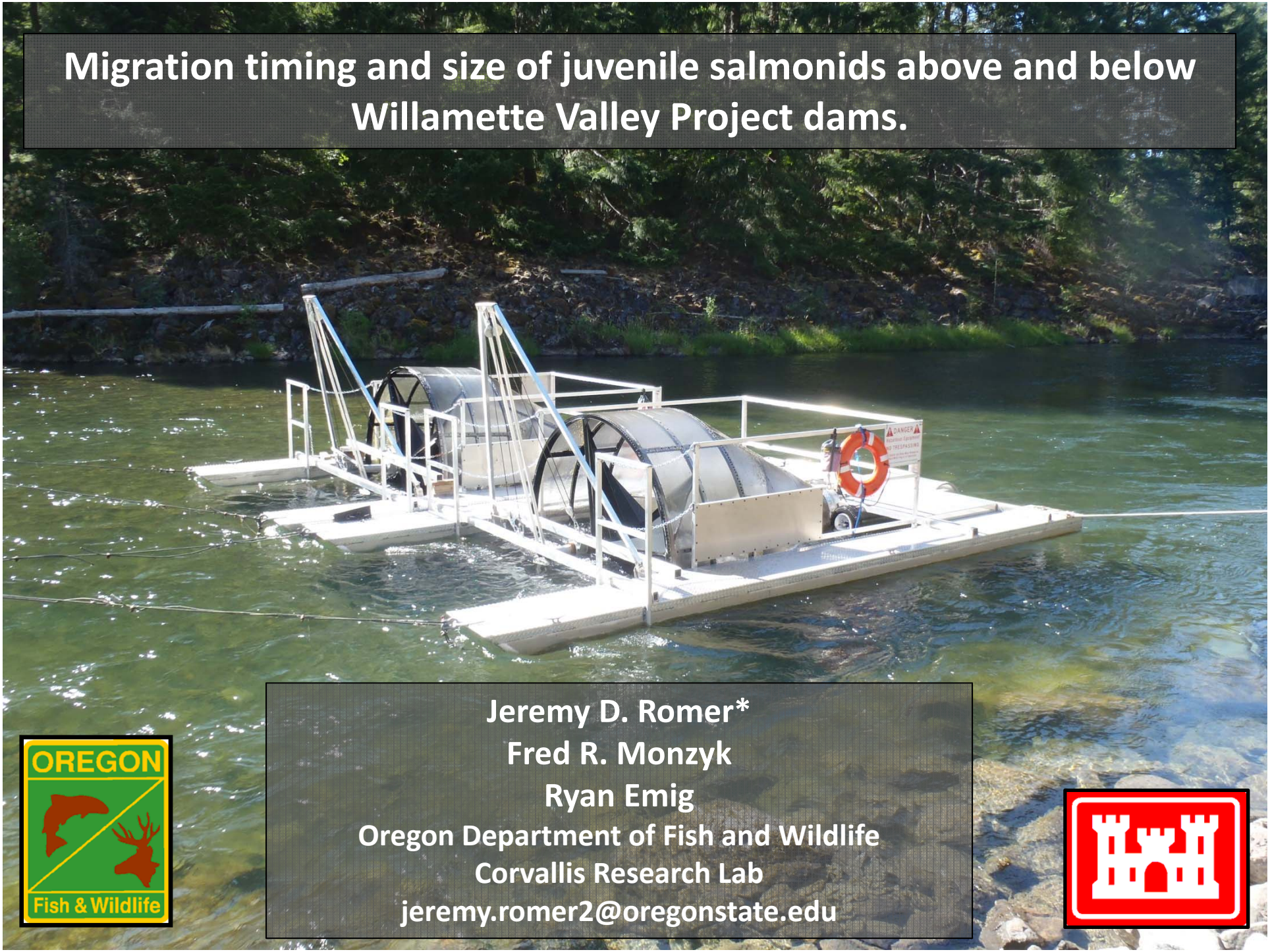
Migration timing and size of juvenile salmonids above and below Willamette Valley Project dams.



