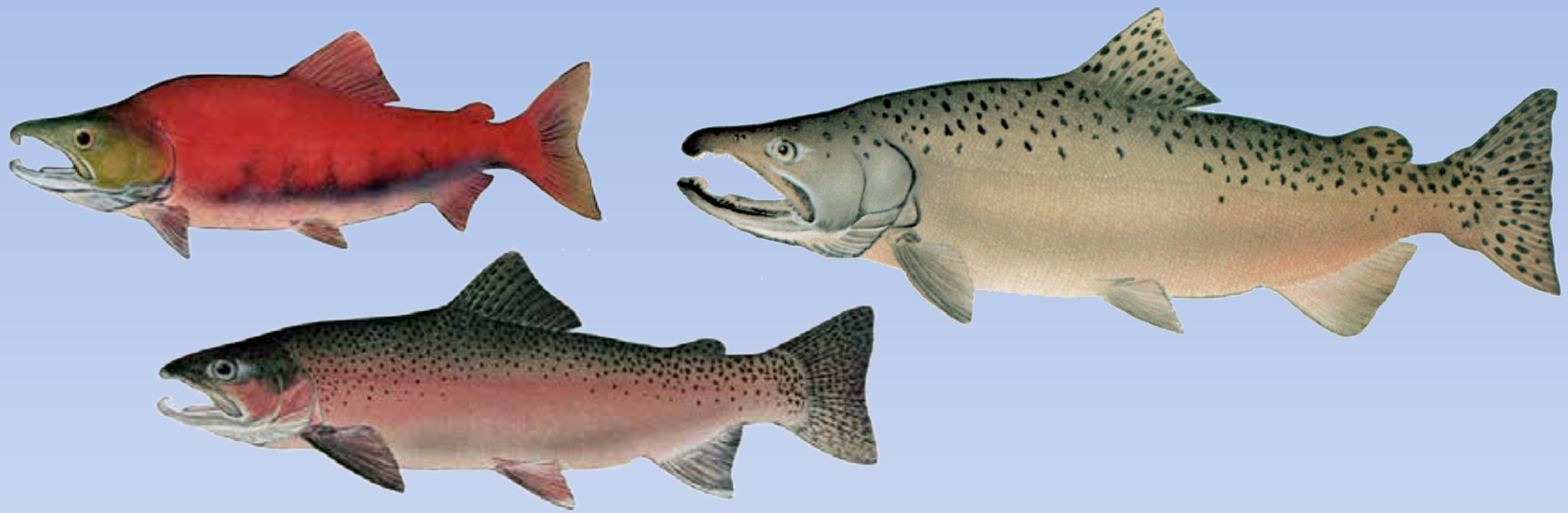
Conversion of radio-tagged adult salmon and steelhead through the lower FCRPS: 2013-2014



Matthew Keefer[1], Chris Caudill[1], Mike Jepson[1], Tami Clabough[1], Eric Johnson[1], Steve Lee[1], Brian Burke[2], & Kinsey Frick[2]

[1] Department of Fish and Wildlife Sciences
University of Idaho

[2] Northwest Fisheries Science Center, NMFS

US Army Corps of Engineers®

University of Idaho
College of Natural Resources

Acknowledgements

Field and data management

T. Dick
M. Jepson
T. Clabough
M. Knopff
S. Lee
M. Morasch
D. Joosten
L. Lyang
J. Garnett
C. Noyes
C. Erdman
J. Renner
L. Martinez-Rocha

Additional support

C. Pinney
T. Mackey
J. Rerecich
N. Zorich
S. Tackley
E. Hockersmith
D. Ogden
USACE Project personnel
Nez Perce Tribe, CRITFC
PSMFC (PTAGIS)

US Army Corps of Engineers®

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NOAA
U.S. DEPARTMENT OF COMMERCE

University of Idaho
College of Natural Resources

Background

- Adult conversion rates below BiOp targets
  - Snake River spring-summer Chinook
  - Snake River steelhead
  - Snake River sockeye
- Uncertainty about where ‘loss’ occurs
- Radiotelemetry can help identify locations and provides a wealth of behavioral data

University of Idaho
College of Natural Resources

BON-McN or BON- LGr adult conversion (PIT-tagged fish)

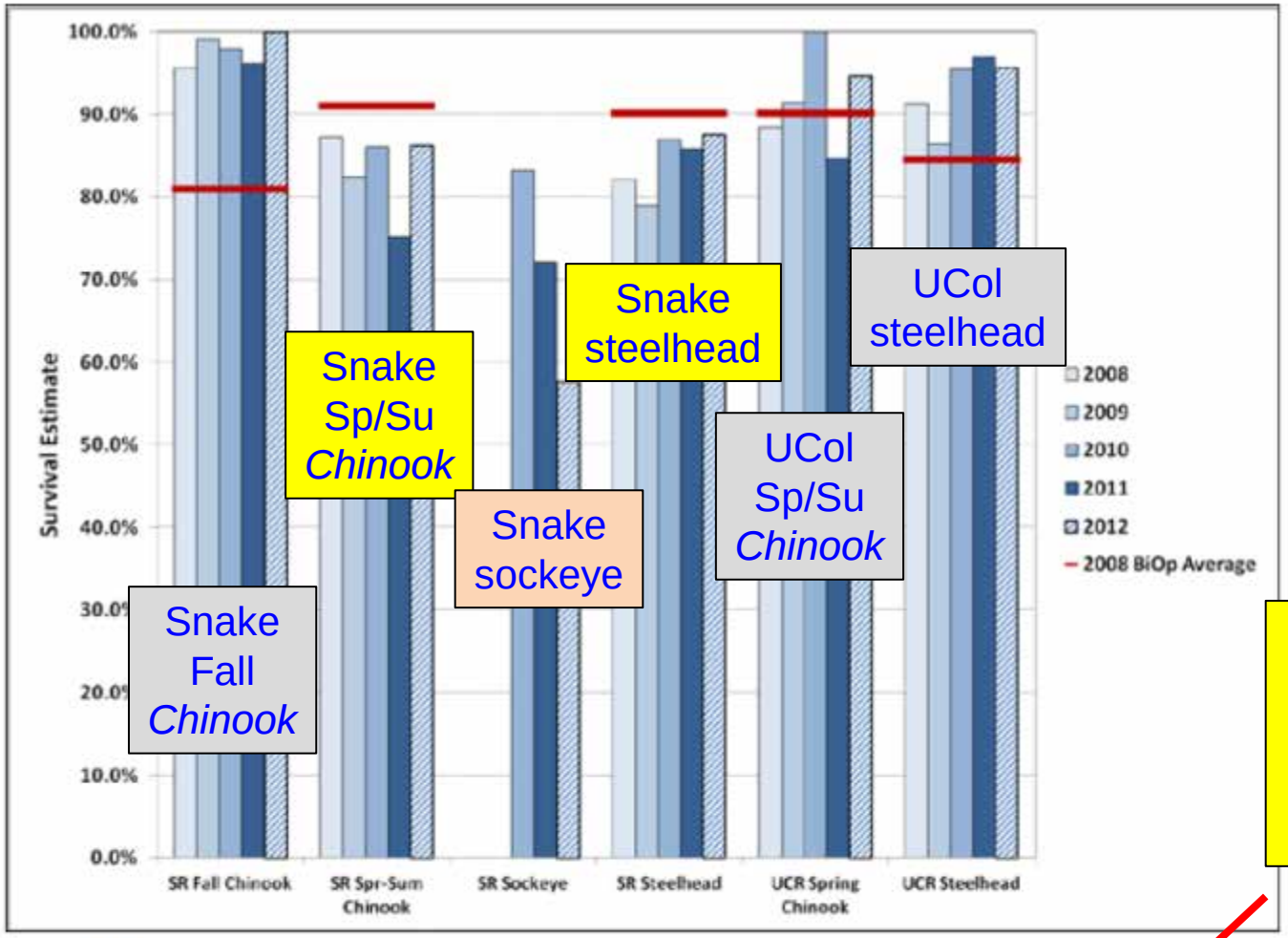


Figure 3.3.1. Recent (2008–2012) annual adult conversion rate estimates (adjusted for reported harvest and natural rates of straying) for known origin, PIT tagged salmon and steelhead that migrated inriver as juveniles compared with 2008 BiOp Adult Performance Standards (2008 SCA Adult Survival Estimates Appendix).

2014 Supplemental BiOp data with 2008 averages

'Adjusted' for harvest & straying for known-origin, PIT-tagged fish

versity of Idaho
e of Natural Resources

Presentation objectives

- Mixed-stock adult conversion rate estimates
  - Chinook, sockeye, steelhead
  - BON → TDD → JDD → MCN
- Distribution / Estimated fate of 'unsuccessful' fish
- Temperature effects
- Fallback effects

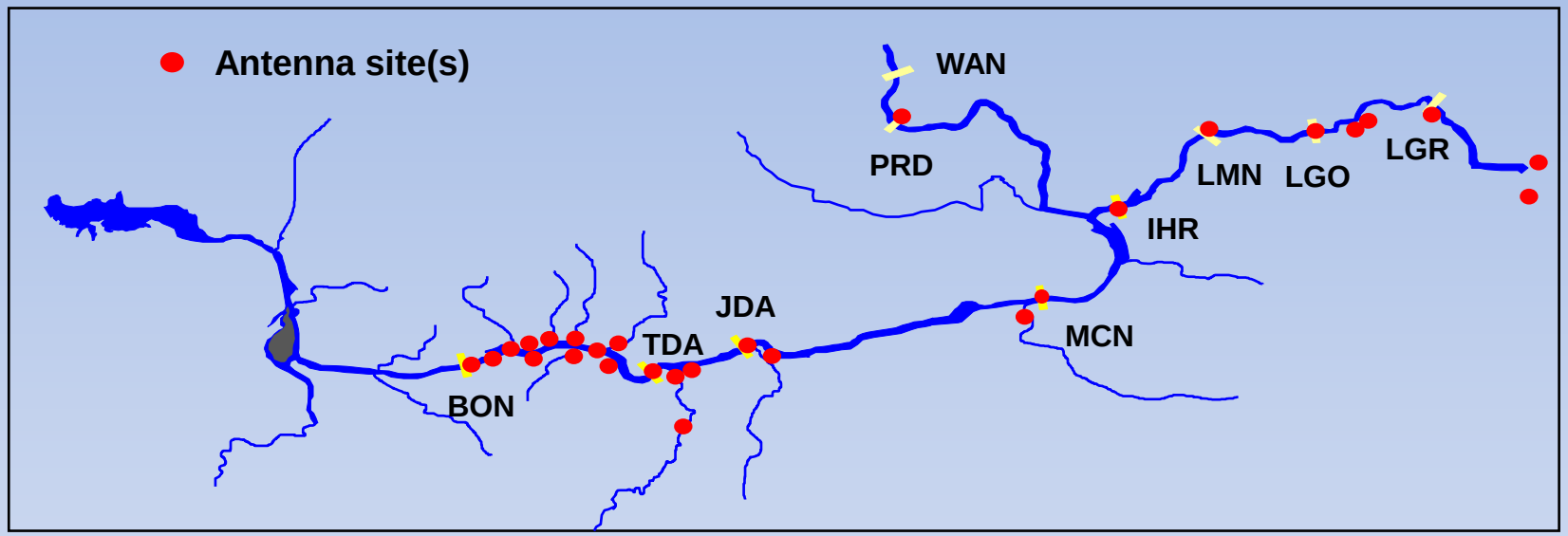
Chinook Prespawn Mortality Review

Methods: fish collection

- Bonneville adult fish facility (AFF)
  - Adult Chinook (Sp-Su), sockeye, steelhead
  - Jack Chinook (Sp-Su)
- Intra-gastric radio-tagging
- FD-PIT as secondary tag
- Unselective sampling
  - *Except* previously PIT-tagged fish were excluded
  - Constraint confounds results somewhat: samples not fully representative

