

IMPACTS OF DAM AND RESERVOIR PASSAGE ON OUTMIGRATING JUVENILE CHINOOK SALMON: RESULTS FROM A PAIRED RELEASE STUDY IN THE UPPER WILLAMETTE BASIN

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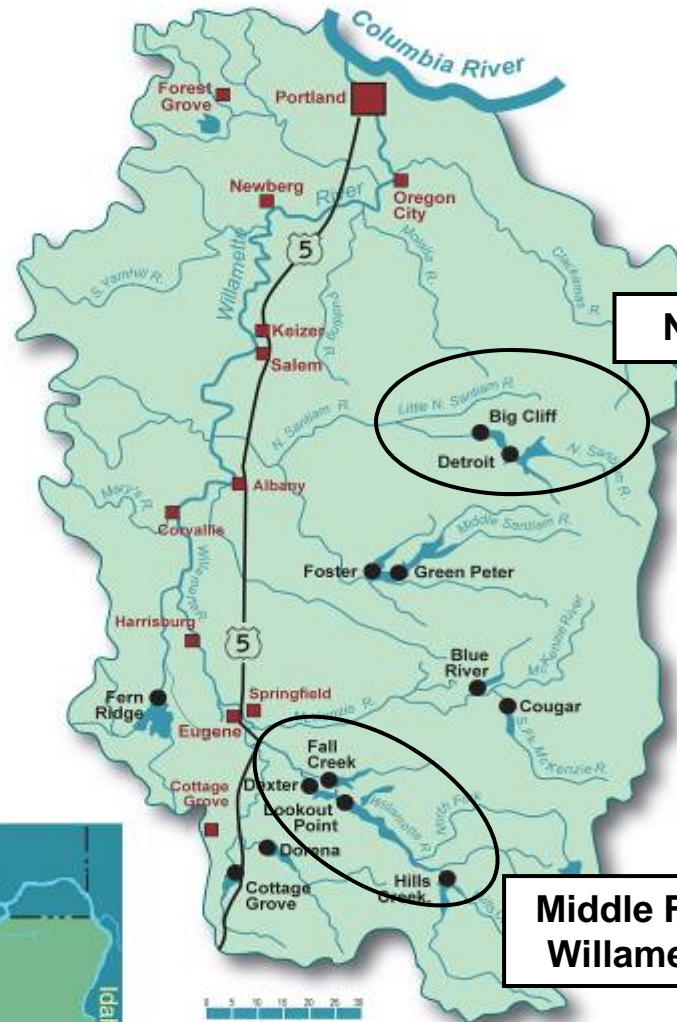


Oregon Department of Fish and Wildlife
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The Willamette Basin