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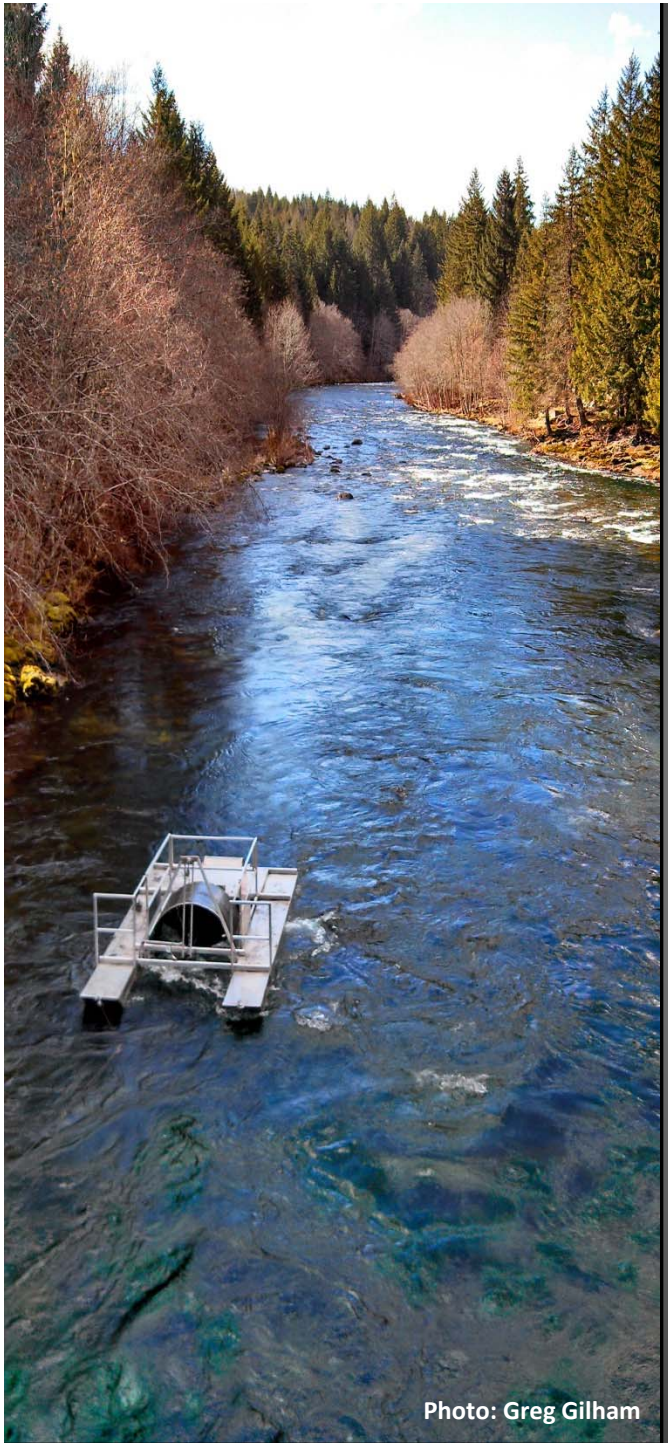


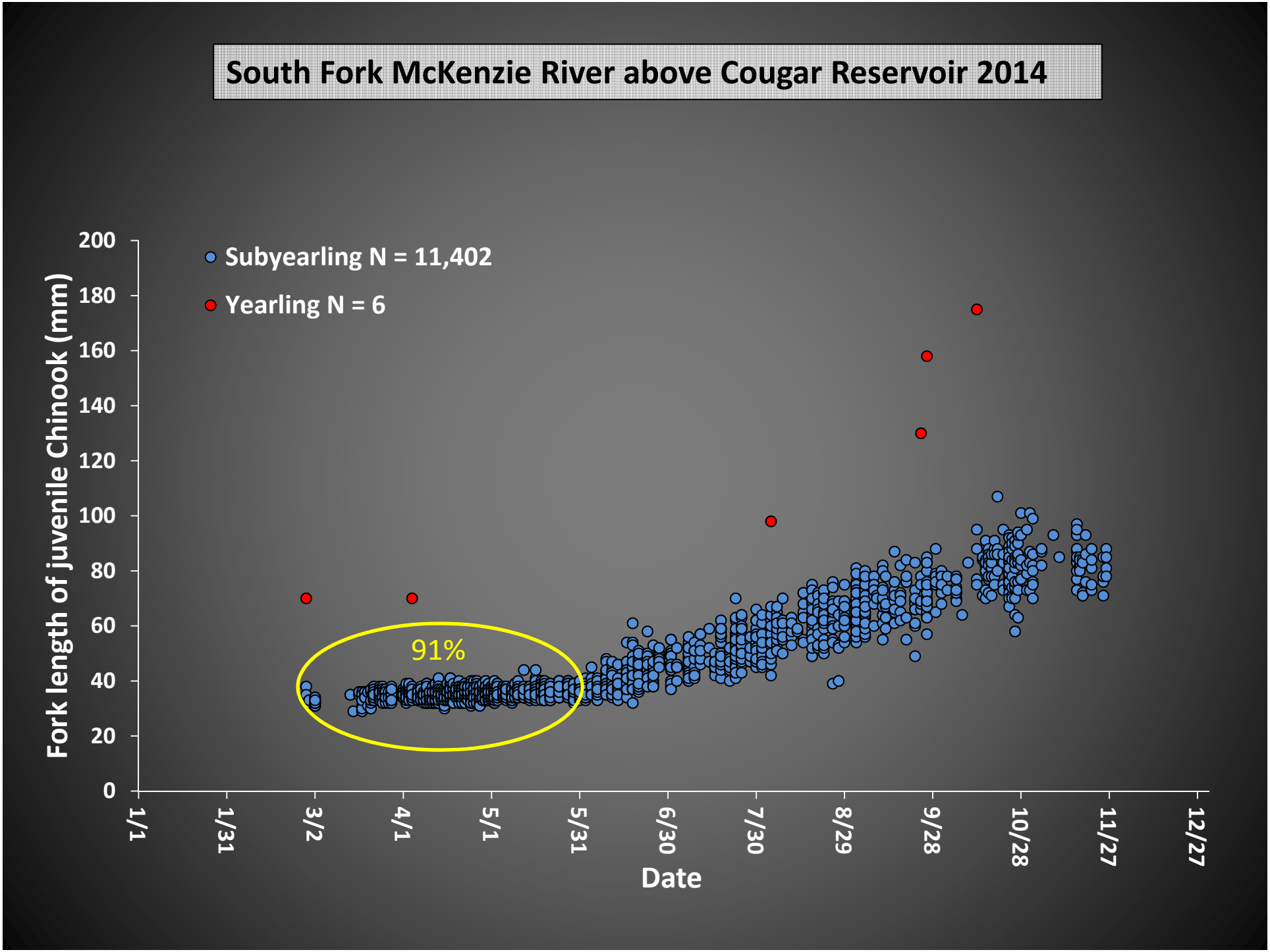
Objectives

Annual monitoring

- Migration timing
- Temporal size of migrants
- Migrant abundance estimates

Long-term monitoring

- Comparisons of migration timing, size, abundance estimates among years
- Estimate the number of adults needed to fully seed available spawning habitat
- Estimate survival of a cohort through the Cougar Project