University of Idaho
College of Natural Resources

Methods: Monitoring / Study area



Tailraces, fishways, ladders at 9 dams

Lower Columbia reservoir sites

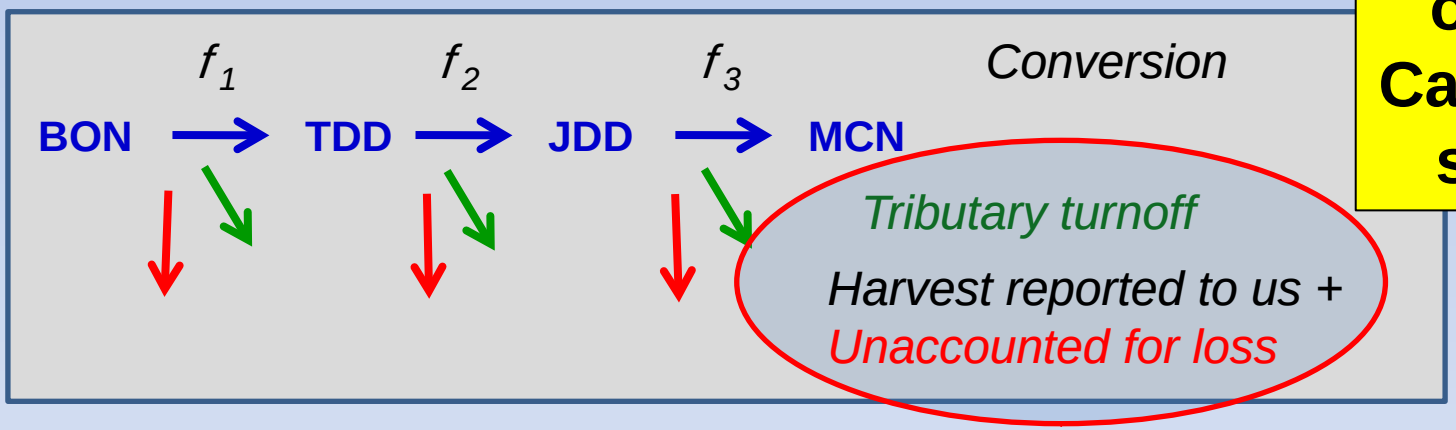
Most major tributaries

Transmitter return: reward program

University of Idaho
College of Natural Resources

Methods: Conversion estimates

- Reach conversion estimates: Program MARK
  - aka: ‘reach escapement’ or ‘survival’ estimates
  - Radio + PIT detection histories

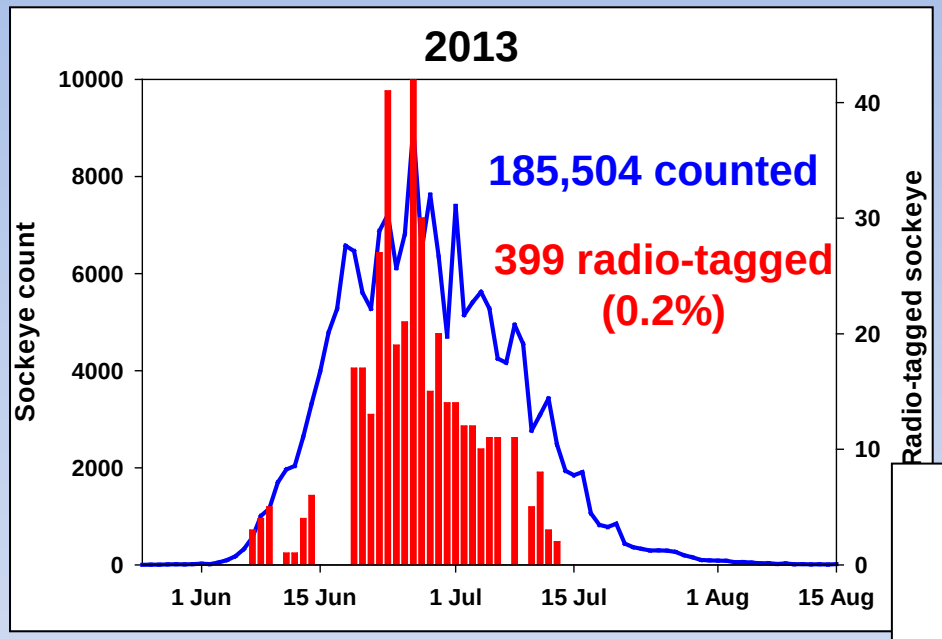


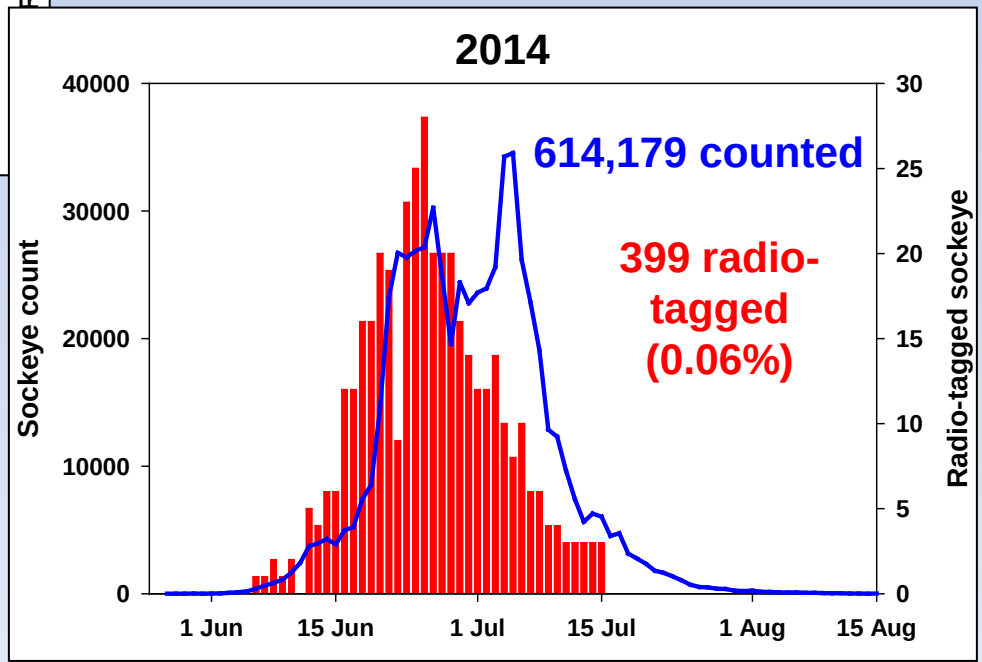
Unknown origin: Cannot ID strays

- Fates of ‘unsuccessful’ fish (did not pass McN)
  - Identify final detection, harvest locations

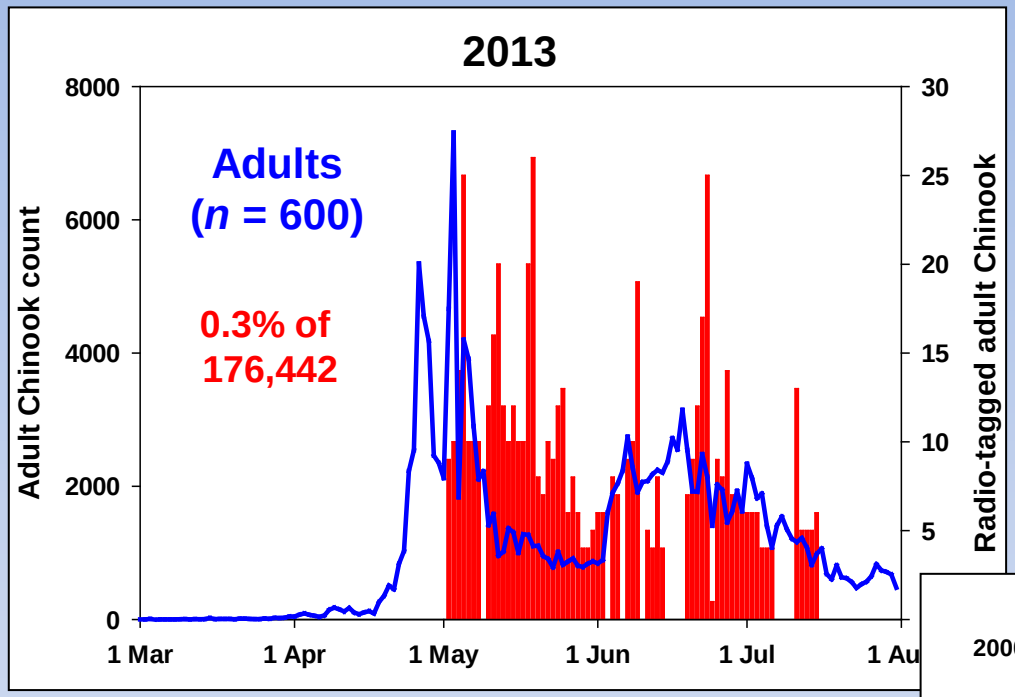
University of Idaho
College of Natural Resources