US Army Corps of Engineers
Portland District



North Santiam

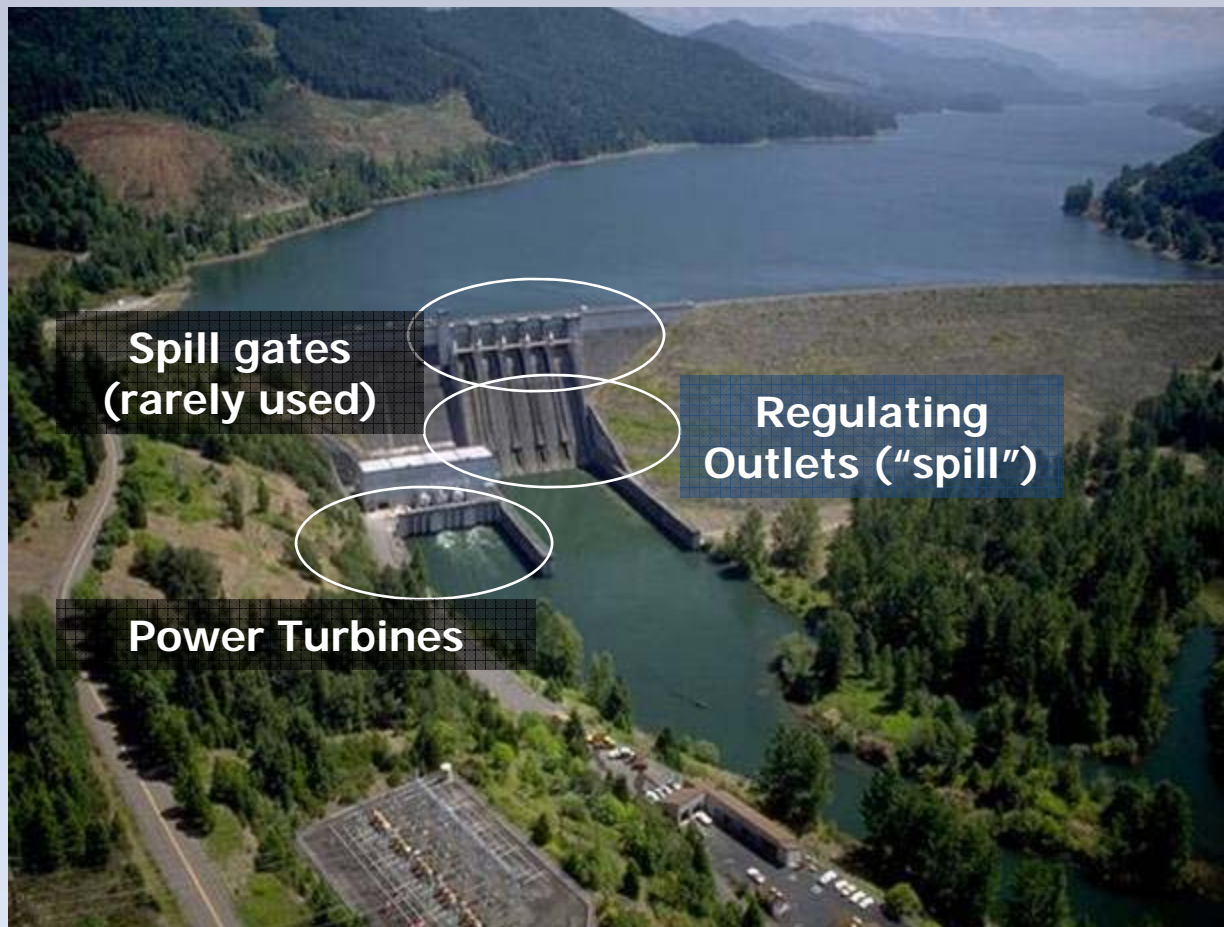
Middle Fork Willamette



Courtesy USACE

The Problem

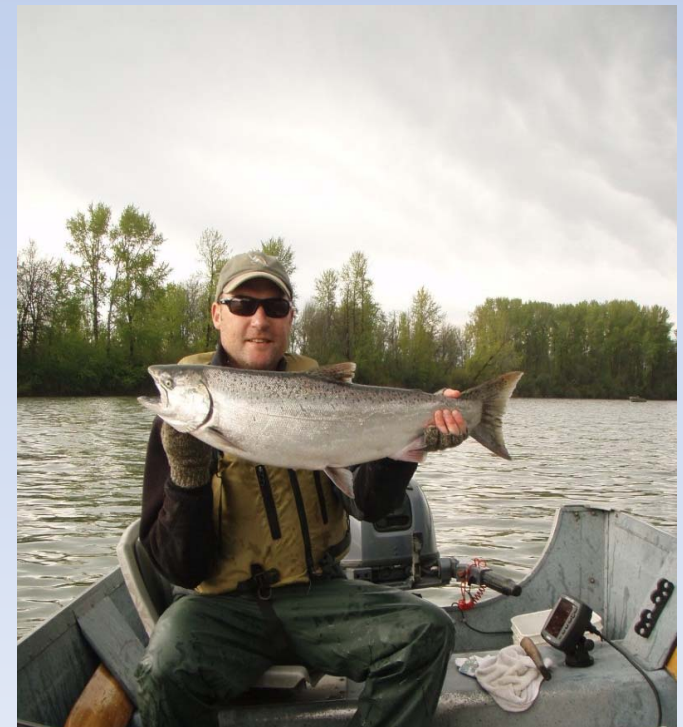
Majority of Historical Spawning Habitat Blocked



- High head dams
- No fish ladders
- Elevated water temperatures
- Long reservoirs
 - Predators
- Pathogens/parasites
- ESA threatened listing 1999 (Chinook salmon)

