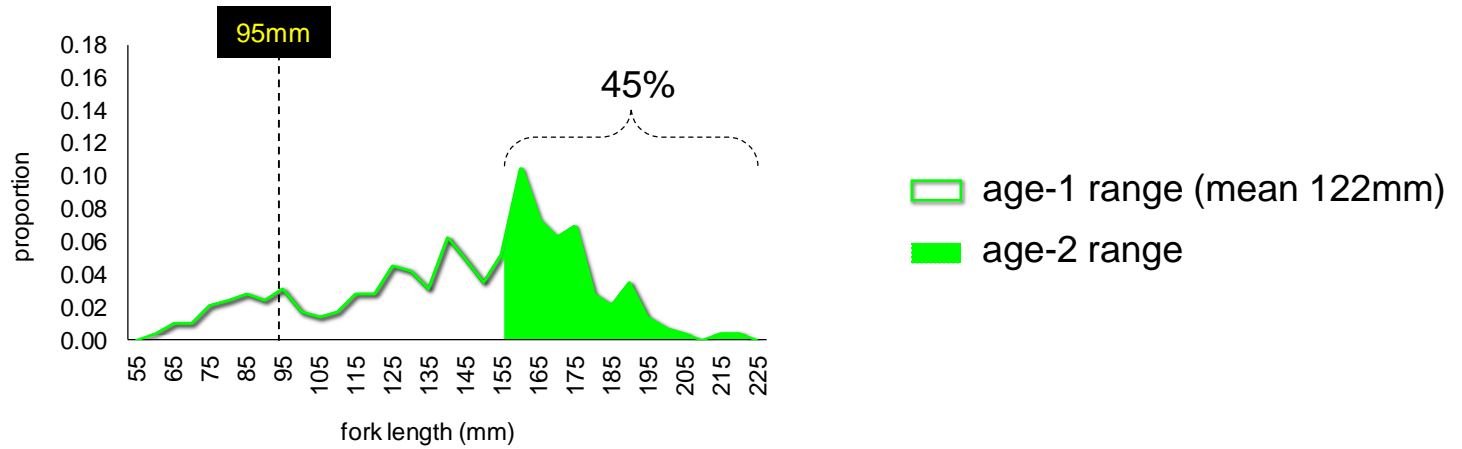
- Richard Bussanich
Okanogan Nation Alliance
(2004-2012 data)



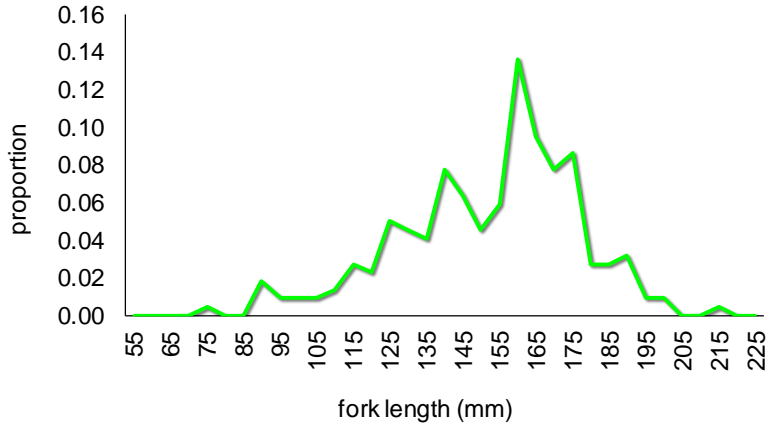
- Lake Wenatchee emigrants
- ~85% age-1
- ~89mm mean FL

- Mclain Johnson
WDFW
(2013-2016 data)