South Fork McKenzie River above Cougar Reservoir 2014
Subyearling N = 11,402
Yearling N = 6
91%
Fork length of juvenile Chinook (mm)
0
20
40
60
80
100
120
140
160
180
200
1/1
1/31
3/2
4/1
5/1
5/31
6/30
7/30
8/29
9/28
10/28
11/27
12/27
Date


Median migration dates for juvenile spring Chinook upstream of WVP projects					
Location	Year				
	2010	2011	2012	2013	2014
North Santiam	--	May 6	May 14	May 14	May 8
Breitenbush	--	Mar 8	--	--	--
South Santiam	--	--	Mar 7	Feb 28	--[a]
South Fork McKenzie	May 1	May 16	May 16	Apr 26	May 8
Middle Fork Willamette	--	Mar 28	Apr 13	Apr 4	Apr 9

[a] Trap was not running for a 26 day window during what has been the peak of outmigration in previous years.

South Fork McKenzie River migrant estimates

Brood Year (BY)	Migrant estimate	95% CI	Number of BY females	Total Number of redds (peak)	Number of redds below trap
2009	685,723	±72,519	629	274	< 5
2010	152,159	±26,665	320	190	--
2011	228,241	±34,715	336	241	29
2012	557,526	±66,031	448	249	33
2013	413,515	±56,164	337	146[a]	--[b]

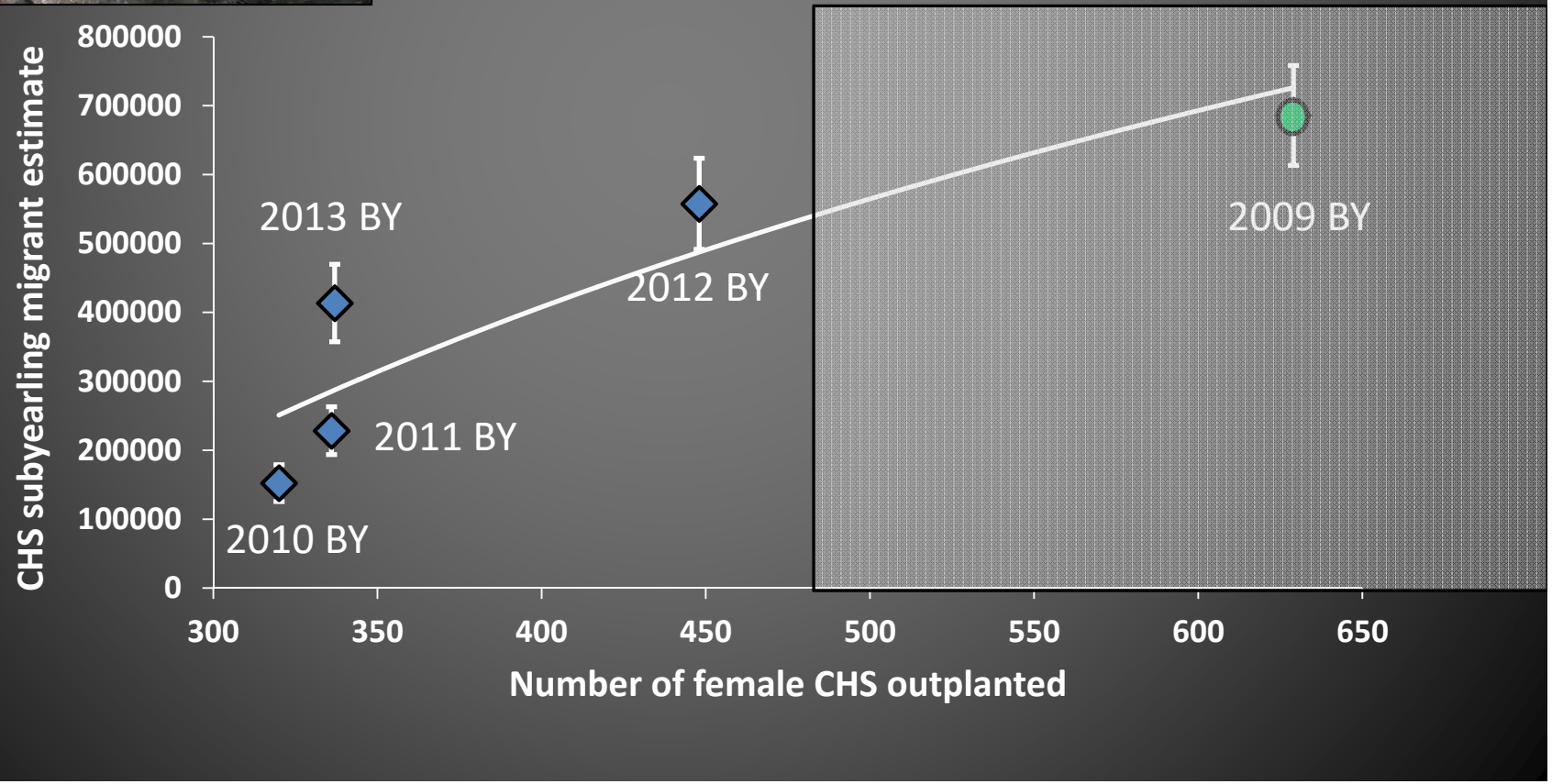
[a] Storm event in fall 2013 near peak spawn decreased redd numbers by flattening redds (2013) brood year. [b] Redds below trap were not surveyed.