Objectives

- Estimate the effect that passage through dams and reservoirs has on juvenile hatchery Chinook salmon focusing on:
 - Outmigration success of juveniles
 - Survivorship to adulthood



Tagging

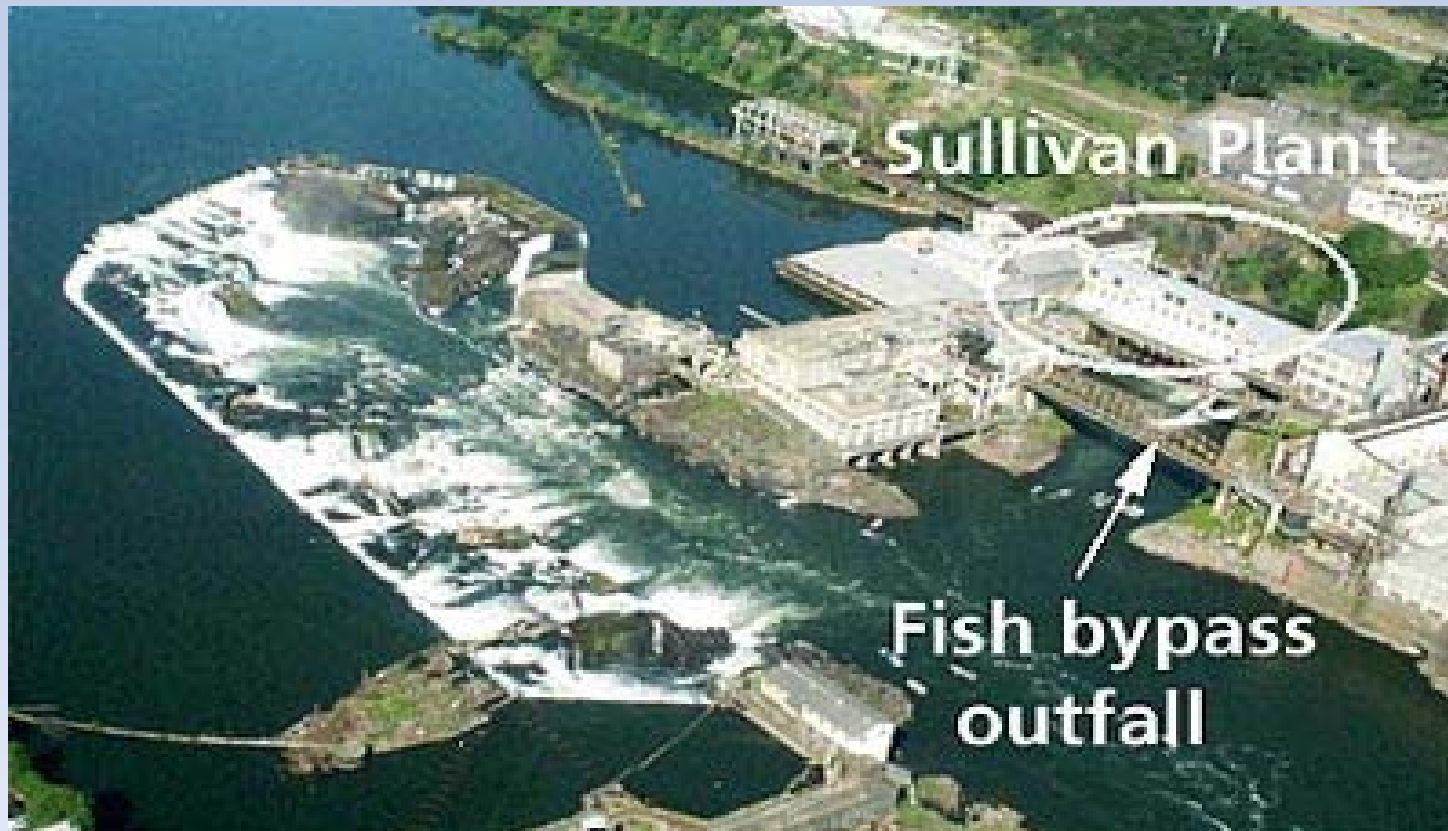
Major assumption: hatchery fish are phenotypically similar to naturally-produced fish entering the reservoir (size, timing, behavior, condition, etc.)



