Migration, Survival, Growth, and Fate of Hatchery Juvenile Chinook Salmon Released Above and Below Dams in the North Santiam River

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Objectives

- Estimate the effect that passage through dams and reservoirs in the North Santiam River has on outmigration success (relative survival) of PIT-tagged juvenile hatchery Chinook salmon
- Estimate the effect that passage through dams and reservoirs has on survivorship to adulthood
- Useful ancillary data: migration rate, growth and fate of juvenile Chinook salmon released above and below dams

Study Area

Tagging & Release

2012

~50,000 @ head of Detroit Reservoir (August 10)

- 37,500 CWT+AD
- 12,500 CWT+AD+PIT
- Median 90 mm FL

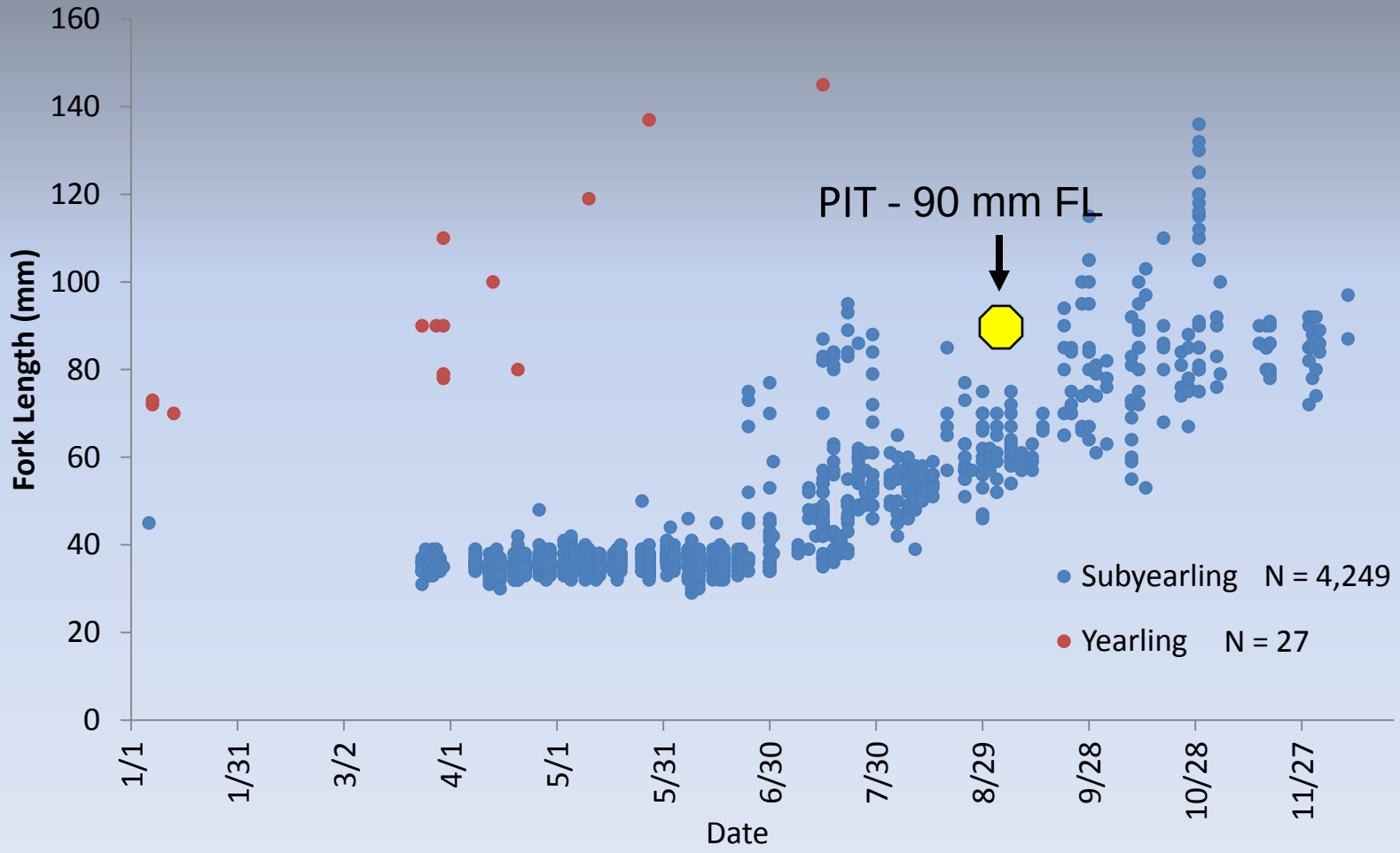
~50,000 @ Minto (August 10)