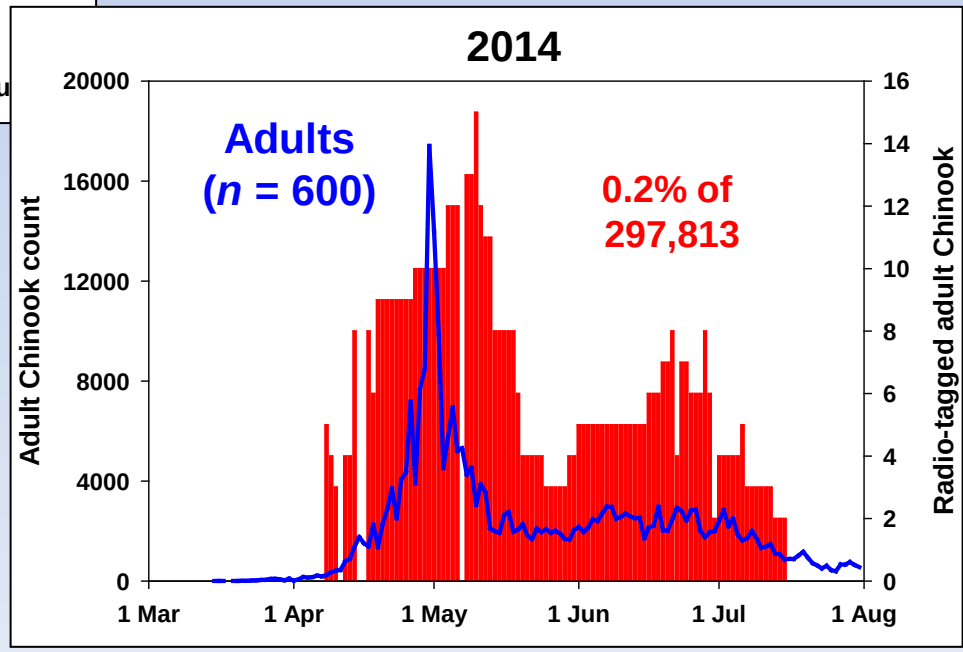
Sockeye sample summary



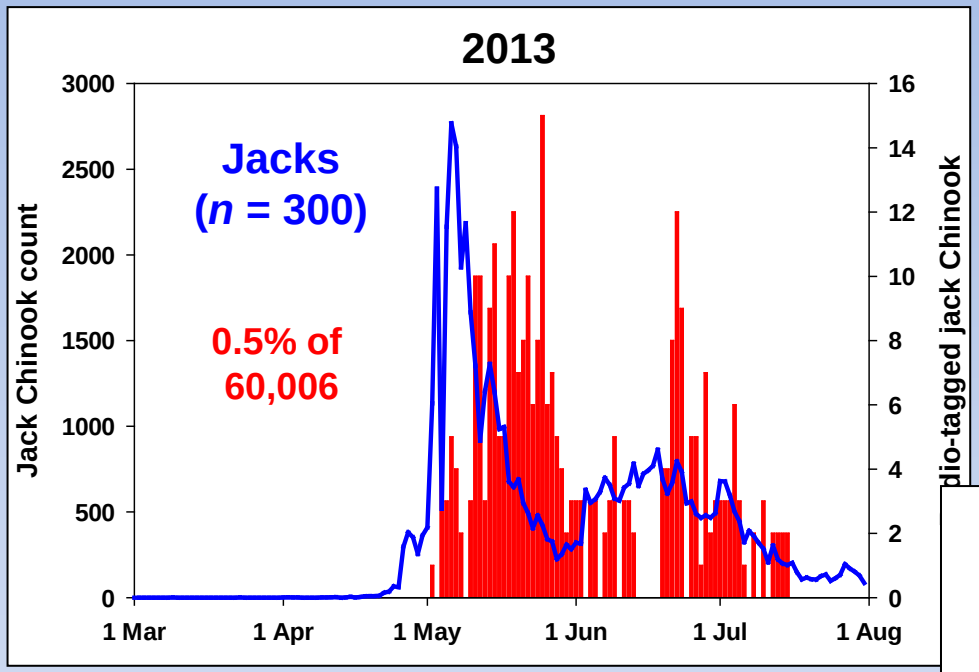


Adult Chinook sample summary

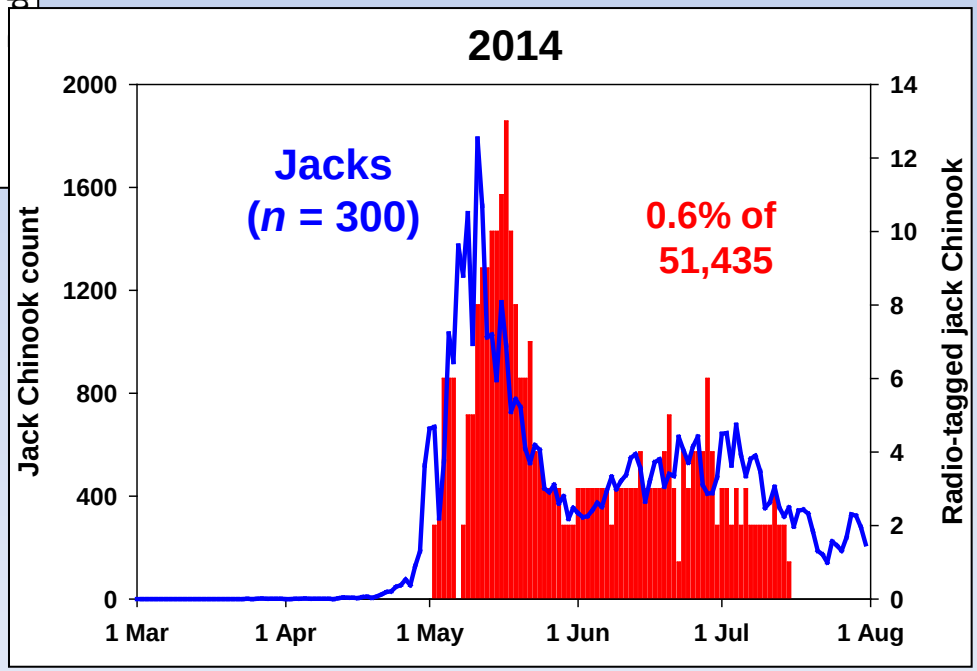




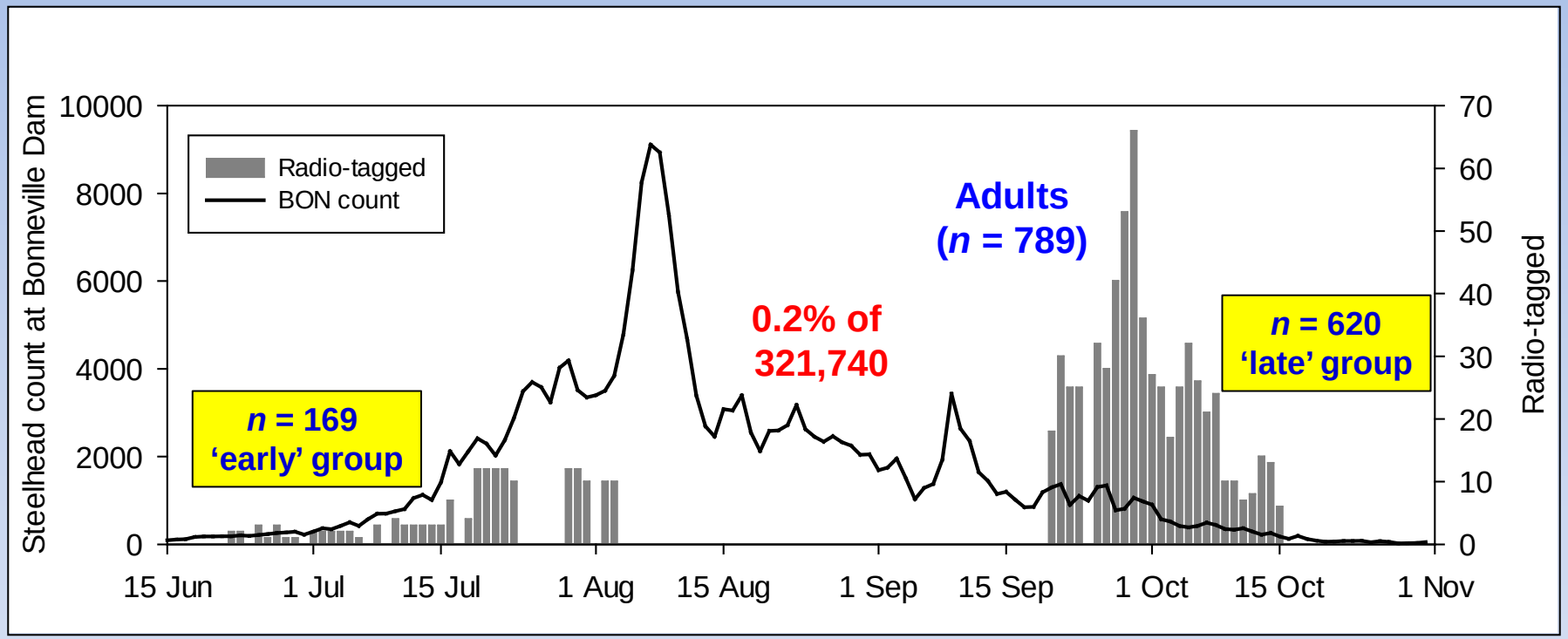
Jack Chinook sample summary



Kinsey Frick presentation: Jack/Adult behavior



2013 Steelhead sample summary

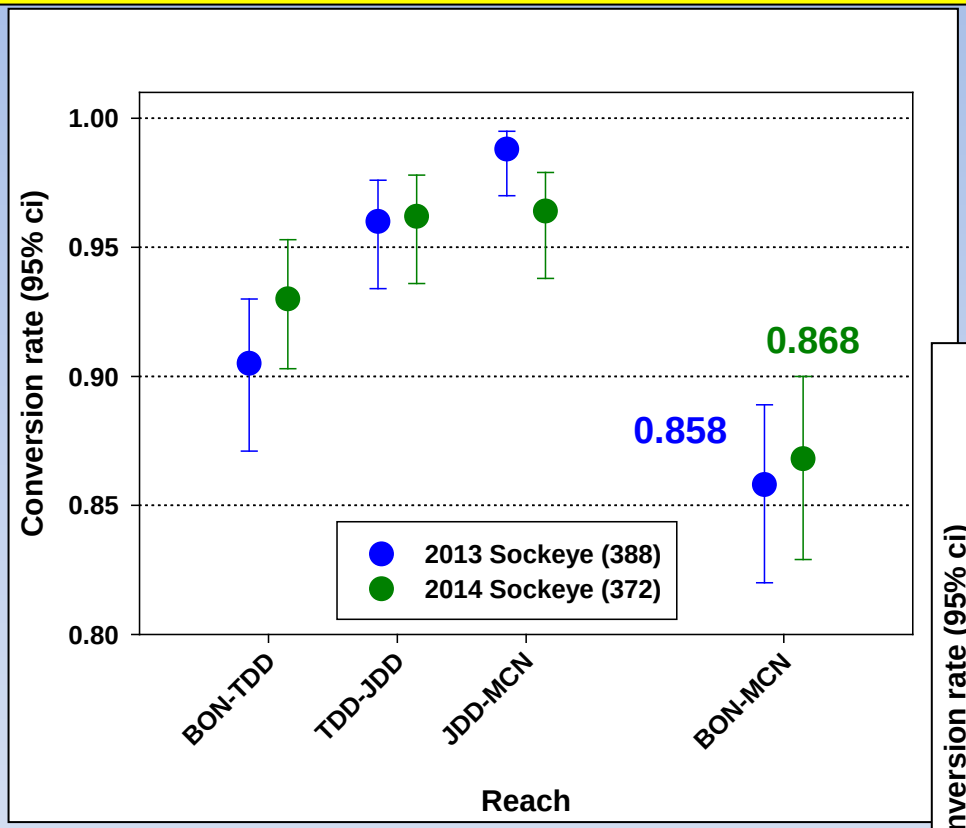


Keefer presentation: Overwintering study

University of Idaho
College of Natural Resources

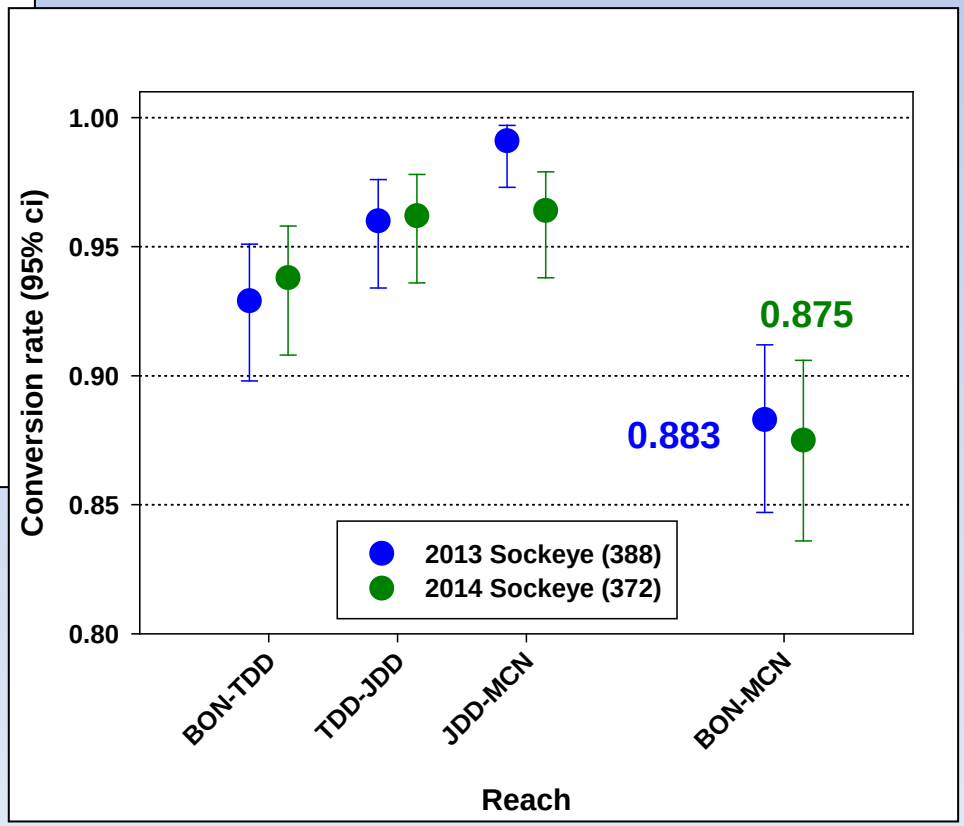
Sockeye conversions

Conversion A: (*n* - Trib – Harvest – Unaccount) / *n*



Conversion D: (*n* - Unaccount) / *n*

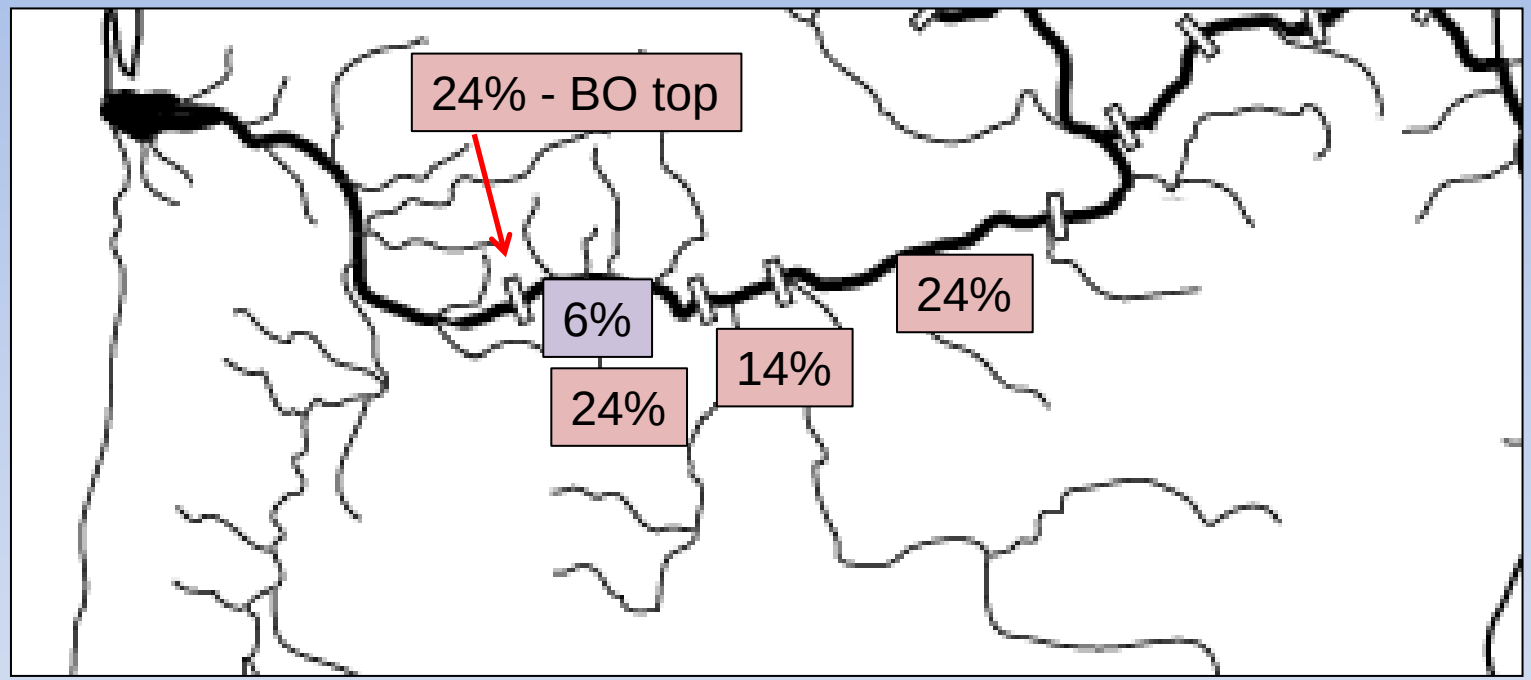
Censored: Tributary turnoff, harvest



Program MARK:
95% profile likelihood CI

‘Unsuccessful’ sockeye fates (2014)