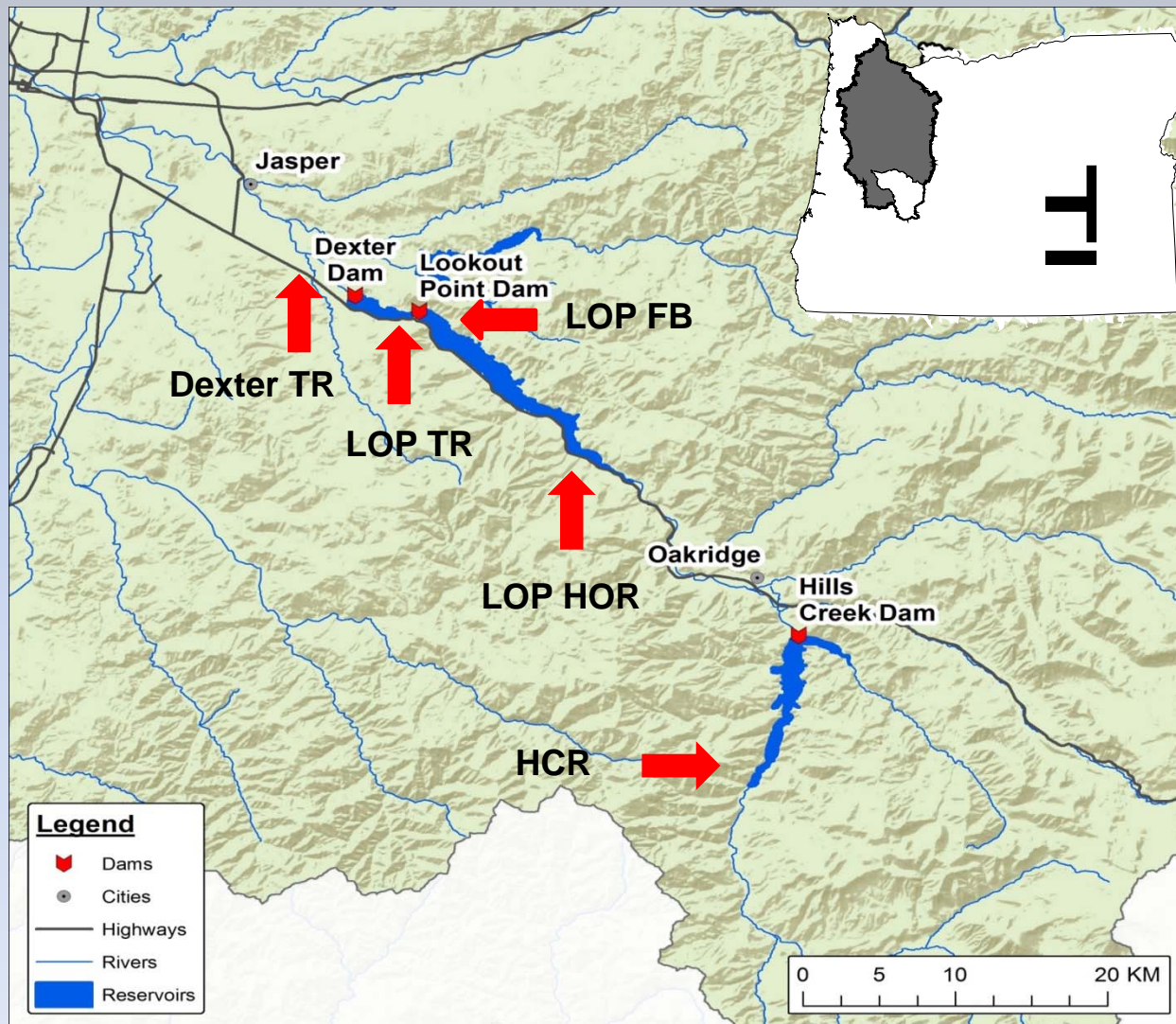
Detection & Recovery

PIT tags (2011-2020):

- Outmigrants at Willamette Falls, <10% detection efficiency
- Adults at Willamette Falls, 100% detection efficiency