- 37,500 CWT+AD
- 12,500 CWT+AD+PIT
- Median 90 mm FL

Tagging

Major assumption: hatchery fish are phenotypically similar to "wild" fish entering the reservoir (size, behavior, condition, etc.)

Detroit Reservoir entry, naturally-produced Chinook (Romer et al. 2012)



Recovery

PIT tags (2012-2018):

- Outmigrants at Willamette Falls, <10%?
- Adults at Willamette Falls, 100%
- Other researchers

CWTs (2012-2017):

- Fisheries, hatcheries, spawner surveys

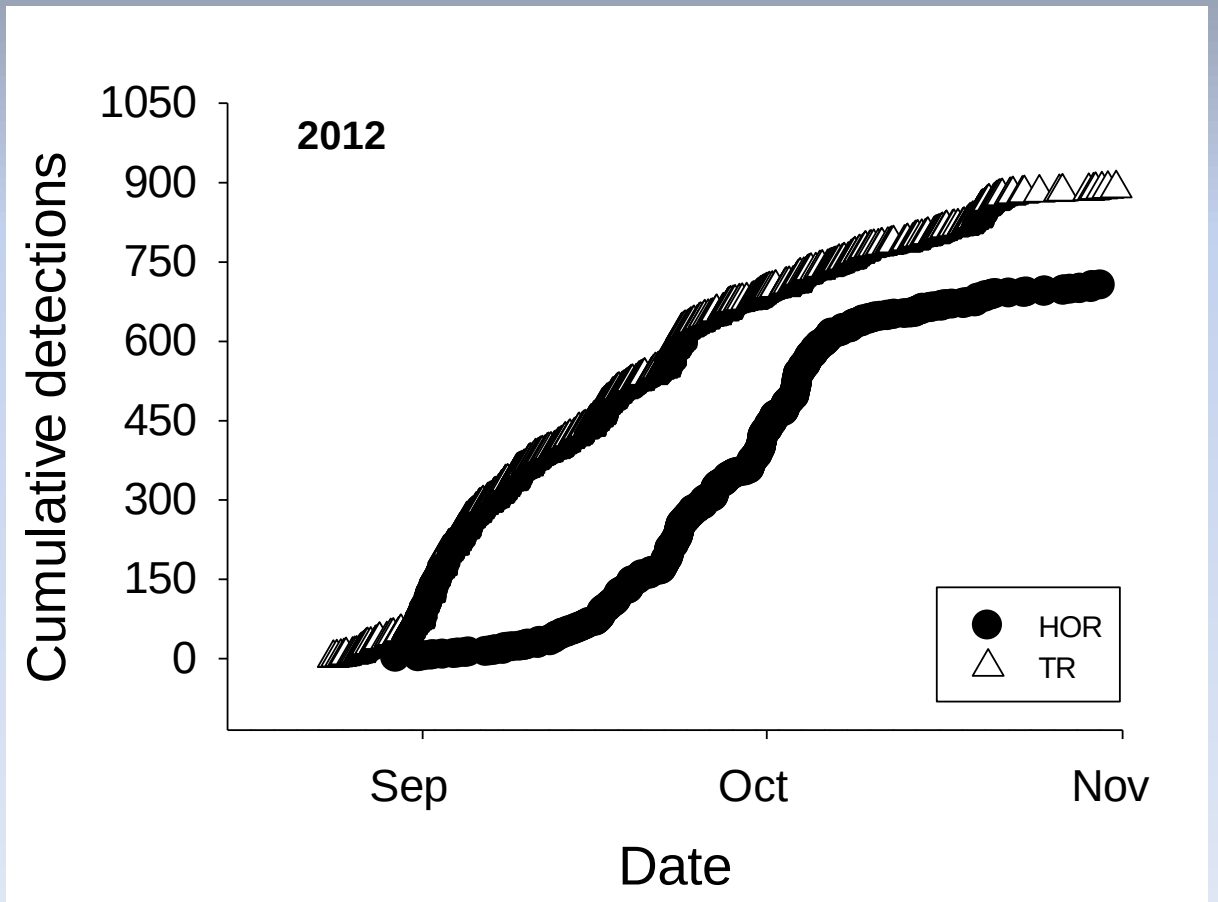
Genetic “tags” (2013-2018?):