n = 51 that passed Bonneville



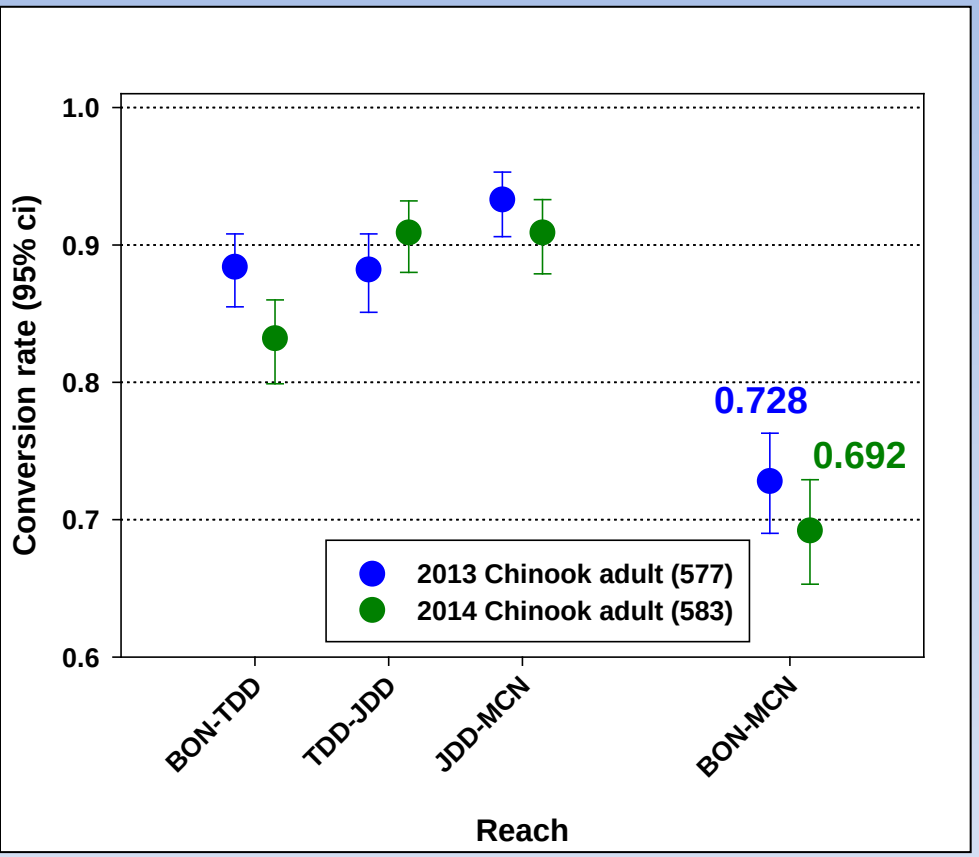
Reported harvest: 6%

Unaccounted for: 94%

University of Idaho
College of Natural Resources

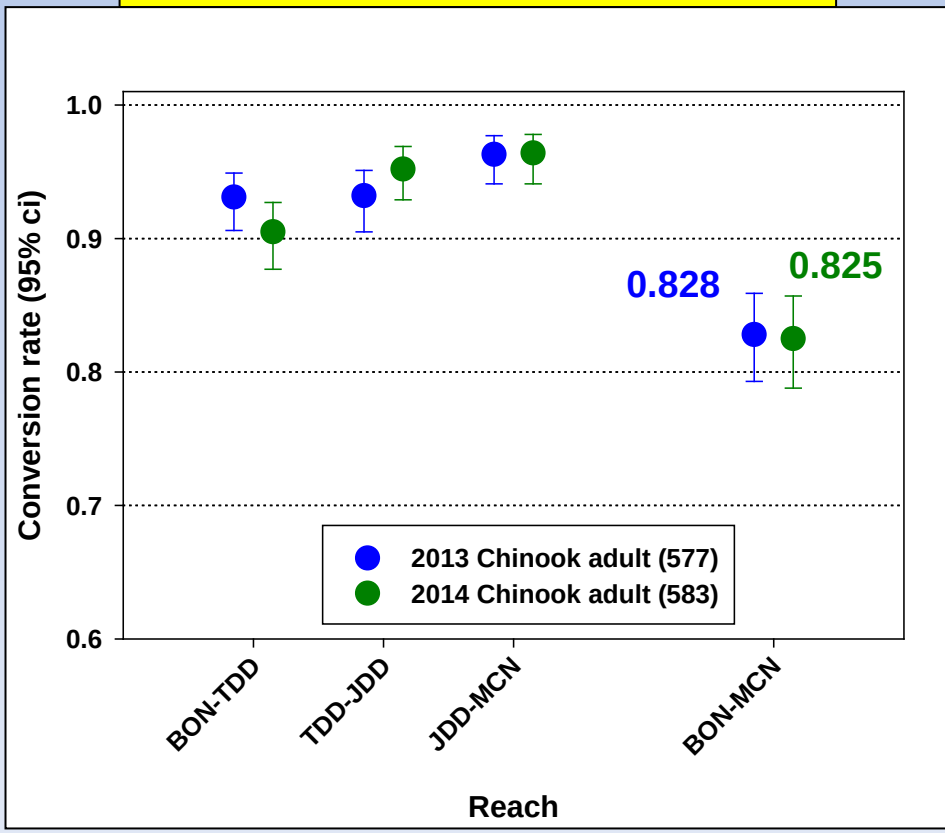
Adult Chinook conversion

Conversion A: (*n* - Trib – Harvest – Unaccount) / *n*



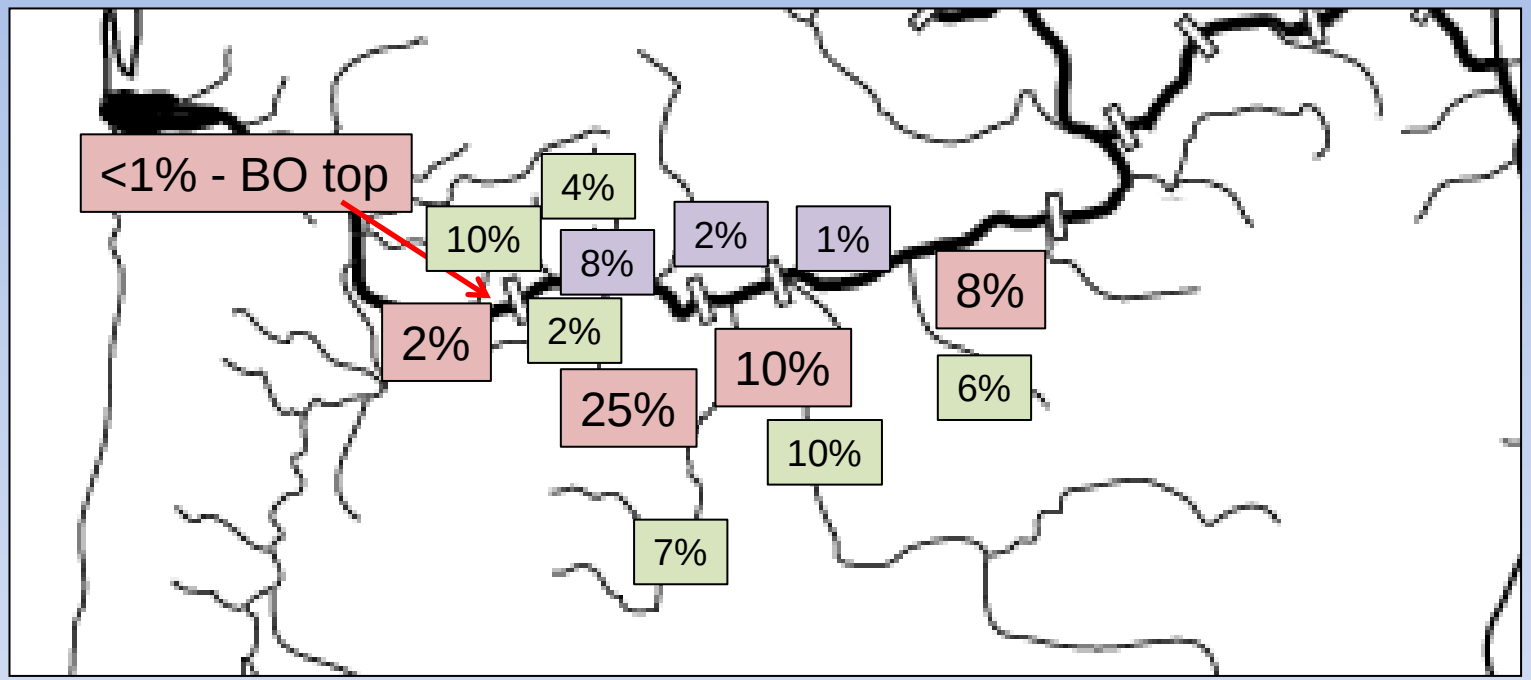
Conversion D: (*n* - Unaccount) / *n*

Censored: Tributary turnoff, harvest



‘Unsuccessful’ CK adult fates (‘14)