Study Area and Release Sites– MFW



HCR=Hills Creek
Reservoir

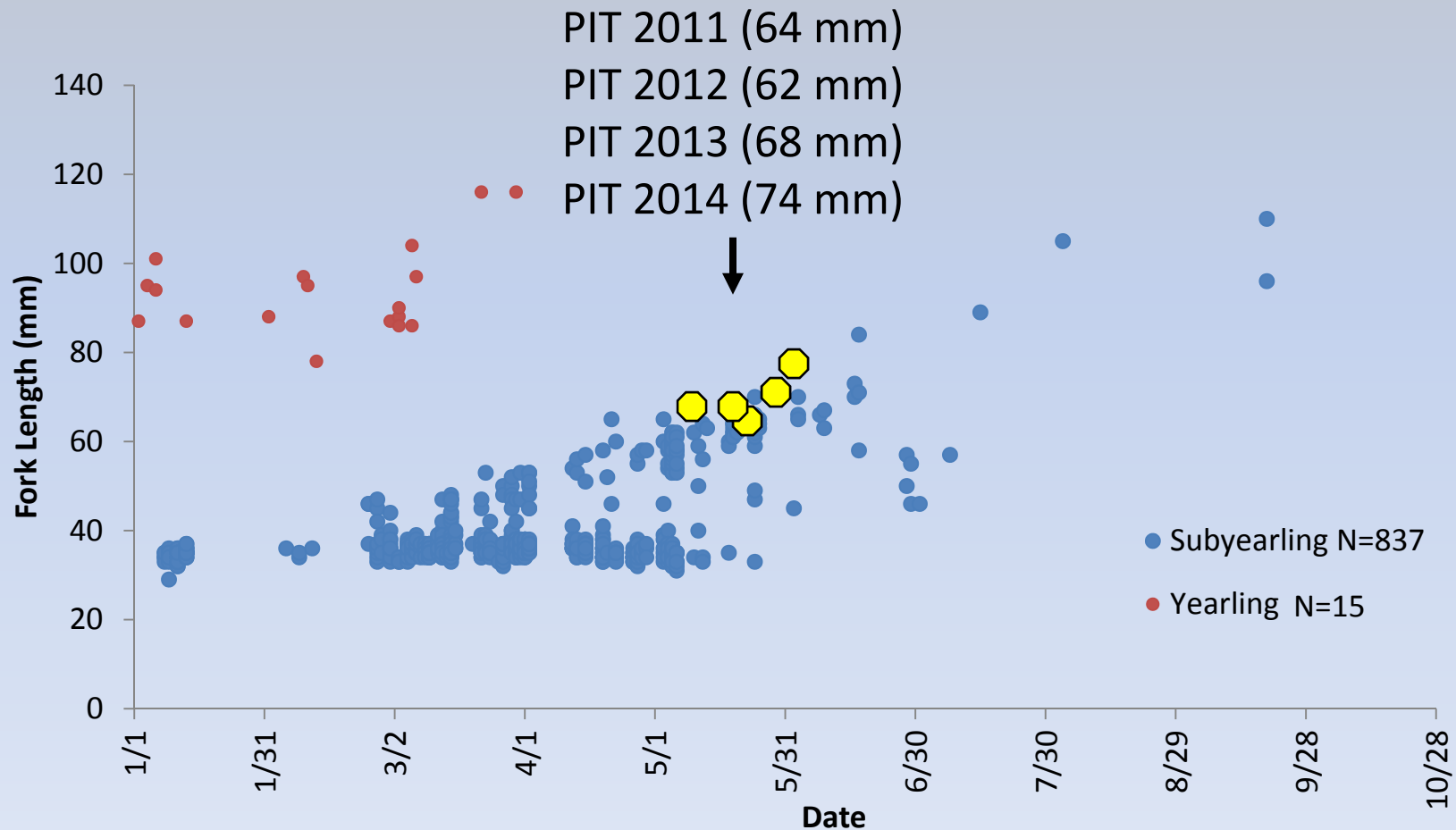
LOP=Lookout Point

HOR=Head of Reservoir

FB=Forebay

TR=Tailrace

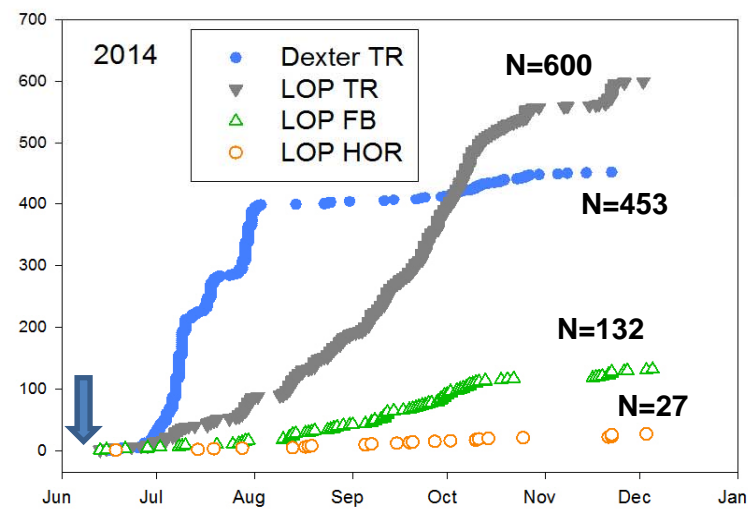
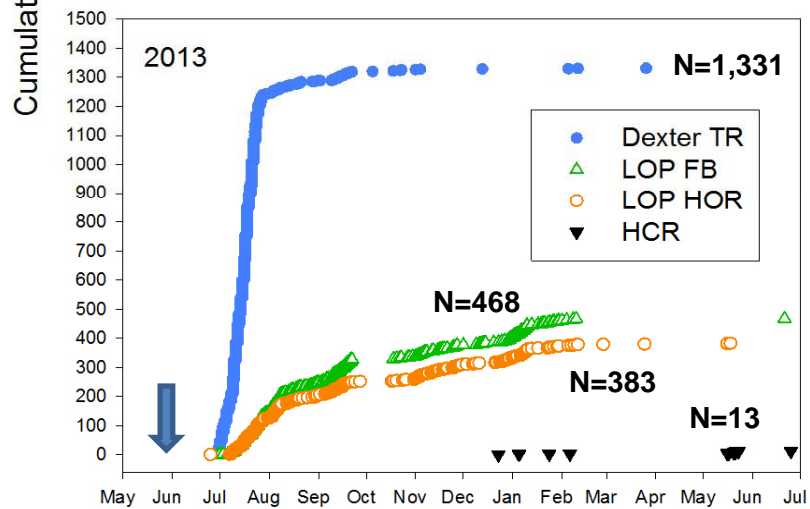
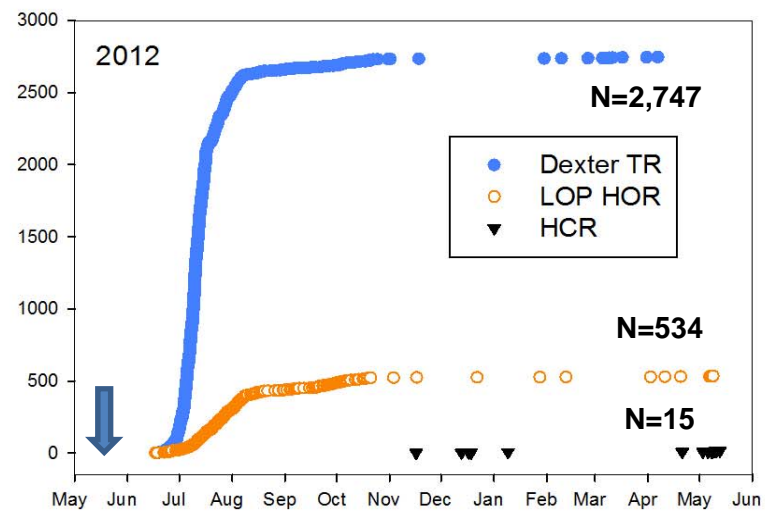
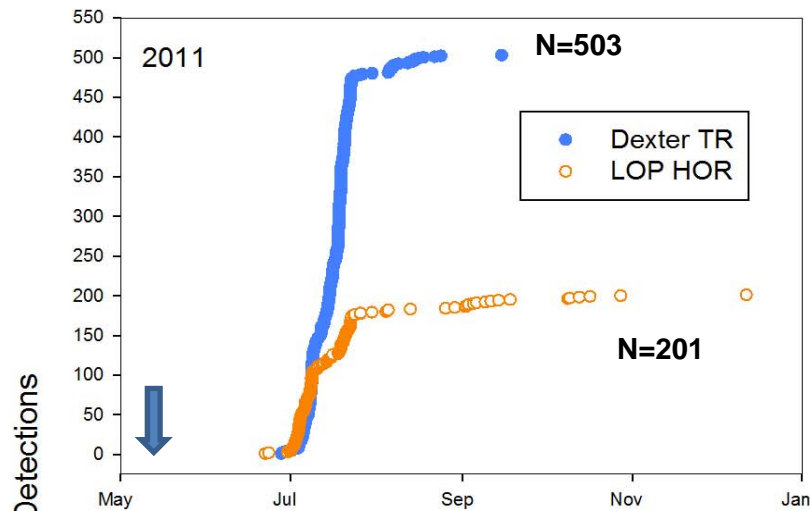
Lookout Point Reservoir entry, naturally-produced Chinook (Romer et al. 2012)