- Collection facilities, hatcheries, surveys

Relative Survival

Detroit to Willamette Falls, 2012:

- 7.1% of tailrace group detected (n = 889)
- 5.7% of reservoir group detected (n = 705)
- 6.5% overall detection
- Significantly different; Z=4.72; P<0.001
- 1.3 tailrace fish for every reservoir fish
- more to come?



Relative Survival

Last week's arrivals:

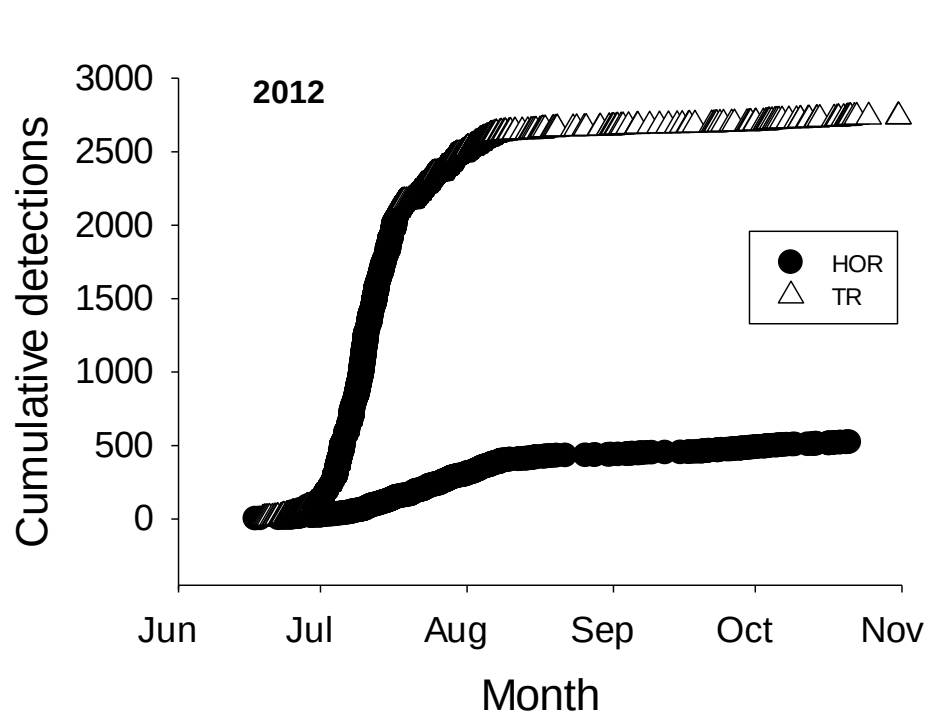
Tag-ID	Basin	Tag Site	Rel. Site	Rel. Date	Det. Date
3D9.1C2E0BA194	North Santiam	MARI	BC TR	08/10/12	01/27/13
3D9.1C2DFCB4D2	North Santiam	MARI	BC TR	08/10/12	01/27/13
3D9.1C2E0B8A16	North Santiam	MARI	BC TR	08/10/12	01/29/13
3D9.1C2E092D81	North Santiam	MARI	BC TR	08/10/12	01/29/13
3D9.1C2E093BCB	North Santiam	MARI	DET RES	08/10/12	01/30/13
3D9.1C2E08DBA1	North Santiam	MARI	BC TR	08/10/12	01/30/13
3D9.1C2E092F8C	North Santiam	MARI	BC TR	08/10/12	01/31/13
3D9.1C2E081D48	North Santiam	MARI	BC TR	08/10/12	01/31/13
3D9.1C2E09780A	North Santiam	MARI	BC TR	08/10/12	01/31/13
3D9.1C2E0944B2	North Santiam	MARI	BC TR	08/10/12	01/31/13
3D9.1C2E0B731C	North Santiam	MARI	DET RES	08/10/12	01/31/13
3D9.1C2E0B8836	North Santiam	MARI	BC TR	08/10/12	01/31/13
3D9.1C2E0BDE64	North Santiam	MARI	BC TR	08/10/12	01/31/13
3D9.1C2E08FAF6	North Santiam	MARI	BC TR	08/10/12	01/31/13
3D9.1C2E07F075	North Santiam	MARI	BC TR	08/10/12	02/01/13
3D9.1C2E07A82D	North Santiam	MARI	BC TR	08/10/12	02/01/13
3D9.1C2E082468	North Santiam	MARI	BC TR	08/10/12	02/02/13
3D9.1C2E091EFE	North Santiam	MARI	BC TR	08/10/12	02/02/13