Parentage based age



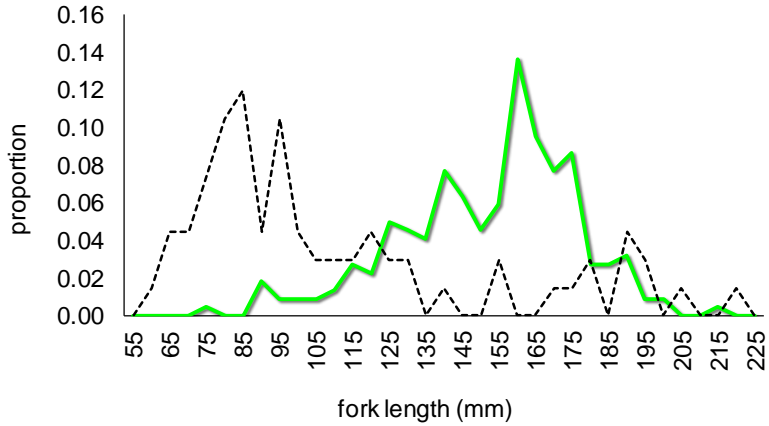
Temporal variation



2015

- large age-1
- mean 150mm FL
- ~56% putative age-2

Temporal variation



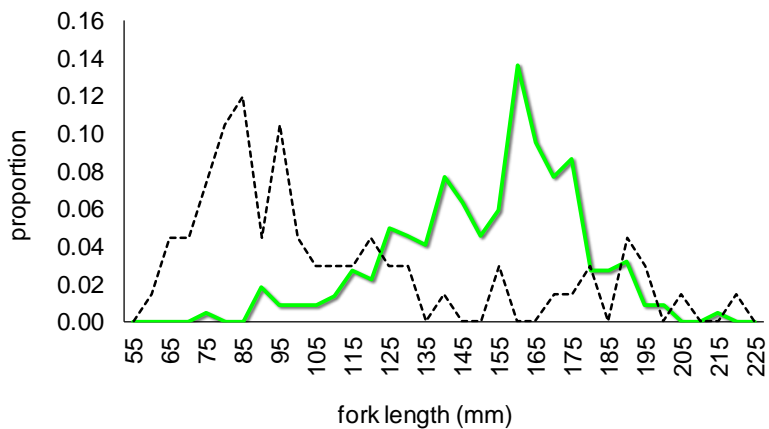
2015

- large age-1
- mean 150mm FL
- ~56% putative age-2

2016

- mean 108mm FL