n = 185 that passed Bonneville



Reported harvest: 10%

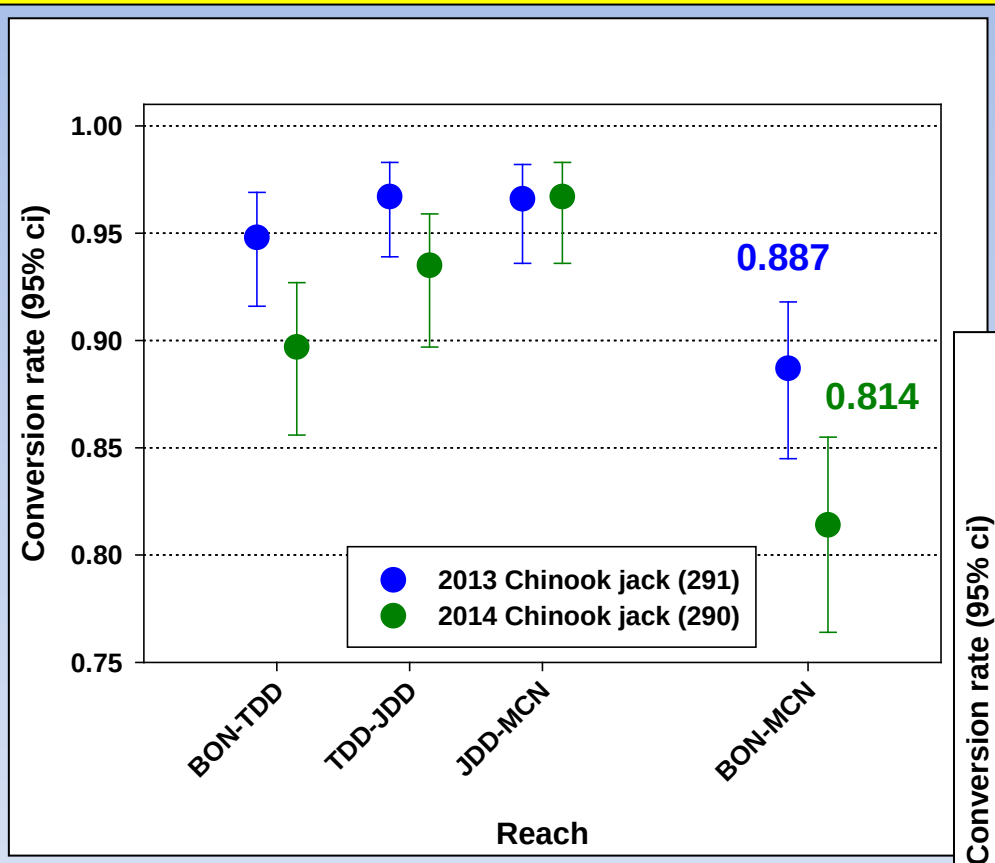
Tributary: 44%

Unaccounted for: 46%

University of Idaho
College of Natural Resources

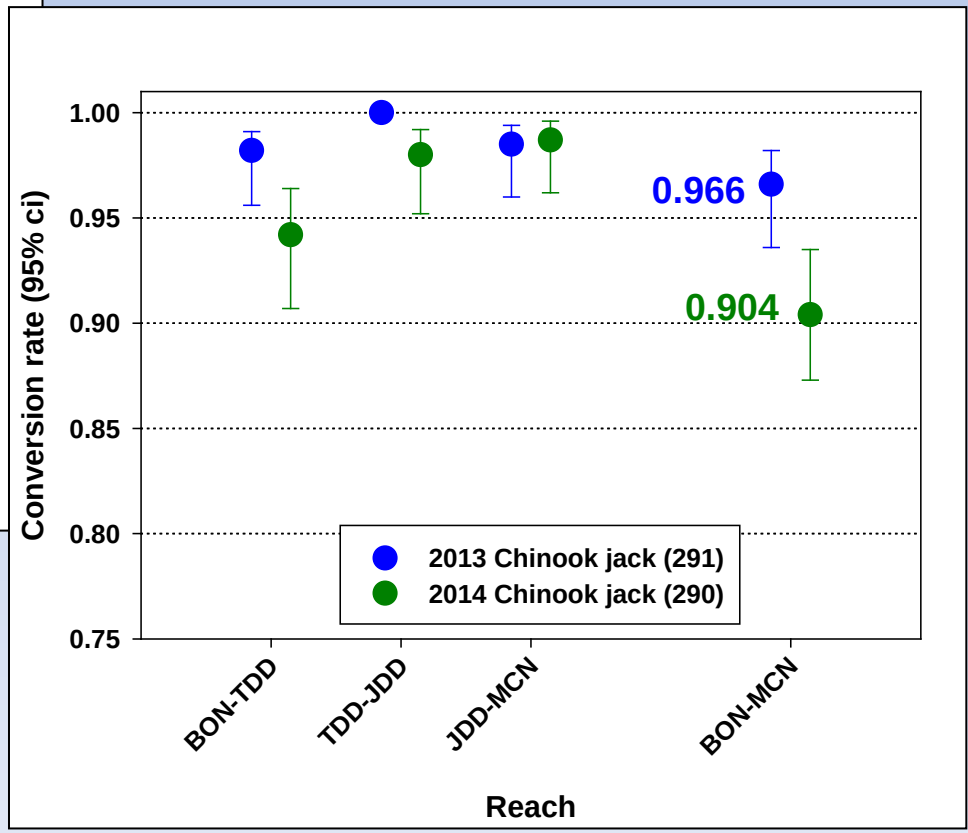
Jack Chinook conversion

Conversion A: (*n* - Trib – Harvest – Unaccount) / *n*



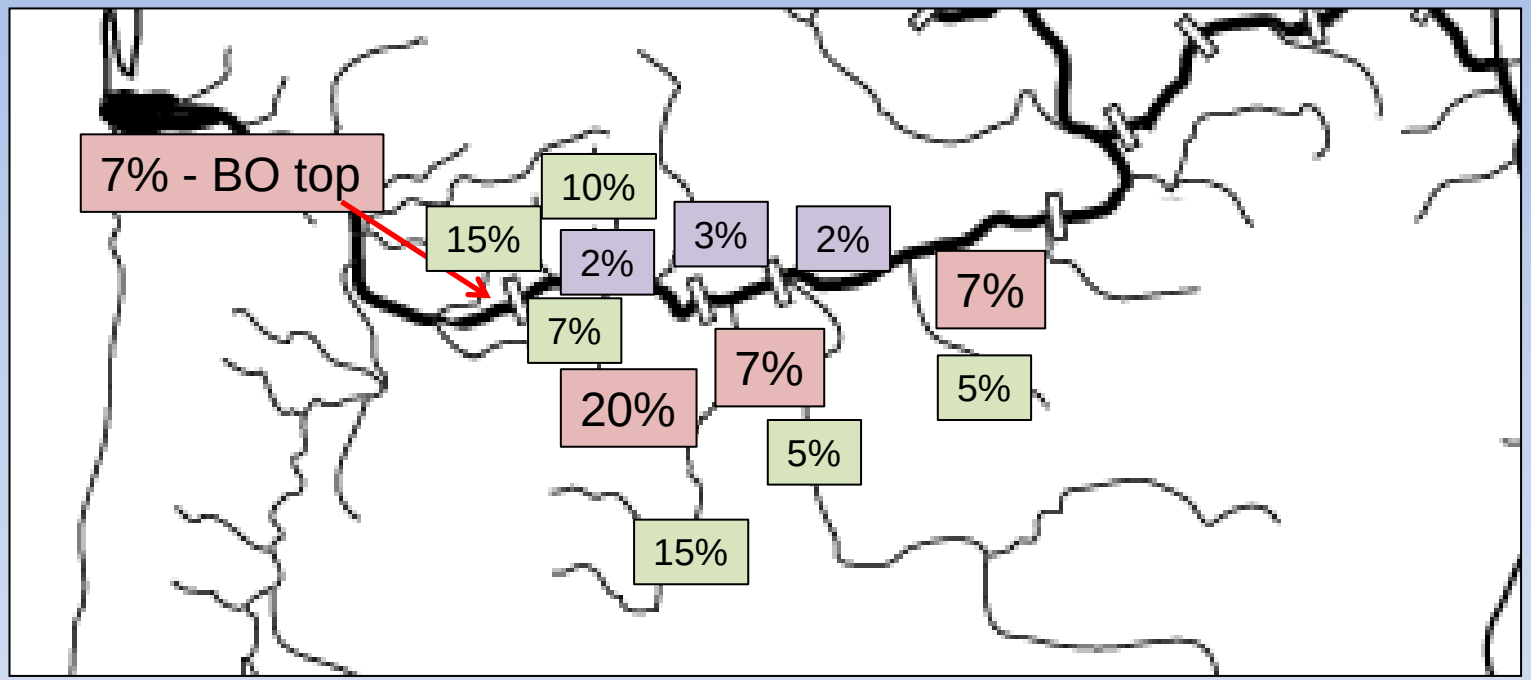
Conversion D: (*n* - Unaccount) / *n*

Censored: Tributary turnoff, harvest



‘Unsuccessful’ CK jack fates (2014)

n = 59 that passed Bonneville



Reported harvest: 7%

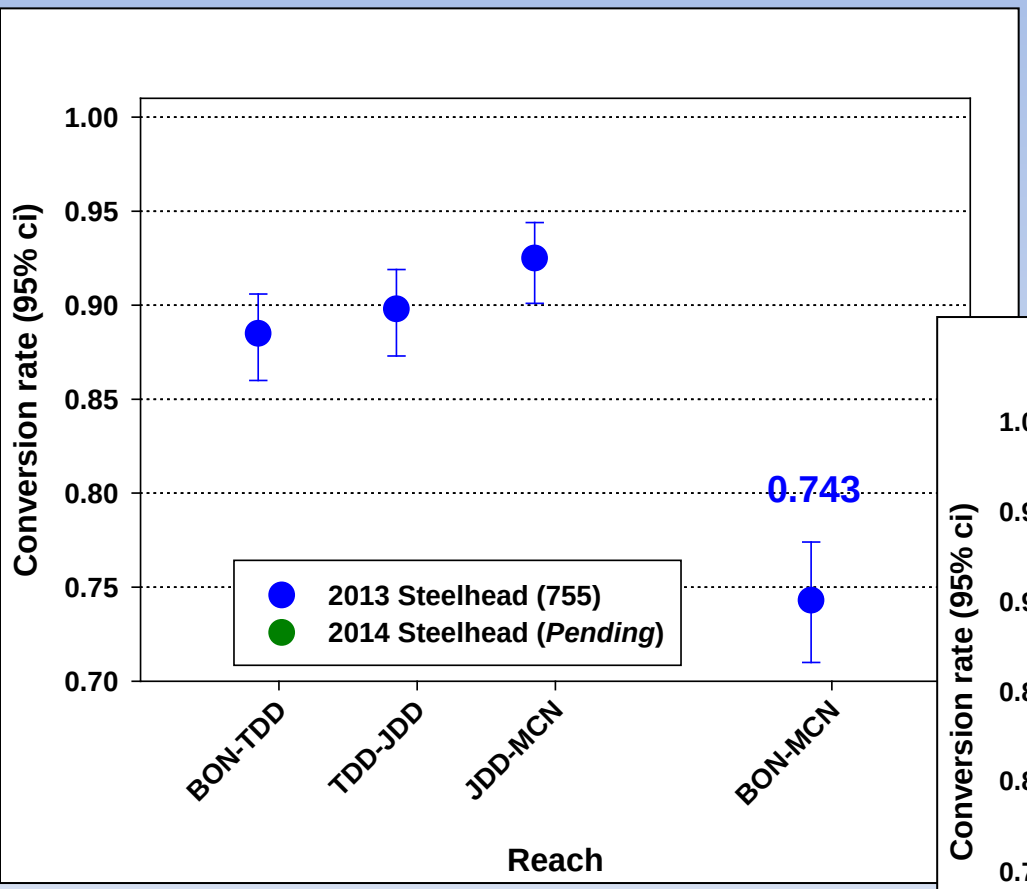
Tributary: 53%

Unaccounted for: 40%

University of Idaho
College of Natural Resources