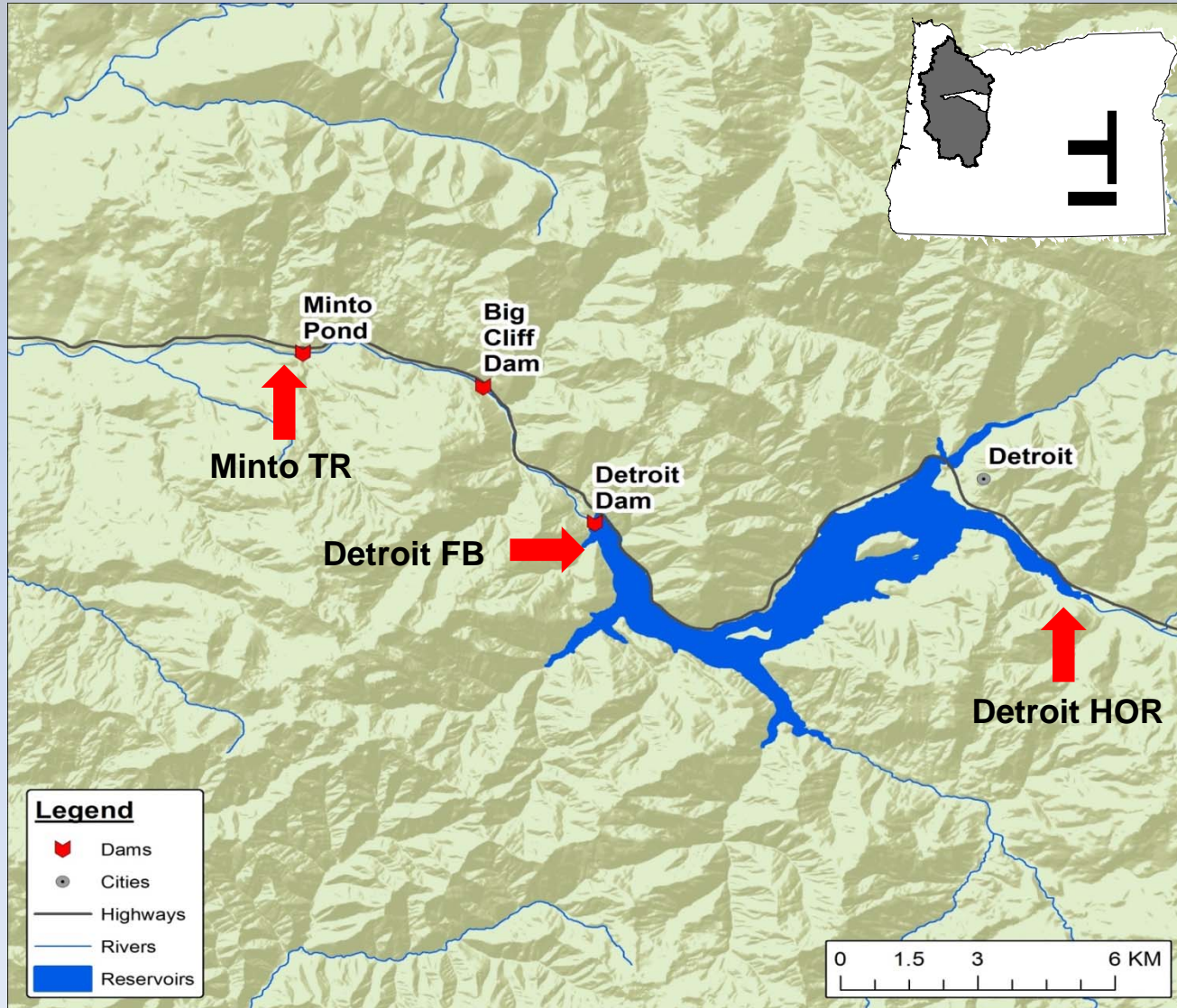
Tagging & Release – MFW

	Release Location				
Release Year	Dexter TR	LOP TR	LOP FB	LOP HOR	HCR
2011	6K	--	--	6K	--
2012	50K	--	--	50K	50K
2013	37K	--	37K	37K	33K
2014	33K	33K	33K	33K	--