- ~19% putative age-2

Temporal variation

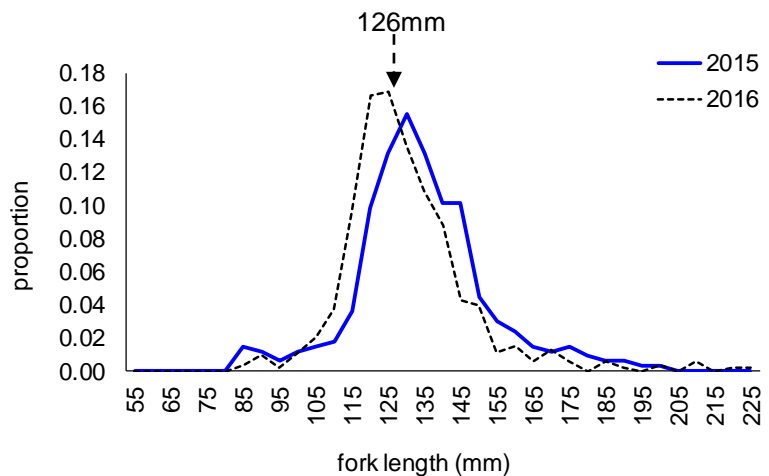


2015

- large age-1
- mean 150mm FL
- ~56% putative age-2

2016

- mean 108mm FL
- ~19% putative age-2



- Little to no difference

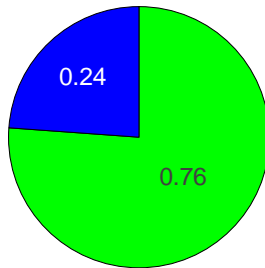
Estimated relative productivity

 Osoyoos stock