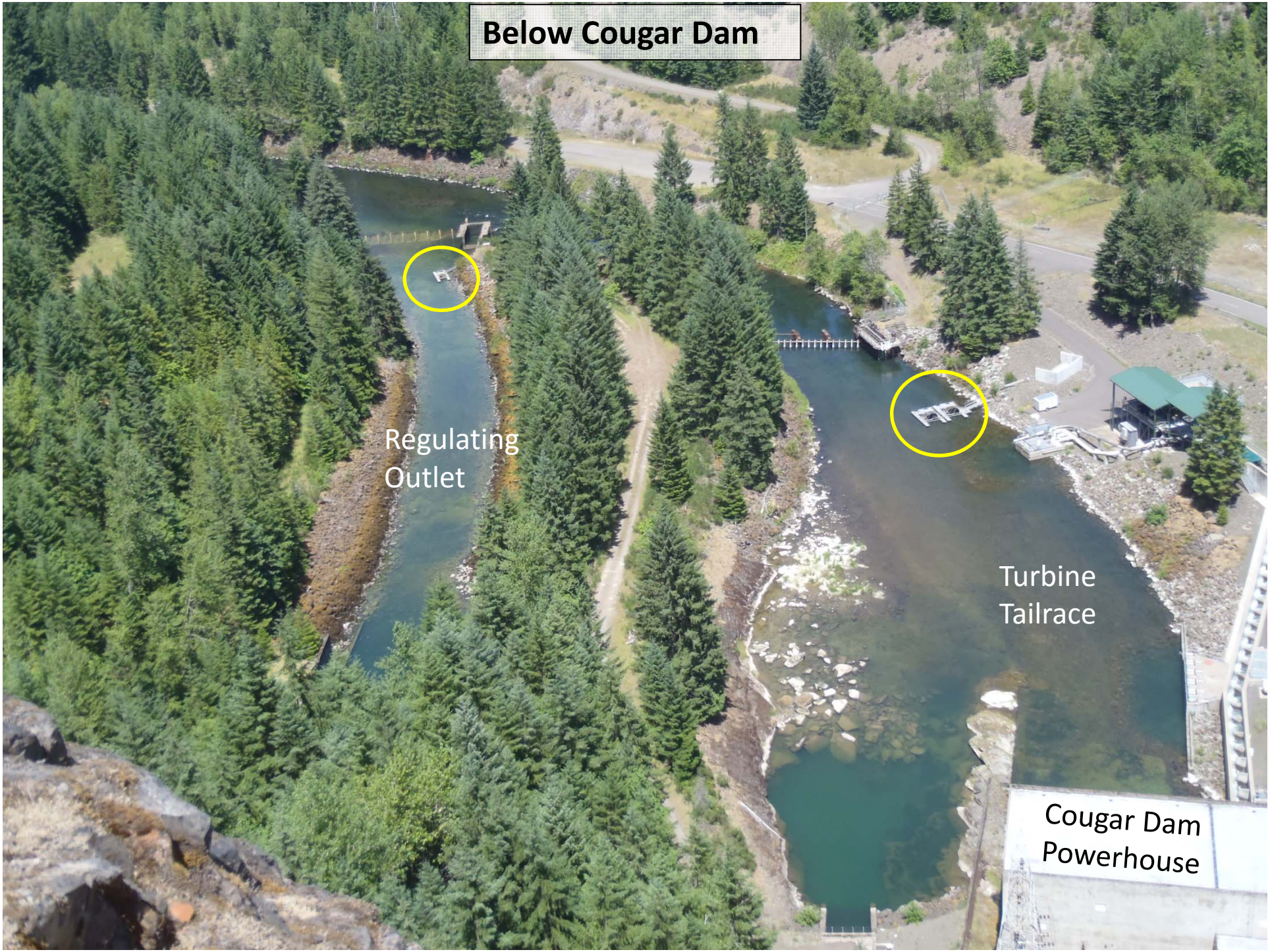

Photo: ODFW OASIS Project

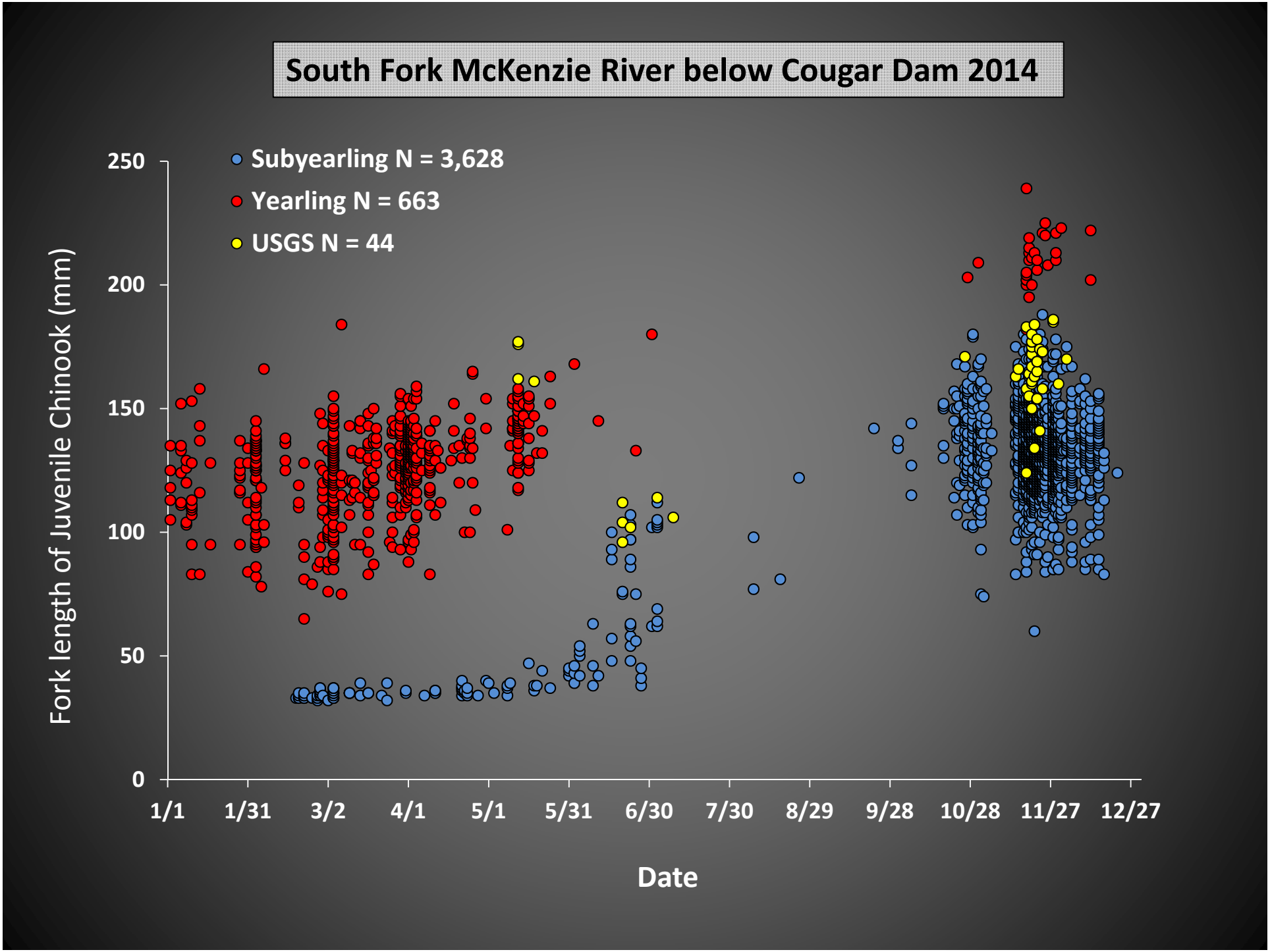
South Fork McKenzie River

Conceptual Exercise Alert

Can we estimate carrying capacity for available spawning habitat?