Relative Survival

Compared to Middle Fork Willamette, 2012:

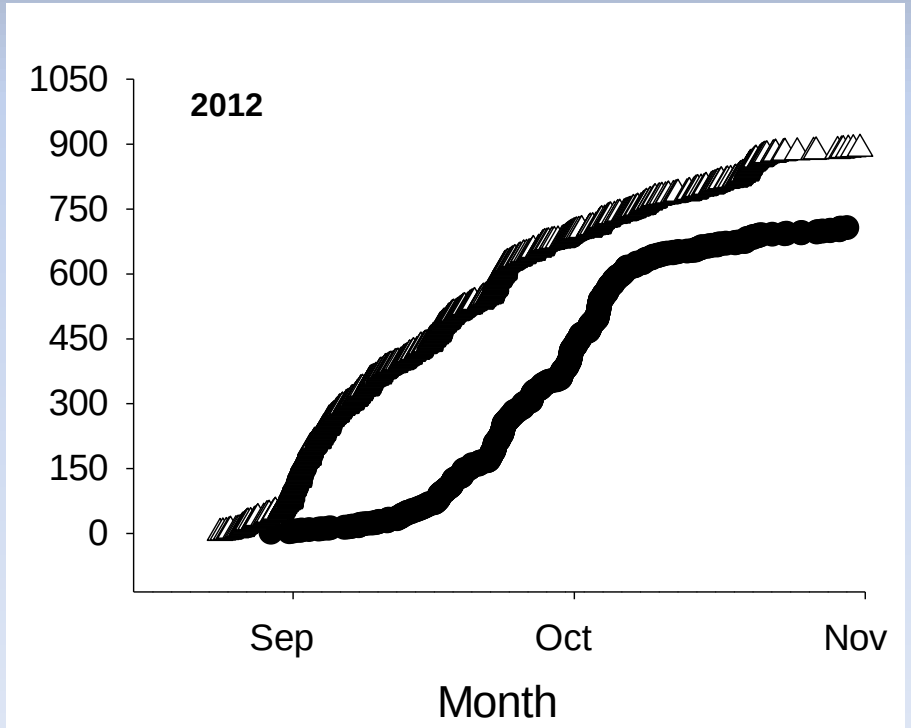
MFWR: FL = 62 mm; released May 23

5.3:1

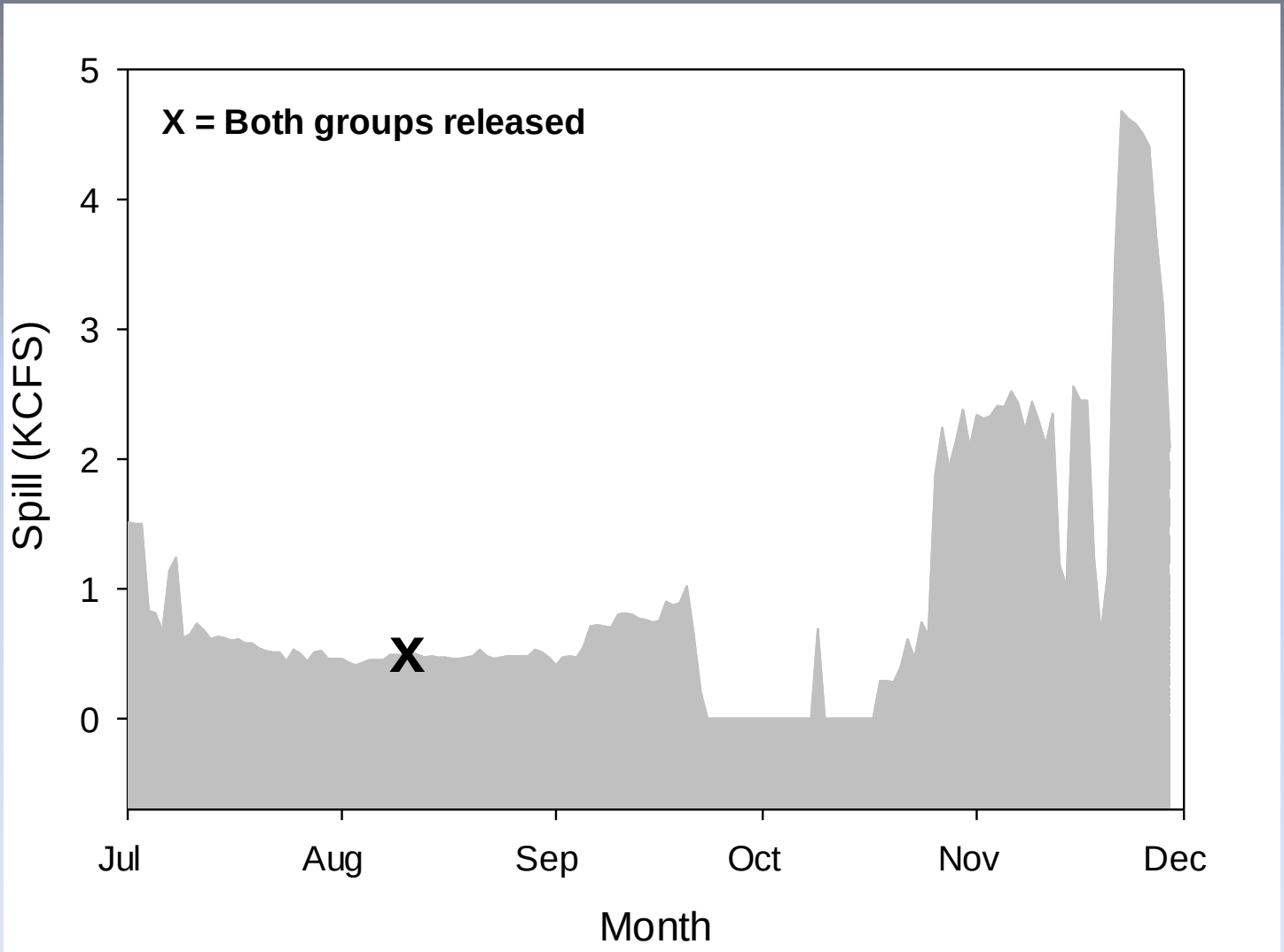