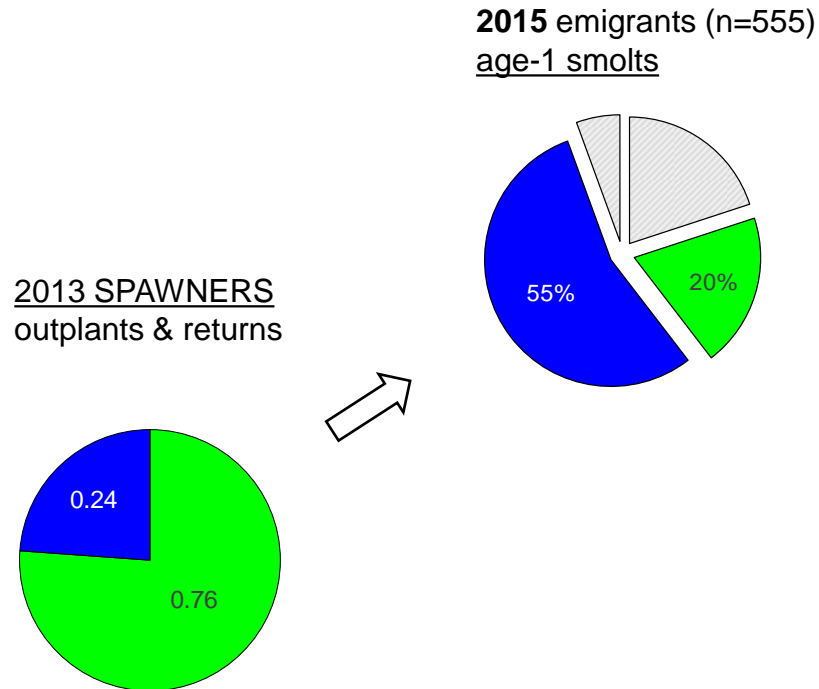
 Wenatchee stock

Spawner proportions vs. emigrating smolt proportions

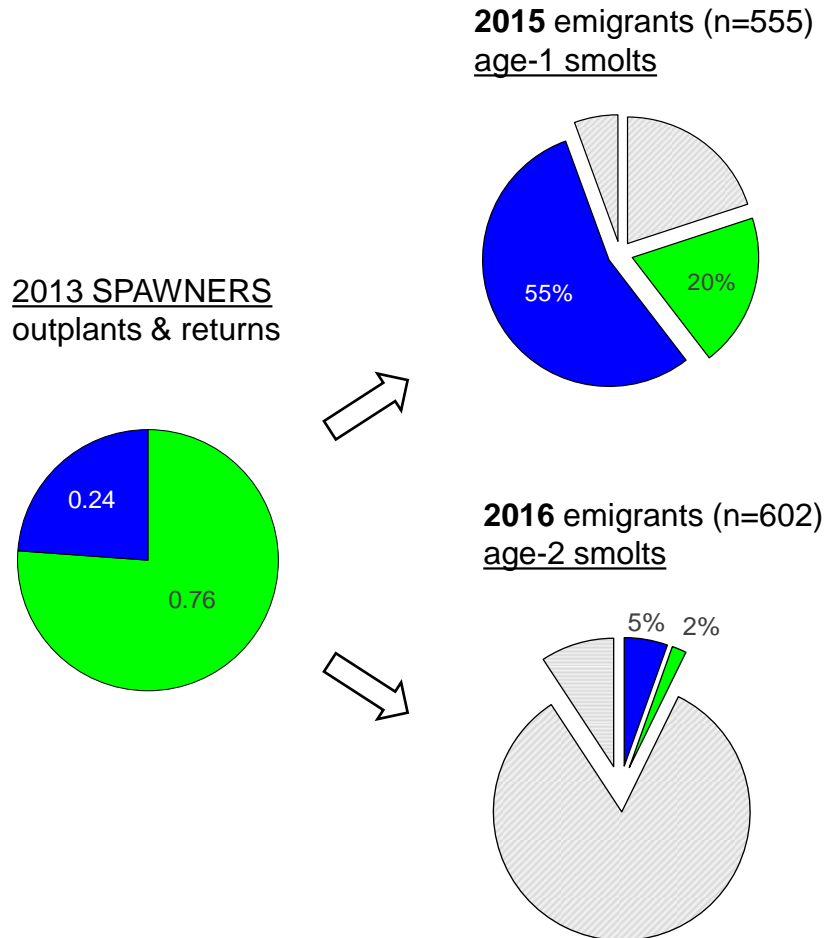
2013 SPAWNERS
outplants & returns



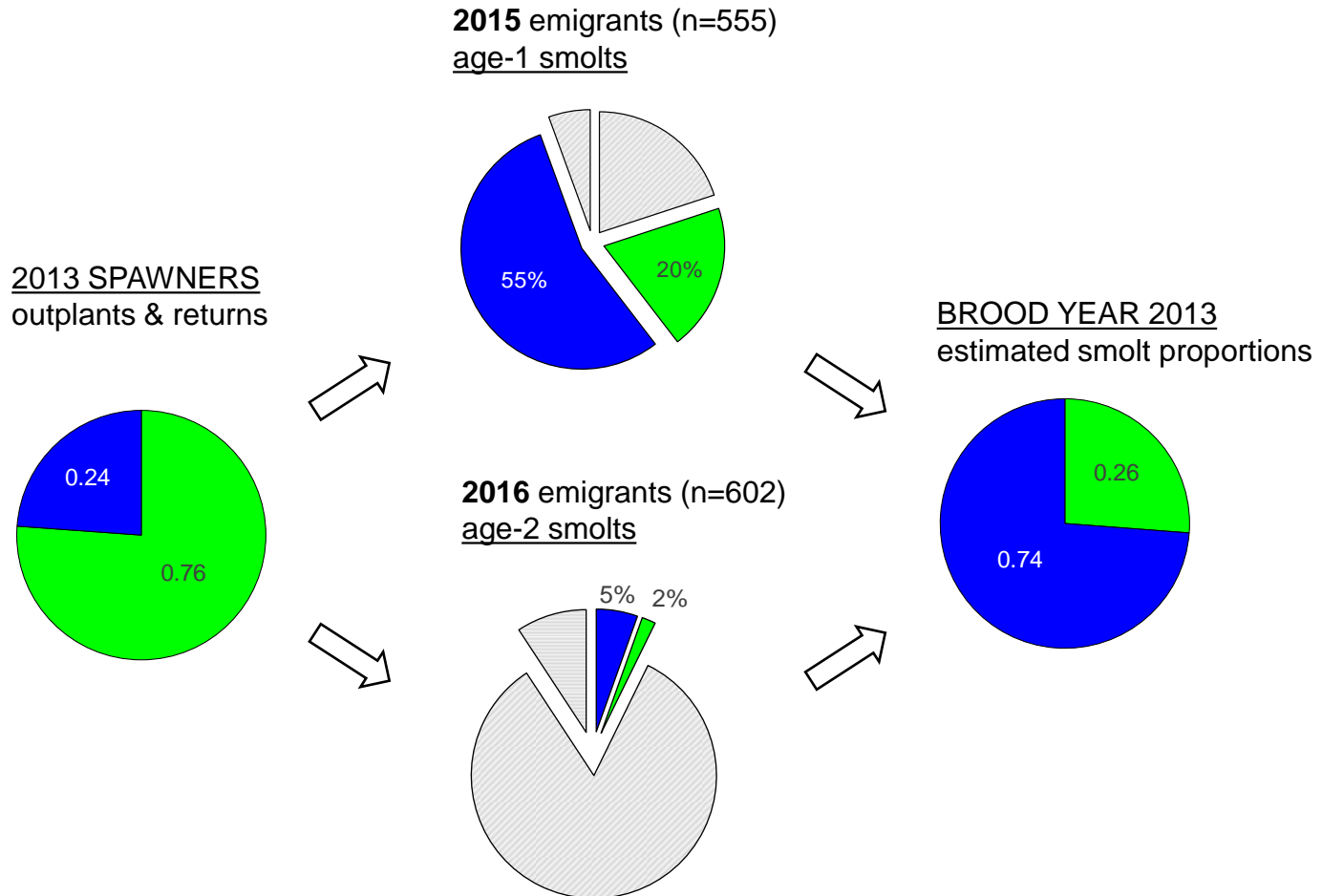
Spawner proportions vs. emigrating smolt proportions