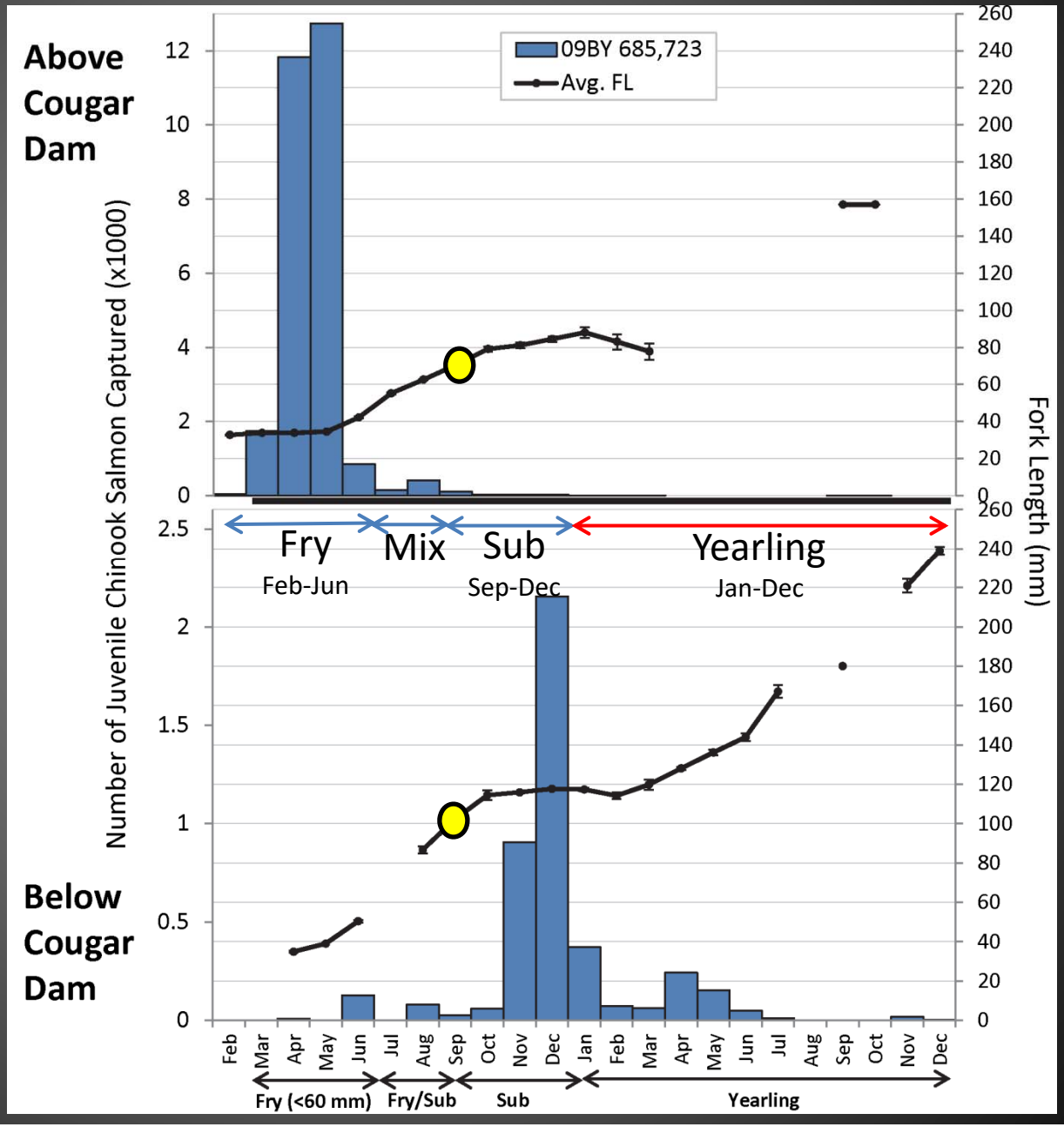



Below Cougar Dam
Regulating Outlet
Turbine Tailrace
Cougar Dam Powerhouse

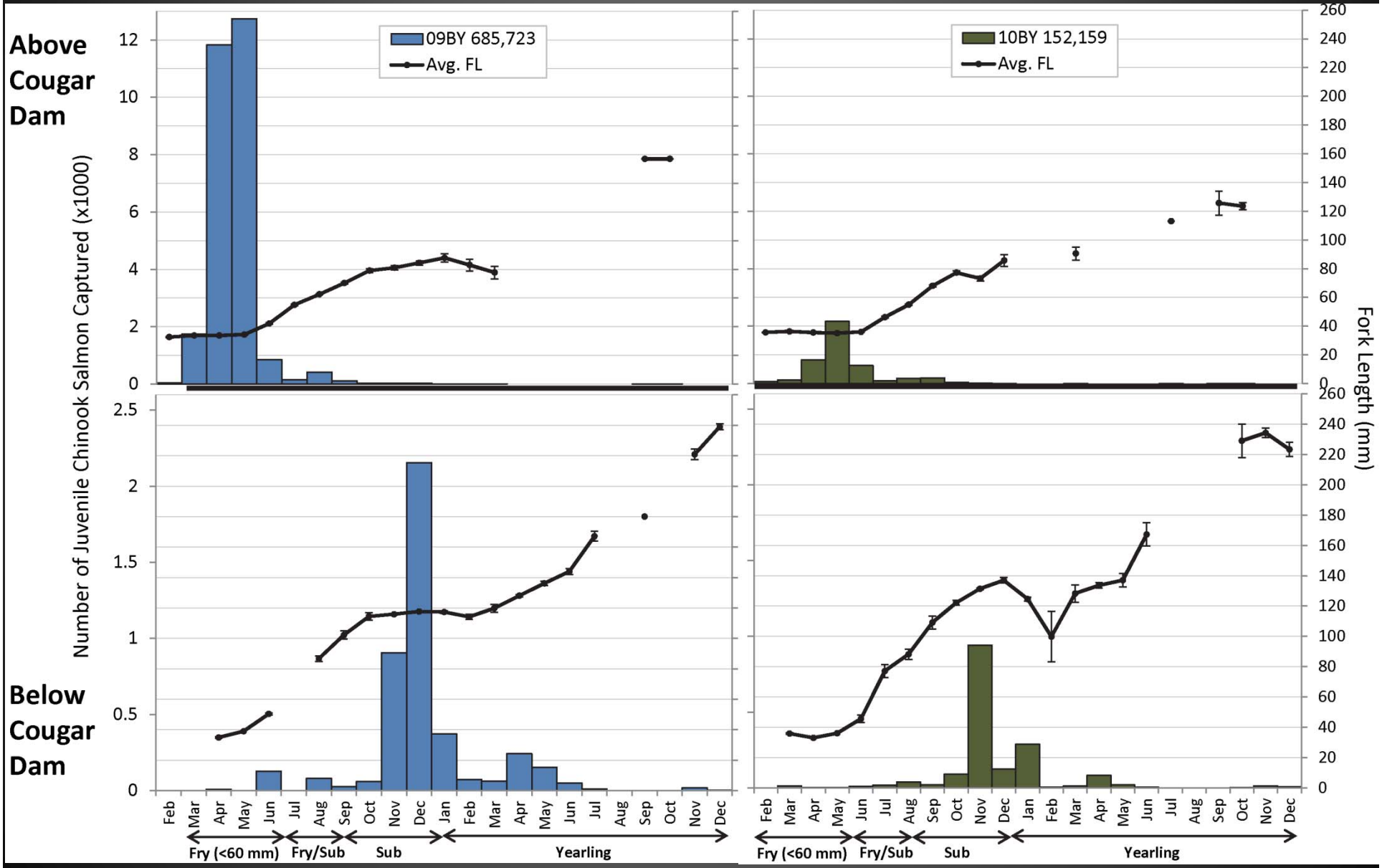

South Fork McKenzie River below Cougar Dam 2014
Subyearling N = 3,628
Yearling N = 663
USGS N = 44
Fork length of Juvenile Chinook (mm)
250
200
150
100
50
0
1/1
1/31
3/2
4/1
5/1
5/31
6/30
7/30
8/29
9/28
10/28
11/27
12/27
Date