Outmigration Success—MFW



Study Area and Release Sites – North Santiam

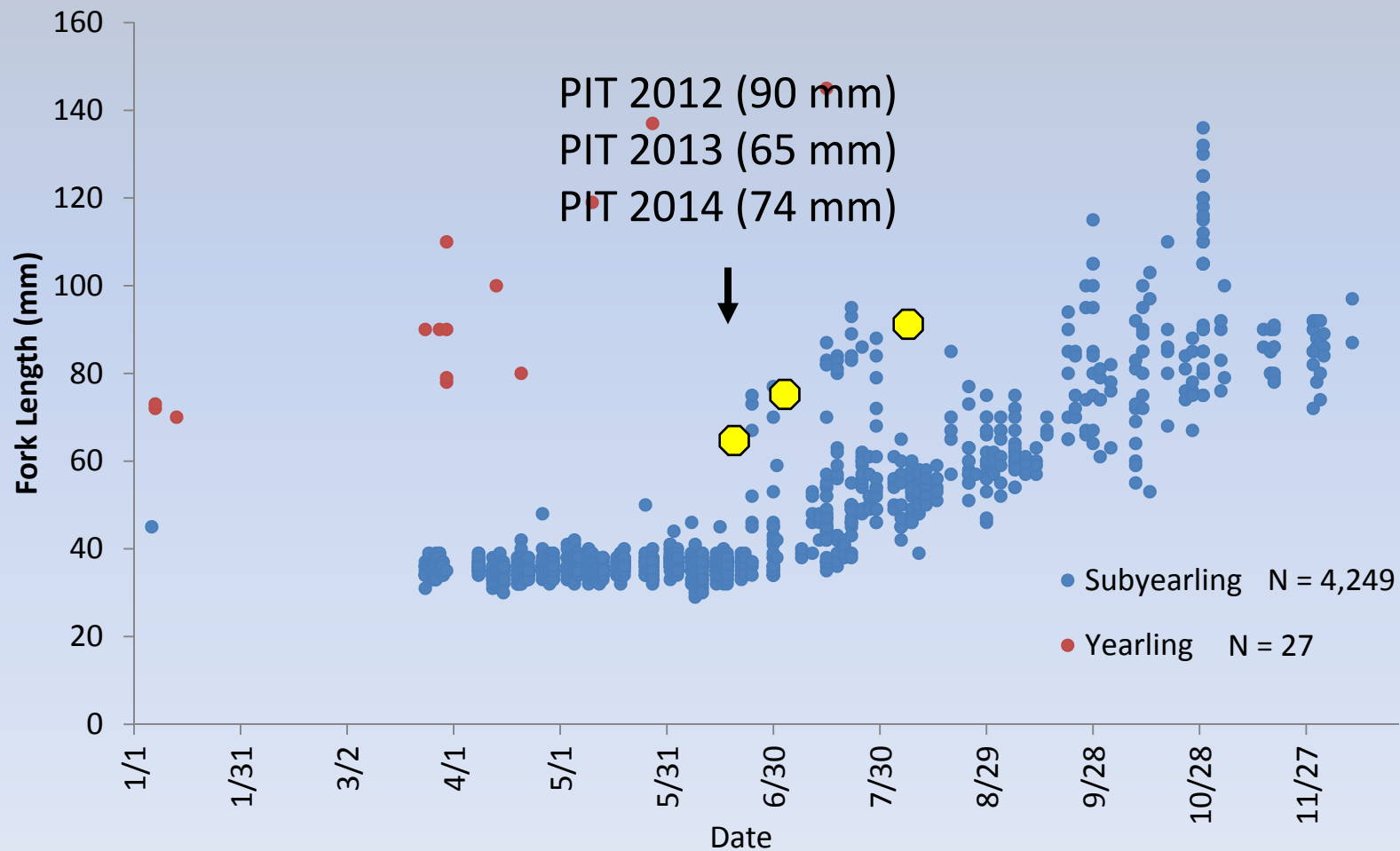


HOR=Head of Reservoir

FB=Forebay

TR=Tailrace

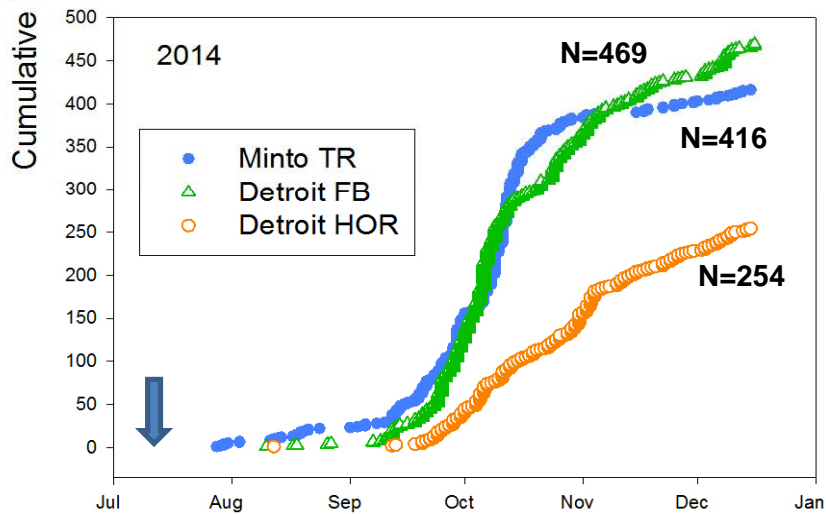
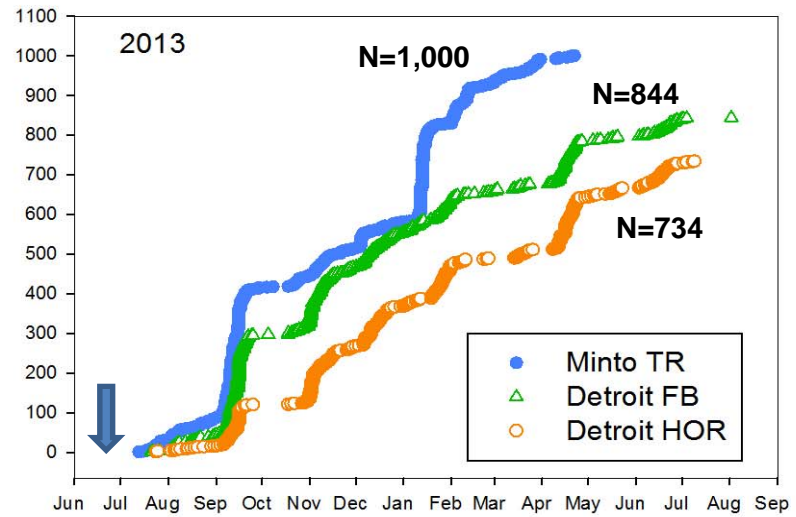
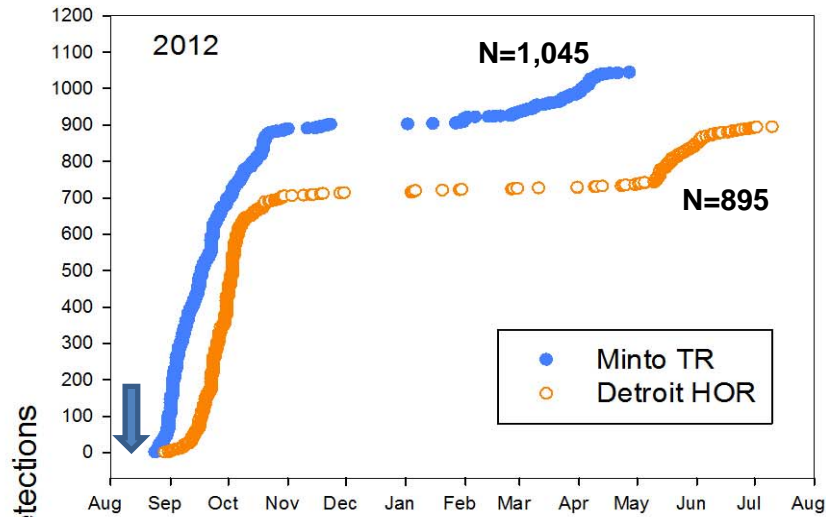
Detroit Reservoir entry, naturally-produced Chinook (Romer et al. 2012)