Spawner proportions vs. emigrating smolt proportions

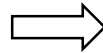
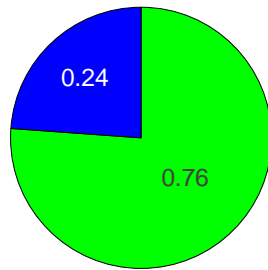


Spawner proportions vs. emigrating smolt proportions

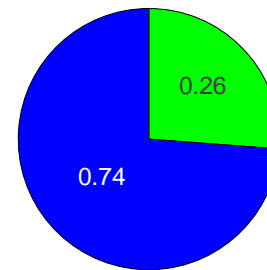


Factors affecting juvenile fate?

Spawner abundance
favors Osoyoos



Juvenile progeny abundance
favors Wenatchee



Adaptation to spawning & rearing habitat

Cle Elum Reservoir:
high elevation (~ 2200'), cold water



Lake Wenatchee: high elevation (~1875'), cold water
No known lakeshore spawning



Adaptation to spawning & rearing habitat

Cle Elum Reservoir:
high elevation (~ 2200'), cold water



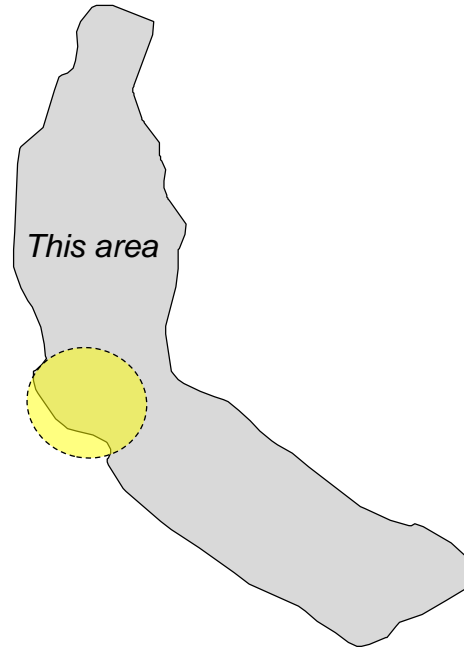
Osoyoos Lake: lower elevation (~910'), eutrophic
literature indicates stream spawning – Okanogan R.



Competition interactions?

(lake spawning & rearing)

Mackinaw gillnetting site

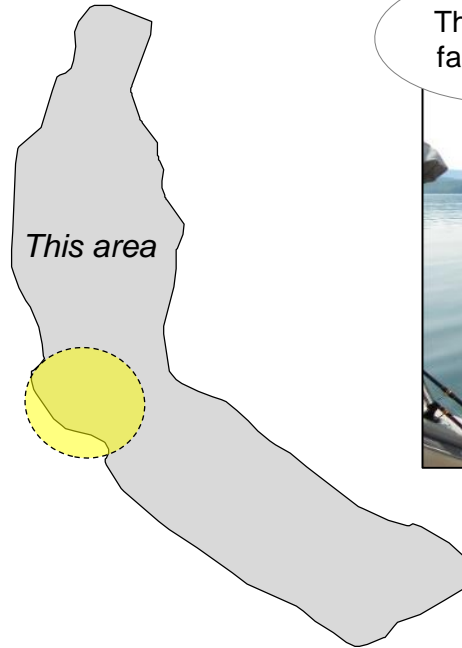


- Sockeye observed here & caught as bycatch

Competition interactions?