Comparison of migration timing and size above and below Cougar Dam

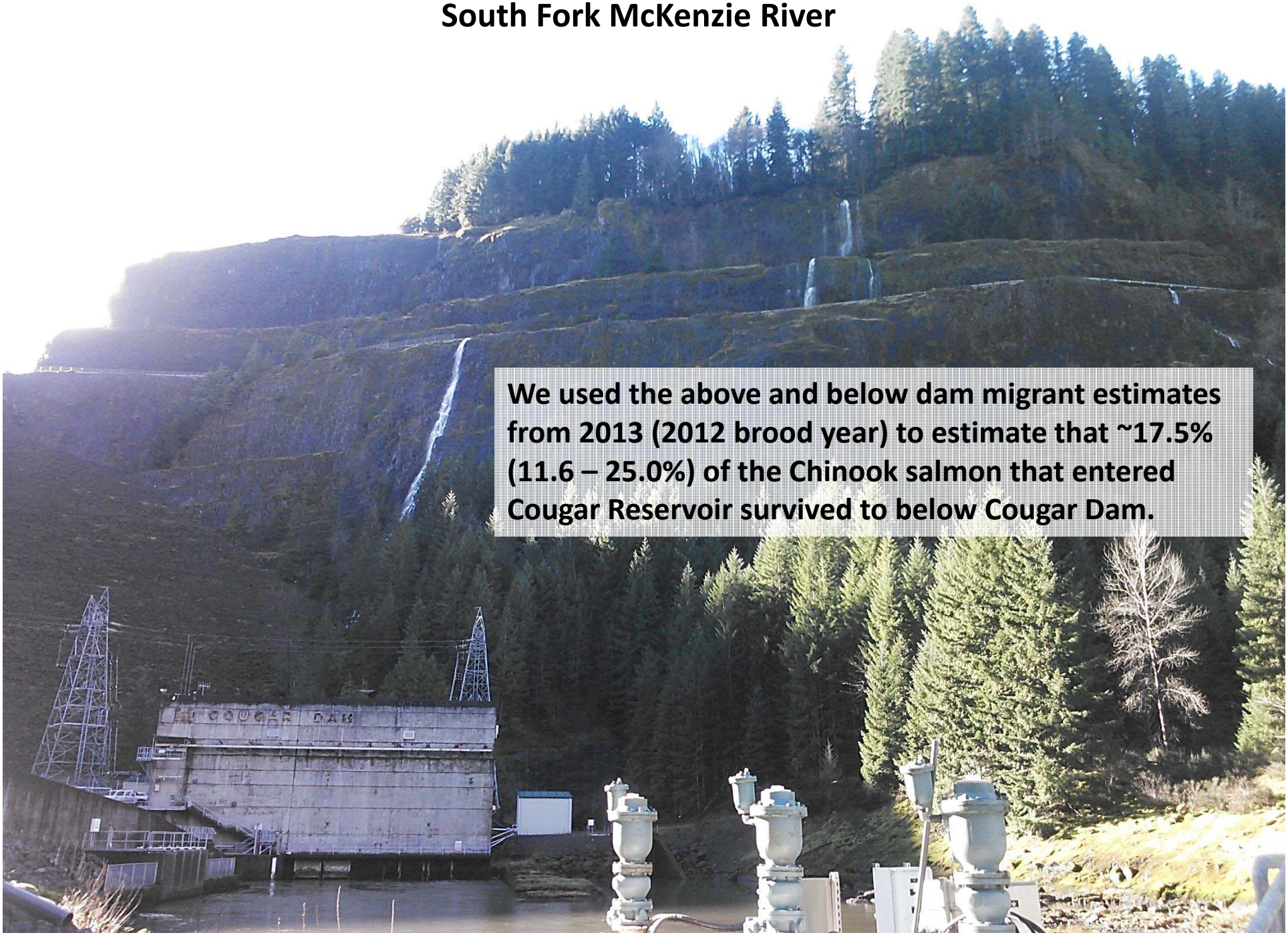
Tracking a brood year through time (22 months)



Migration timing is consistent under current operations
Strength of brood year is highly variable