N. Santiam: FL = 91 mm; released Aug. 10

1.3:1



Effects of Dam Operations – Detroit 2012

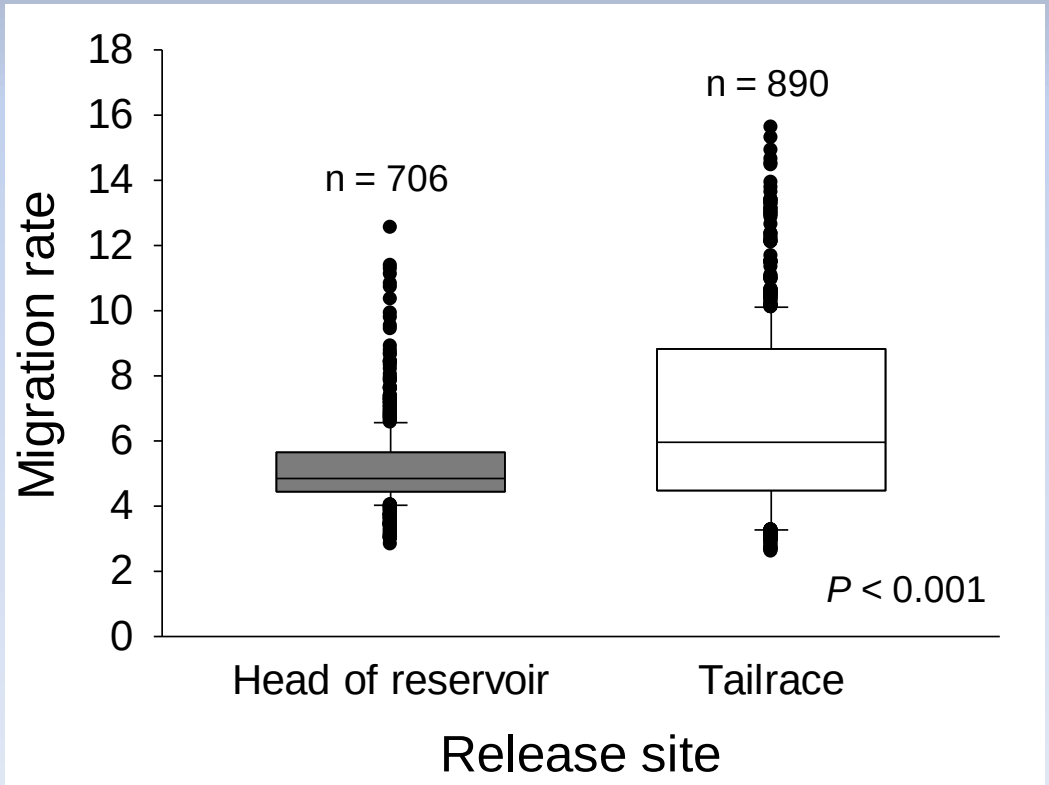


Migration Rate

Median migration rate (km/d), release to Willamette Falls:

Migration rates of ~5.5 km/d – similar to LOP releases

Tailrace group migrated significantly faster (+1.1 km/d) than reservoir group – similar to 2012 LOP