(lake spawning & rearing)

Mackinaw gillnetting site



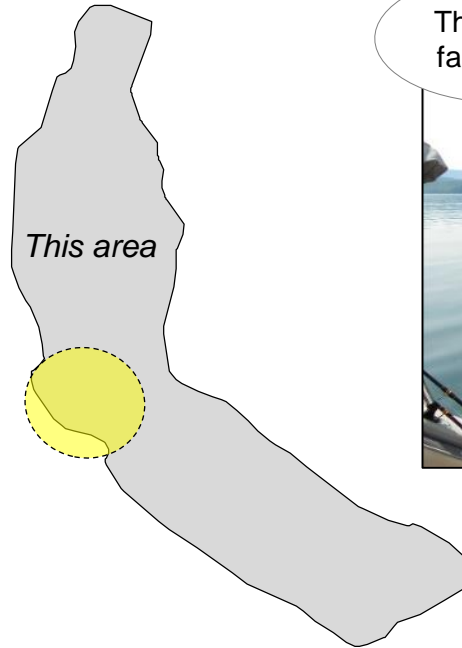
WashingtonLakes.com

- Sockeye observed here & caught as bycatch
- Fishing reports indicate good kokanee fishing in this area

Competition interactions?

(lake spawning & rearing)

Mackinaw gillnetting site

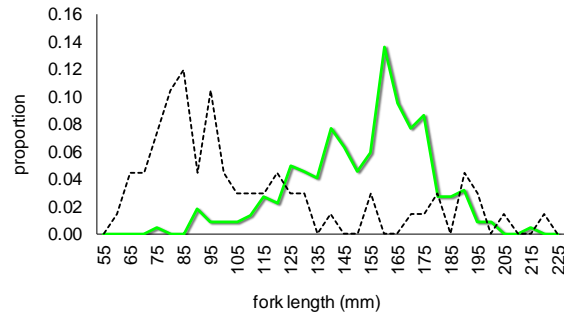


WashingtonLakes.com

- Sockeye observed here & caught as bycatch
- Fishing reports indicate good kokanee fishing in this area
- Bycatch includes: 0 WE origin, 60 OS origin, 4 kokanee (* field notes)

Residualizing & growth rate?

recall....



2015

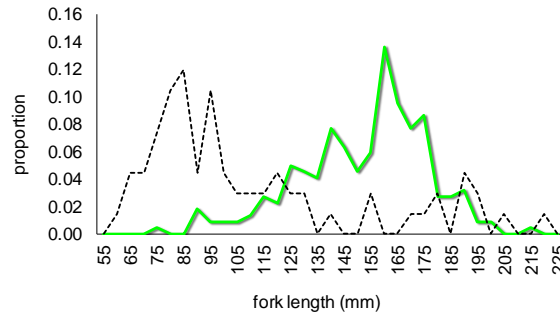
- large age-1
- mean 150mm FL
- ~56% putative age-2

2016

- mean 108mm FL
- ~19% putative age-2

Residualizing & growth rate?

recall....



2015

- large age-1
- mean 150mm FL
- ~56% putative age-2

2016

- mean 108mm FL
- ~19% putative age-2

2016 carcass samples



- suspect kokanee (n=5)
- However.....GSI = 3 Osoyoos sockeye & 2 Wenatchee sockeye