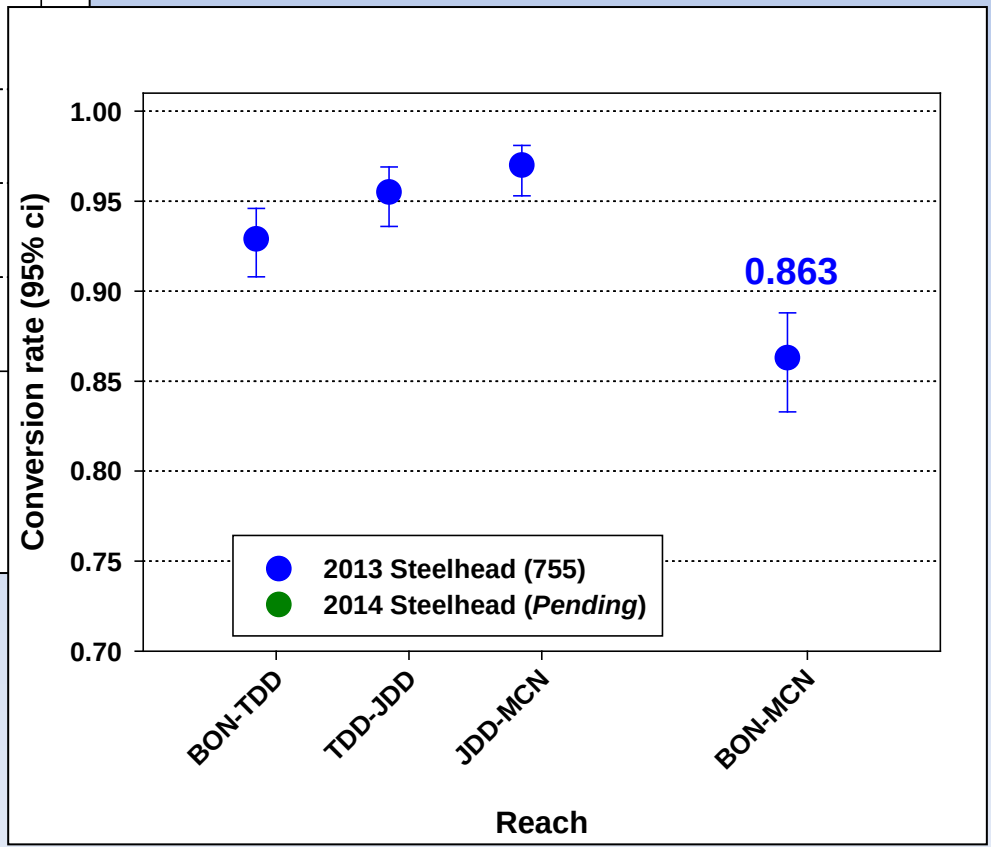
Adult steelhead conversion

Conversion A: (*n* - Trib – Harvest – Unaccount) / *n*



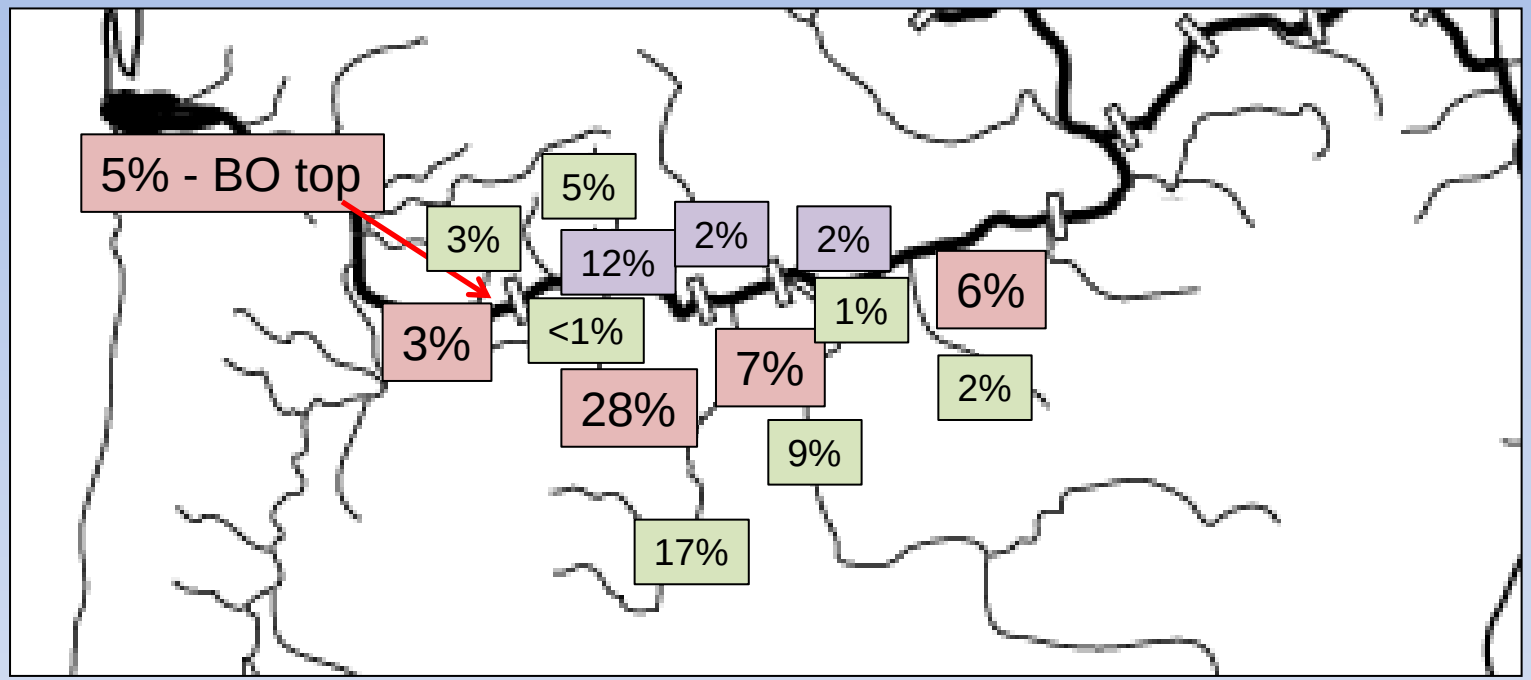
Conversion D: (*n* - Unaccount) / *n*

Censored: Tributary turnoff, harvest



‘Unsuccessful’ steelhead fates (‘13)

n = 200 that passed Bonneville



Reported harvest: 16%

Tributary: 37%

Unaccounted for: 48%

University of Idaho
College of Natural Resources

Bonneville-McNary conversions

Run	*Year*	Conversion A	Conversion D
Sockeye	2013	0.858	0.883
	2014	0.868	0.875
Chinook (A)	2013	0.728	0.828
	2014	0.692	0.825
Chinook (J)	2013	0.887	0.966
	2014	0.814	0.904
Steelhead	2013	0.743	0.863
	2014	pending	pending