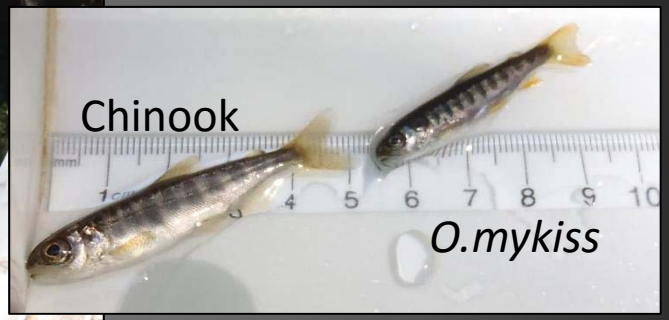


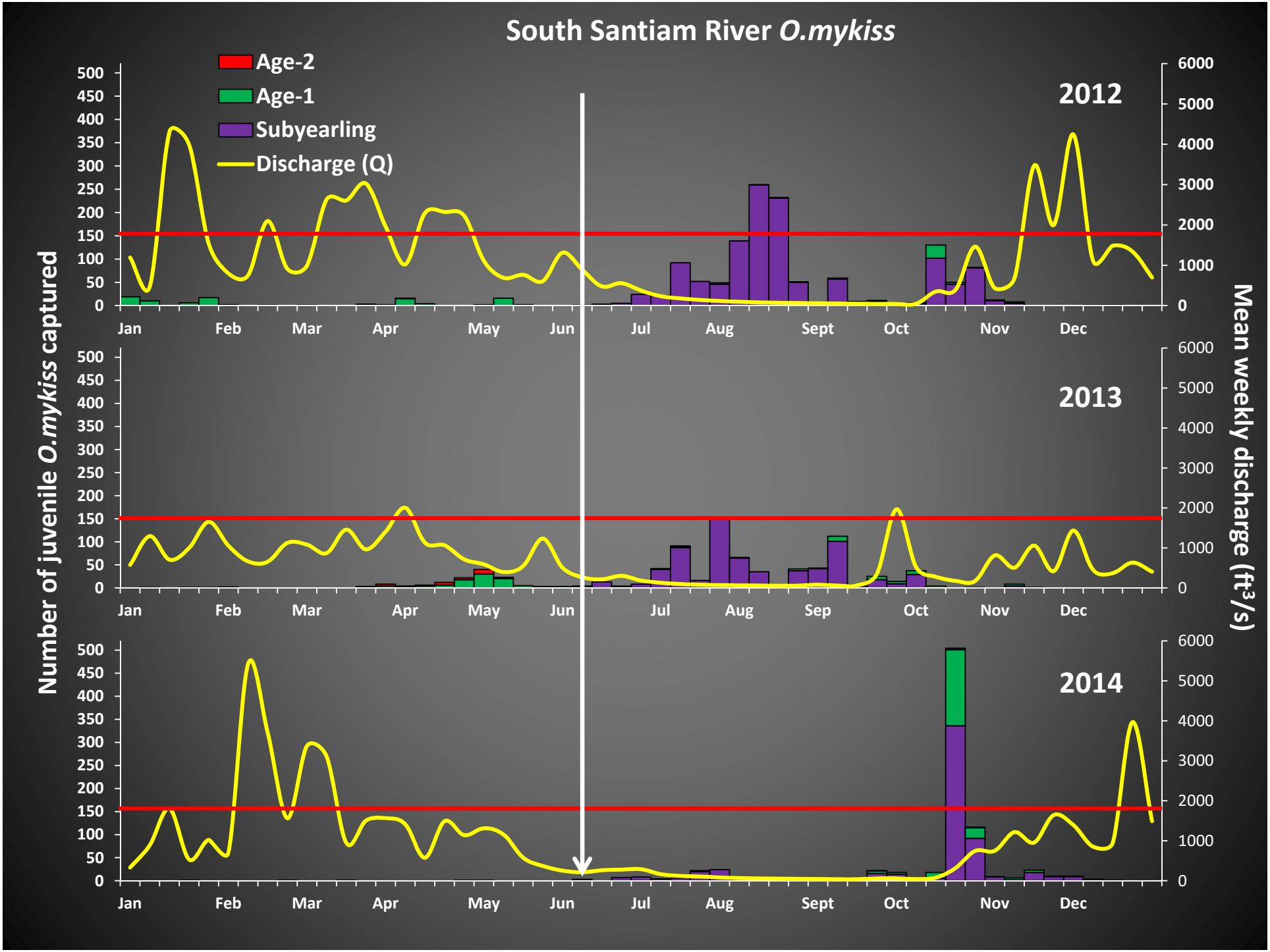
South Fork McKenzie River



We used the above and below dam migrant estimates from 2013 (2012 brood year) to estimate that ~17.5% (11.6 – 25.0%) of the Chinook salmon that entered Cougar Reservoir survived to below Cougar Dam.

South Santiam River above Foster Reservoir




South Santiam River O.mykiss
Age-2
Age-1
Subyearling
Discharge (Q)
2012
2013
2014
Number of juvenile O.mykiss captured
Mean weekly discharge (ft3/s)
0
50
100
150
200
250
300
350
400
450
500
0
1000
2000
3000
4000
5000
6000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Sep
Oct
Nov
Dec

Summary

Juvenile Chinook above and below WVP dams

- In all sub-basins and years we sampled, a majority of Chinook enter reservoirs as fry (<60 mm) in the spring and exit as subyearlings in fall.
- Migration timing is similar in Middle Fork Willamette and South Santiam rivers, but earlier than North Santiam and South Fork McKenzie.
- As more data are collected, migrant abundance estimates may be used to estimate carrying capacity of spawning habitat above Cougar Reservoir.
- Migrant estimates between consecutive years can be highly variable.
- Above and below dam screw trapping can be used to estimate survival through projects where sufficient data are available.

Juvenile *O.mykiss* in the South Santiam River

- Emergence timing in the South Santiam is consistent among years.
- Migration timing for different age classes into Foster Reservoir is highly variable among years.

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http://oregonstate.edu/dept/ODFW/willamettesalmonidrme/reservoir-research