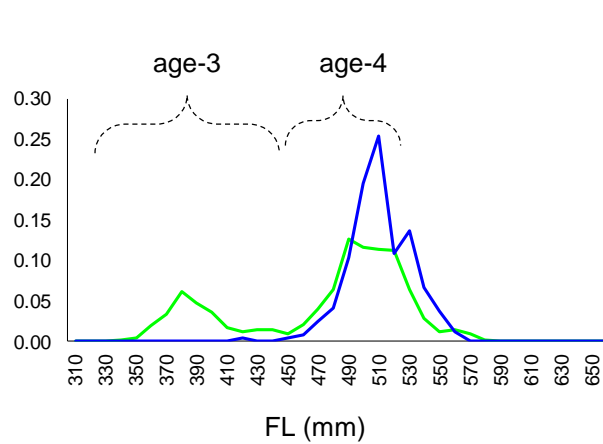


adult demographics

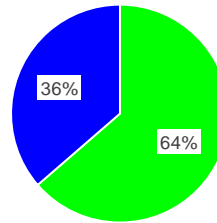
 Osoyoos stock

 Wenatchee stock

Return time & FL size

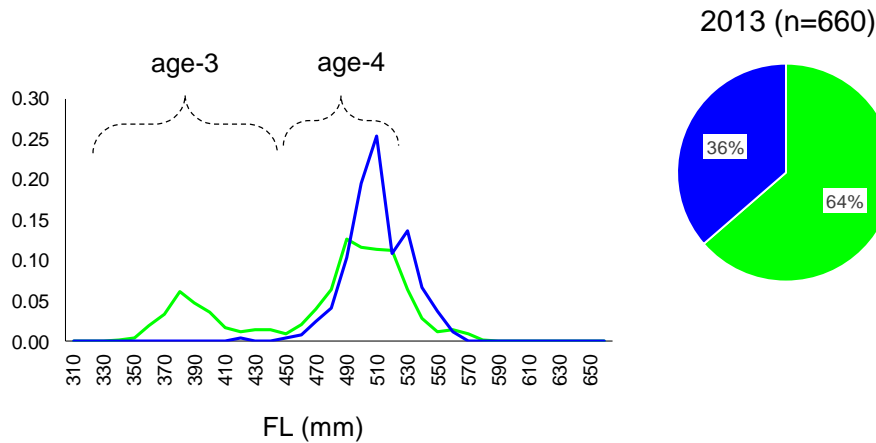


2013 (n=660)

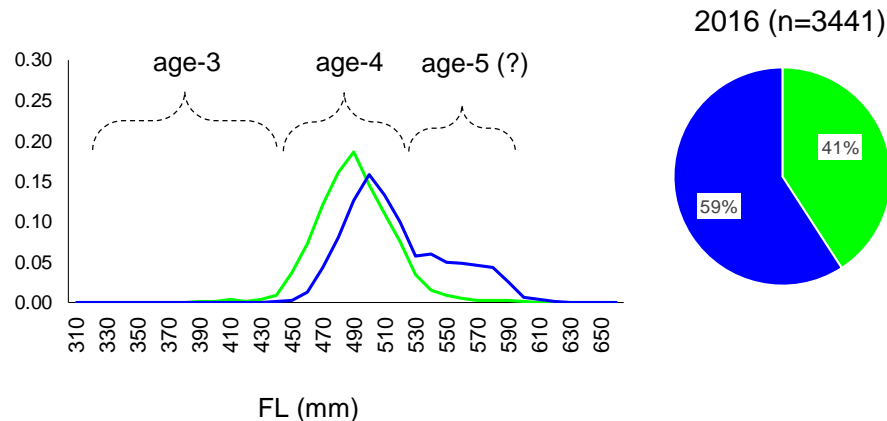


- Greater proportion Osoyoos
- No difference in return time
- Wenatchee: age-3 < 1%
- Osoyoos: 26% age-3

Return time & FL size



- Greater proportion Osoyoos
- No difference in return time
- Wenatchee: age-3 < 1%
- Osoyoos: 26% age-3



- Greater proportion Wenatchee
- only **2%** are adult progeny from BY2013 (age-3)
- 2017 return may include large proportion BY2013 progeny (i.e. age-4)

Is this guy done yet?

I'm spent

ACCORDS project funding



Yakama nation biologists & technical staff



**Nick Hoffman, Travis Jacobson, Megan Moore
Jeremiah Newell**