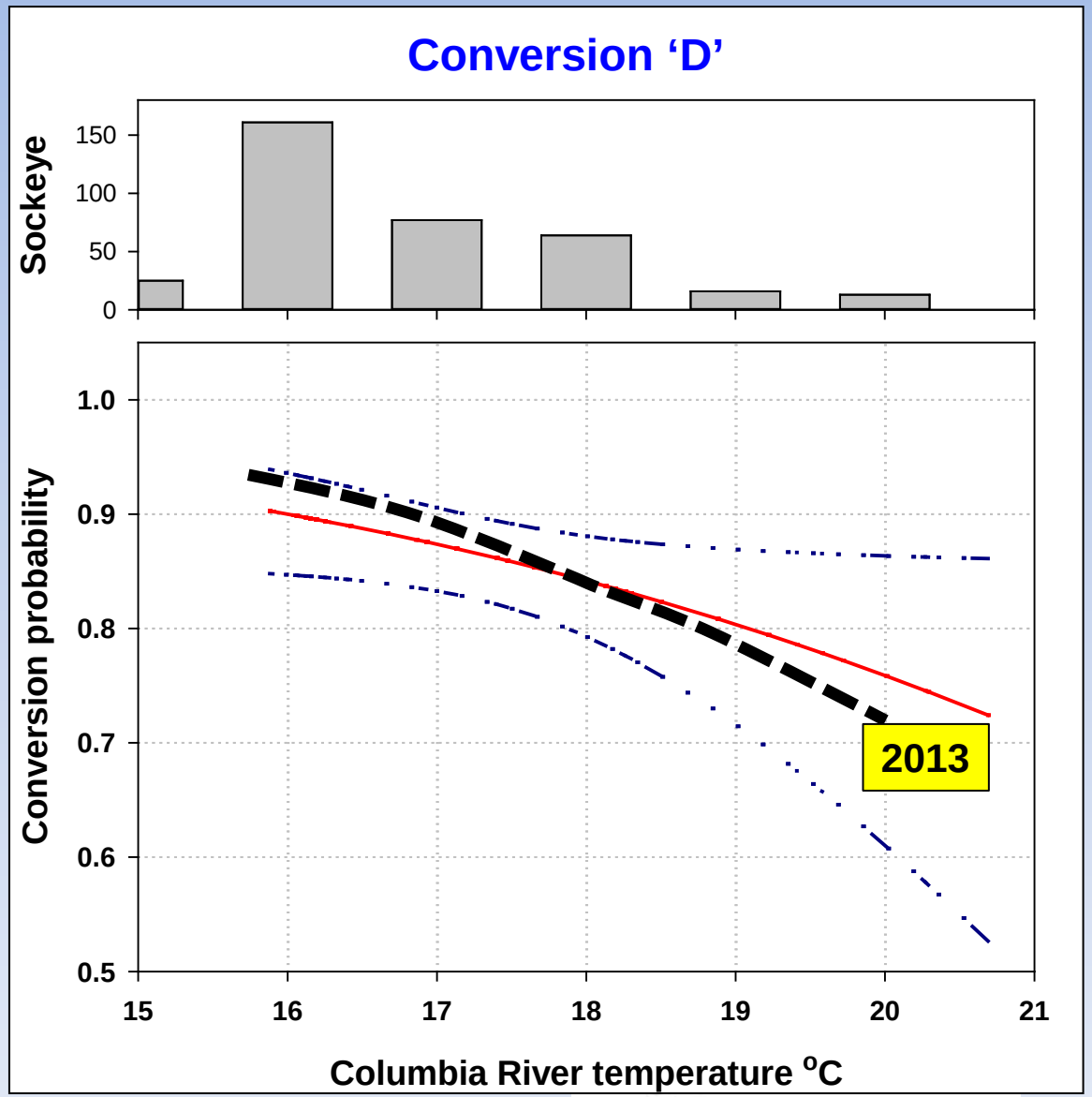
Conversion A: (*n* - Trib – Harvest – Unaccount) / *n*

Conversion D: (*n* - Unaccount) / *n*

University of Idaho
College of Natural Resources

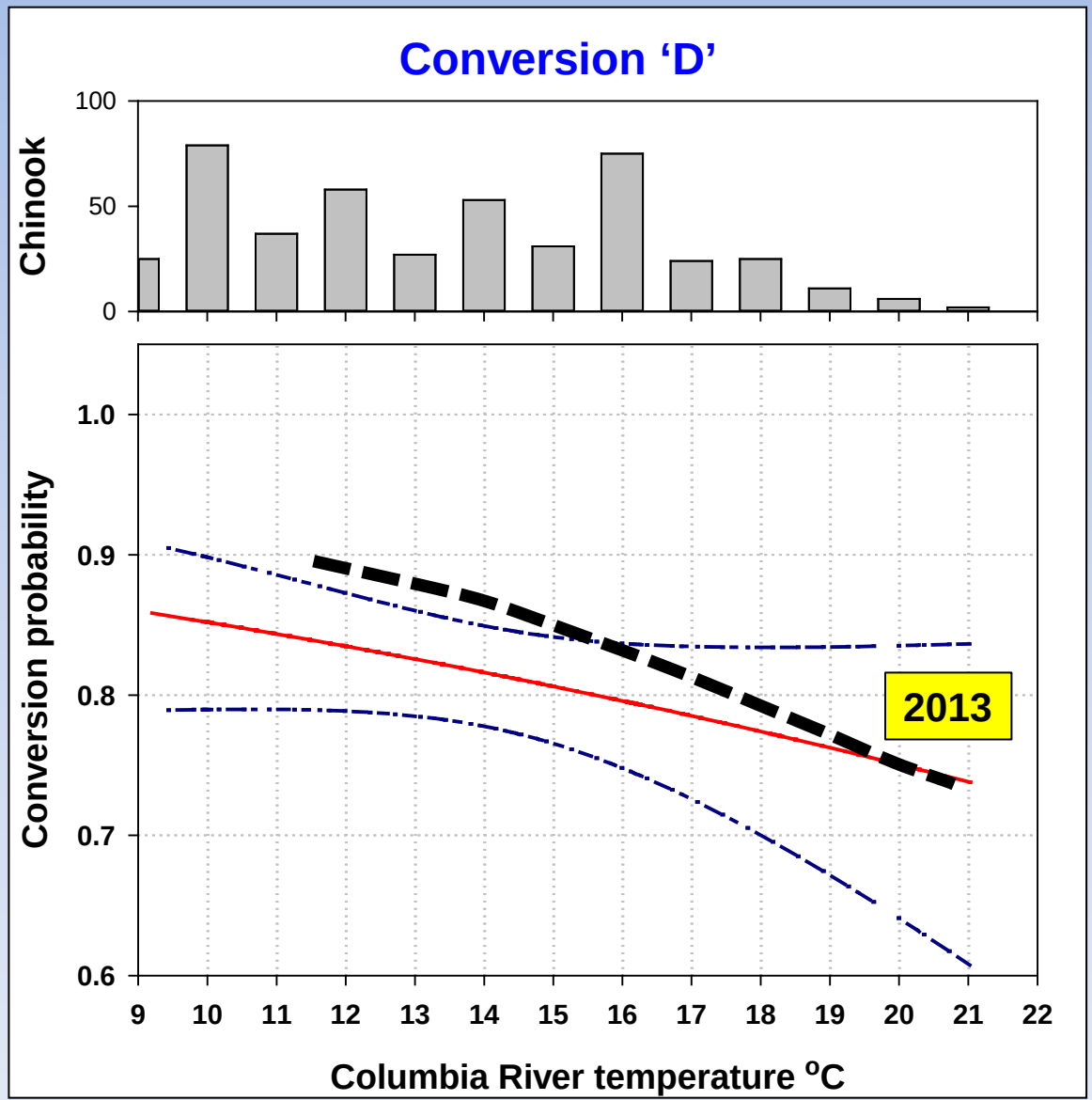
Temperature effect: sockeye 2014

- BON-MCN logistic regression model
  - *chisq*= 3.3
  - *P* = 0.071
  - *n* = 353



Temperature effect: Chinook (A) 2014

- BON-MCN logistic regression model
  - *chisq*= 2.4
  - *P* = 0.122
  - *n* = 453



Fallback effect on conversion: 2014

Conversion 'D'

Run	*Site*	No Fallback	Fallback	
Sockeye	BON	0.869 (350)	0.875 (16)	+ 0.006
	Any[1]	0.865 (327)	0.897 (39)	+ 0.032
Chinook (A)	BON	0.825 (445)	0.680 (25)	- 0.145
	Any[1]	0.824 (437)	0.727 (33)	- 0.097
Chinook (J)	BON	0.904 (240)	0.917 (12)	+ 0.013
	Any[1]	0.904 (230)	0.909 (22)	+ 0.005

[1] Bonneville, The Dalles, or John Day

University of Idaho
College of Natural Resources

Conclusions

- Direct comparison of RT and PIT conversion estimates *not recommended*
  - PIT-based ‘standards’ = unambiguous up-river fish
  - RT = unknown mix of up-river and lower river fish
- 2014 estimates preliminary
  - Additional transmitter returns from fisheries
- Conversion rates varied among runs
  - Adult Chinook < Steelhead < Sockeye < Jack Chinook

University of Idaho
College of Natural Resources

Conclusions

- Largest unaccounted losses in Bonneville reservoir, consistent with past results
- Fallback = Lower conversion (adult Chinook)
- Temperature effects (sockeye, adult Chinook)
- Many more details available. . . .