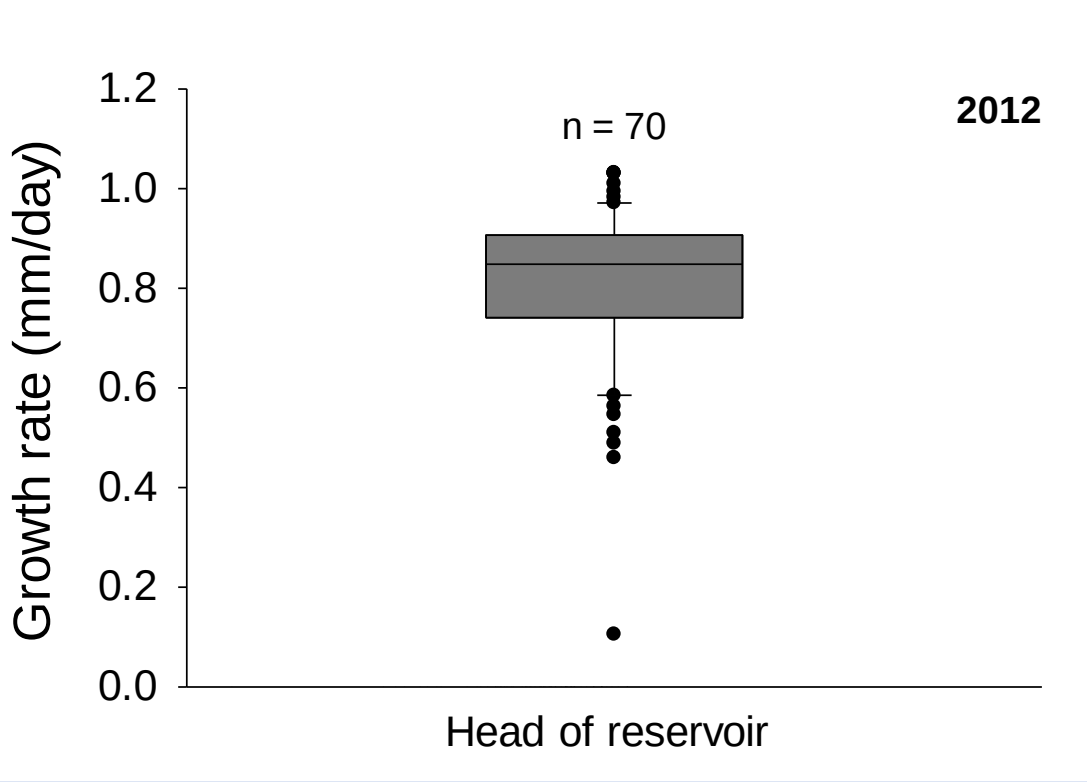


Growth

Median growth rate, 2012:

Reservoir group = 0.85 mm/d

No tailrace release fish recaptured



Fate

No evidence of predation (but we didn't look for it, either)

Fate

Other recapture / recovery:

- ODFW gill net, Detroit Reservoir – 70 PIT, 855 non-PIT
- ODFW screw trap, Detroit tailrace – 2 PIT, 68 non-PIT

Release timing not aligned with mainstem / subbasin juvenile sampling, e.g. Schroeder et al.

Juvenile to Adult Survival

TBD: First adult returns expected in spring 2014

	BY2011	BY2012	BY2013*
Age 3	2014	2015	2016
Age 4	2015	2016	2017
Age 5	2016	2017	2018
Age 6	2017	2018	2019

BY=brood year

* if project continued

Key Points

PIT-tagged Chinook released above projects:

- Grew fast in the reservoir
- Migrated slower to Willamette Falls than tailrace group
- Detected at a lower rate = presumed lower survival
- Relative survival to Willamette Falls much better than Middle Fork Willamette – with caveats – suggesting better reservoir survival and passage efficiency
- No anecdotal observations of predation

❖ 2013 plans: 50K PIT groups @ 65 mm FL, earlier release

Acknowledgments

- USACE - Task Order W9127N-10-2-0008-0009, administered by Rich Piaskowski
- ODFW – Greg Grenbemer & staff; Fred Monzyk, Jeremy Romer, Ryan Emig, Brian Cannon, Luke Whitman
- NOAA – Bill Muir (original concept)
- Biomark, Inc. – PIT tagging
- PSMFC – Tag recovery database
- PGE – Interrogation facility


Questions &
Discussion
NEW WEBSITE
http://oregonstate.edu/dept/ODFW/willamettesalmonidrme