Tagging & Release – NS

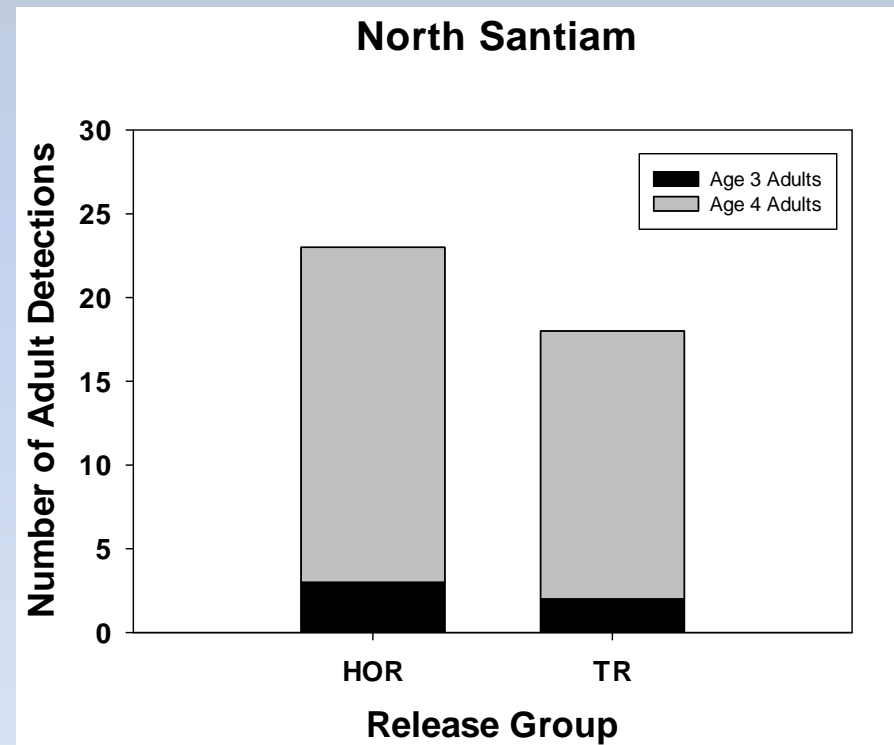
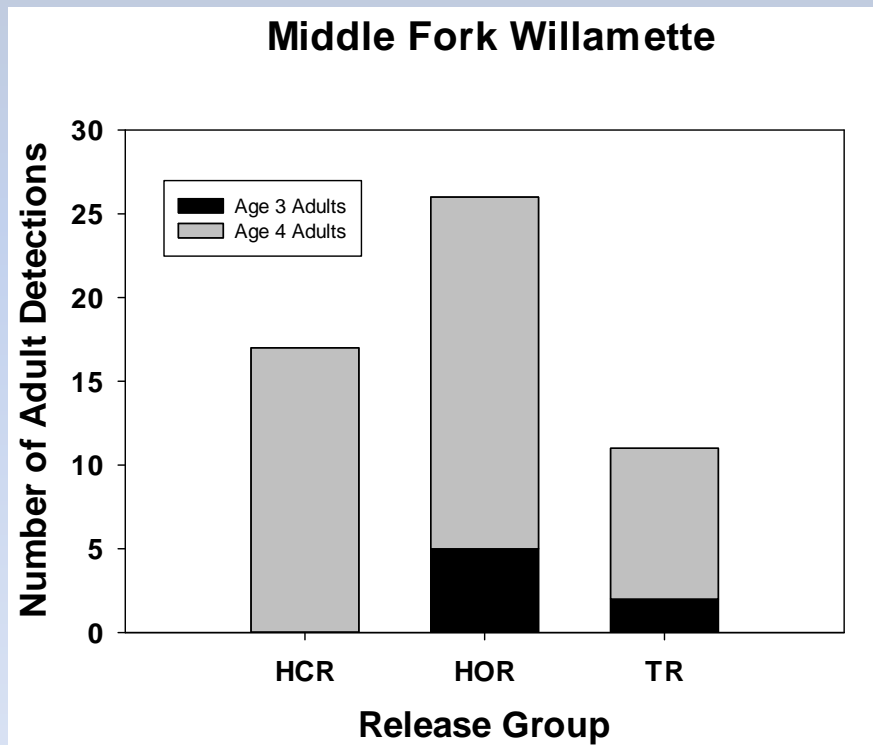
	Release Location		
Release Year	Minto TR	Detroit FB	Detroit HOR
2012	12K	--	12K
2013	33K	33K	33K
2014	33K	33K	33K

Outmigration Success—NS



Juvenile to Adult Survival

Adult Detections at Willamette Falls



**2012 Release Year for both basins

Key Points

Fish released above dams:

- Detected at a lower rate=consistent evidence of dam/reservoir impacts related to lower outmigration success; impacts appear to be greater in the MFW

Middle Fork Willamette

Year	Ratio (TR:HOR)	Effect
2011	2.5:1	60%
2012	5.1:1	81%
2013	3.4:1	71%
2014	16.8:1	94%

North Santiam

Year	Ratio (TR:HOR)	Effect
2012	1.8:1	15%
2013	1.6:1	36%
2014	1.6:1	39%

- Better survival to adulthood in both basins than tailrace releases (!) – based on partial cohort returns

Acknowledgments

- USACE - Task Order W9127N-10-2-0008-0009, administered by Rich Piaskowski; Greg Taylor, Todd Pierce, Doug Garletts, Chad Helms, Nathaniel Erickson et al.
- ODFW – Dan Peck & staff; Fred Monzyk, Jeremy Romer, Ryan Emig, Kelly Reis
- NOAA – Bill Muir (original concept)
- Biomark, Inc. – PIT tagging
- PSMFC – Tag recovery database
- PGE – Interrogation facility

A landscape photograph showing a large reservoir in the foreground. The water is calm and greyish. In the middle ground, there is a cleared, brownish area, possibly a reservoir bed or a cleared field. The background features rolling hills and mountains covered in dense evergreen forests, with patches of snow on the upper slopes. Power lines are visible in the upper part of the image.

Questions & Discussion

<http://oregonstate.edu/dept/ODFW/willamettesalmonidrme>