Technical Report 2014-12

2-Year Final Report: summer 2015

REACH CONVERSION RATES OF RADIO-TAGGED CHINOOK AND SOCKEYE SALMON IN THE LOWER COLUMBIA RIVER, 2013

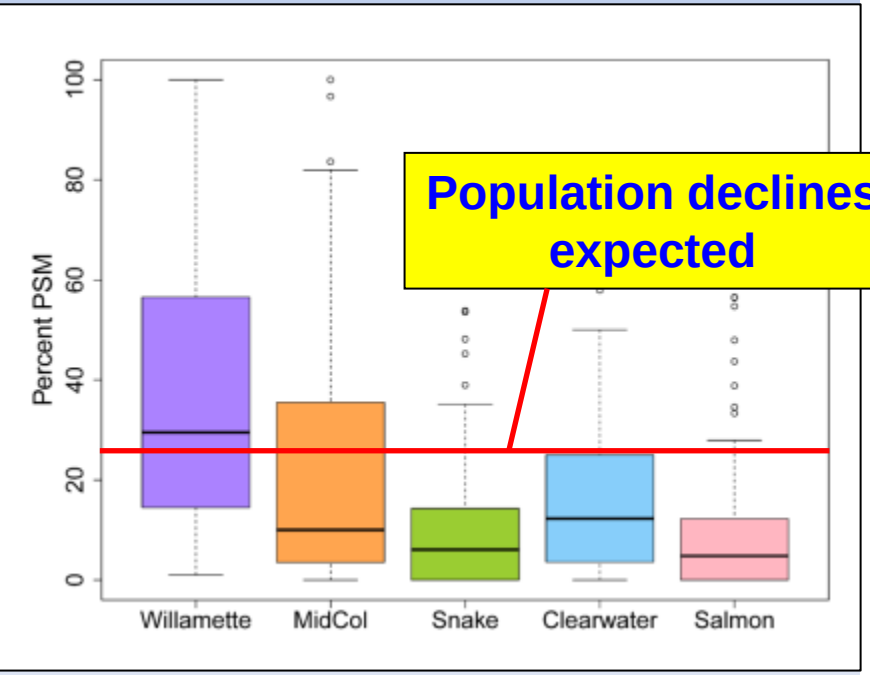
A Report for Study Code ADS-P-13-2

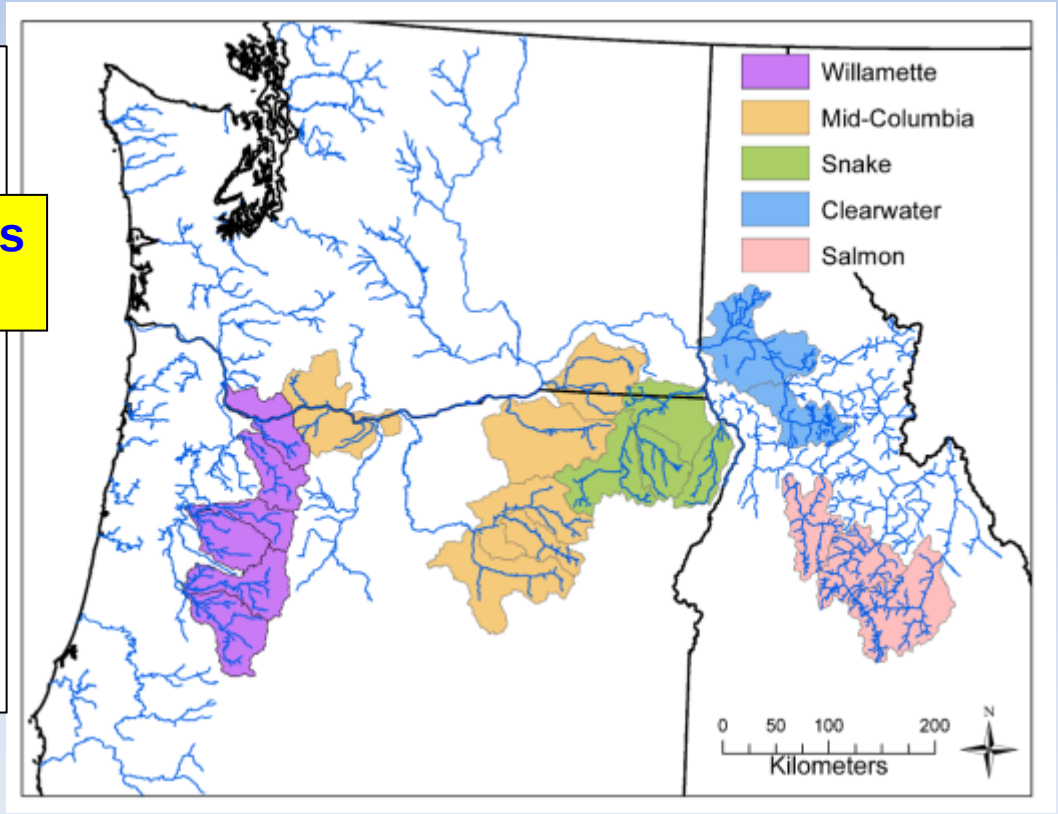
Prespawn mortality: preview

- PSM is a regionally important Chinook issue
- Corps-funded: joint UI / NOAA project
  - Work horses: Tracy Bowerman, Lisa Crozier
- Objectives
  - Methods review
  - Existing PSM rate compilation
  - Environmental effects
  - Demographic effects
  - Energetic costs of migration through Hydrosystem

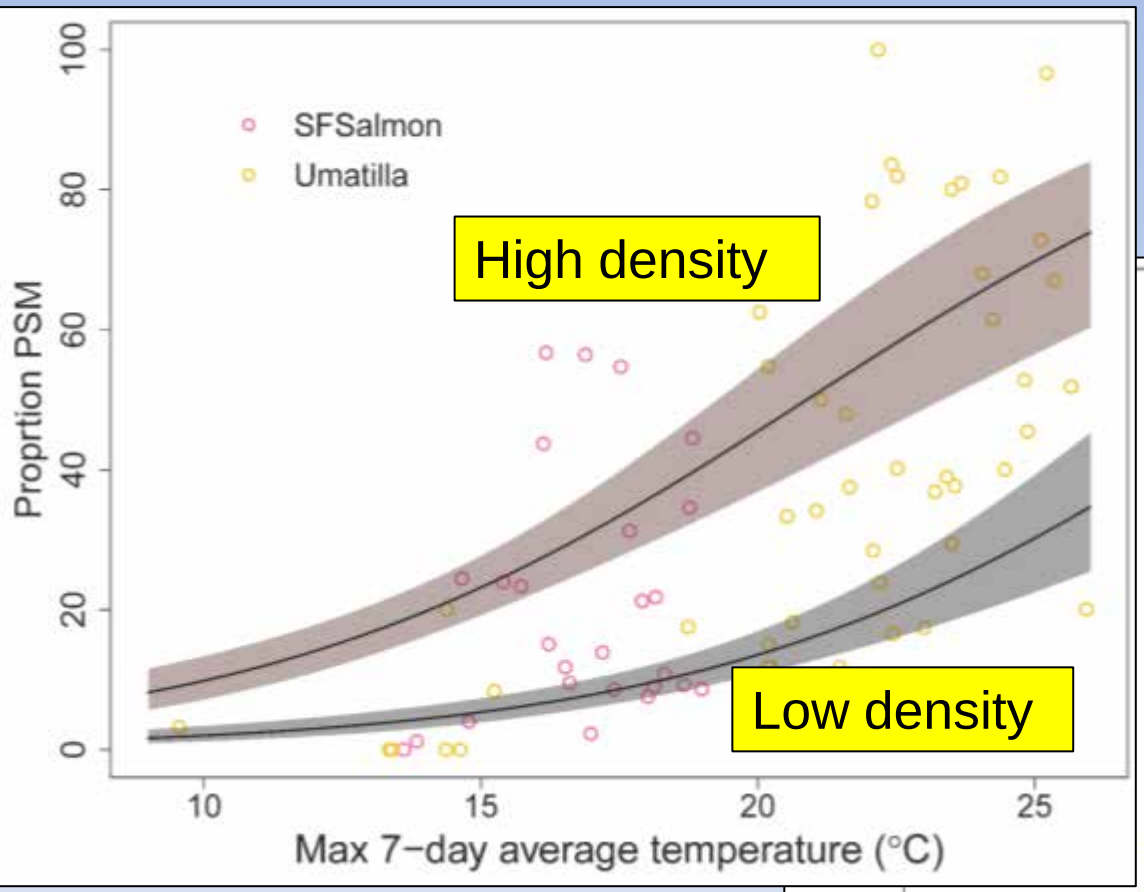
PSM snapshot

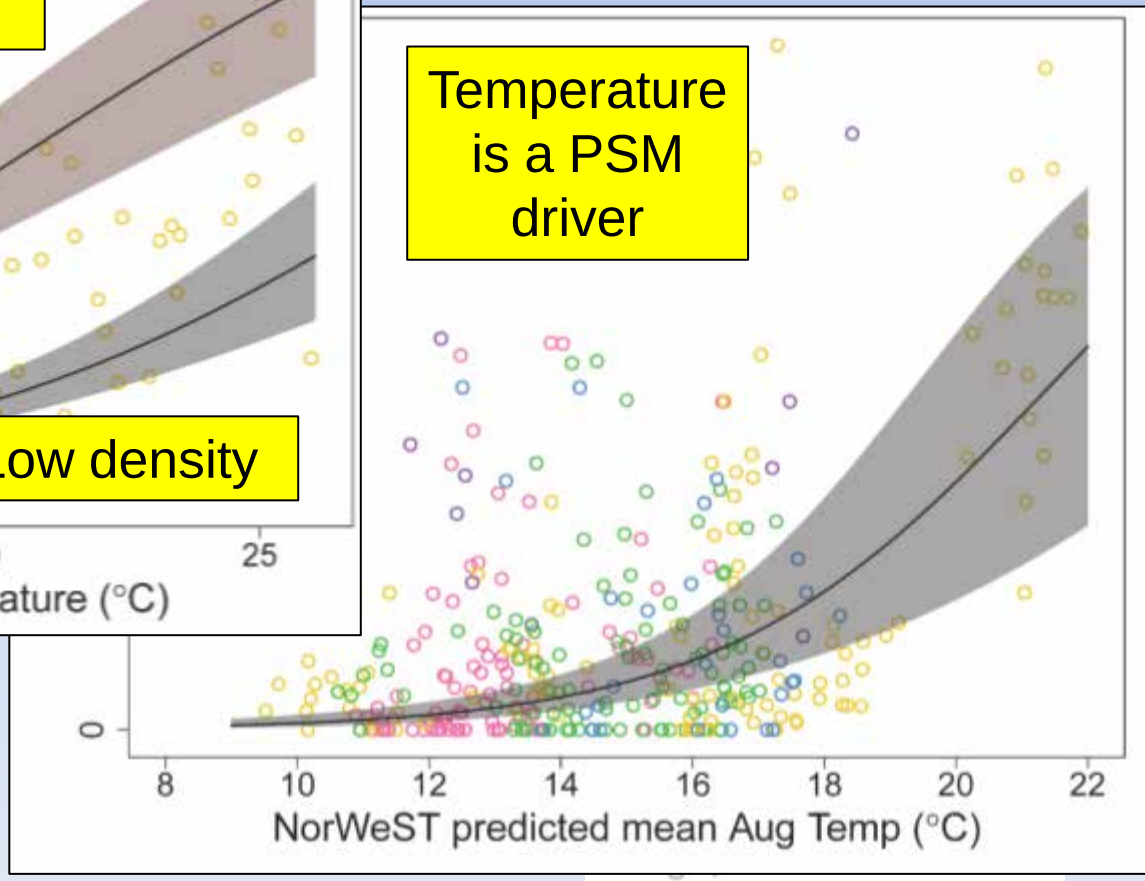
- Methods survey complete: West Coast
- 450 site years of PSM data in Columbia basin
- 8 agencies, 3 ESUs





PSM snapshot





Stay tuned: More to come. . . .

University of Idaho
College of Natural Resources