



Use of PIT Tag Technology for Fish Tracking in the Gorge: Who's doing what, where, and why?

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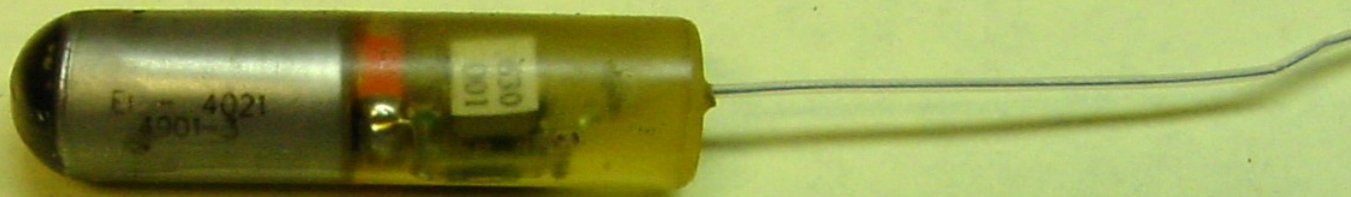
U.S. Department of the Interior
U.S. Geological Survey

What I want to do today:

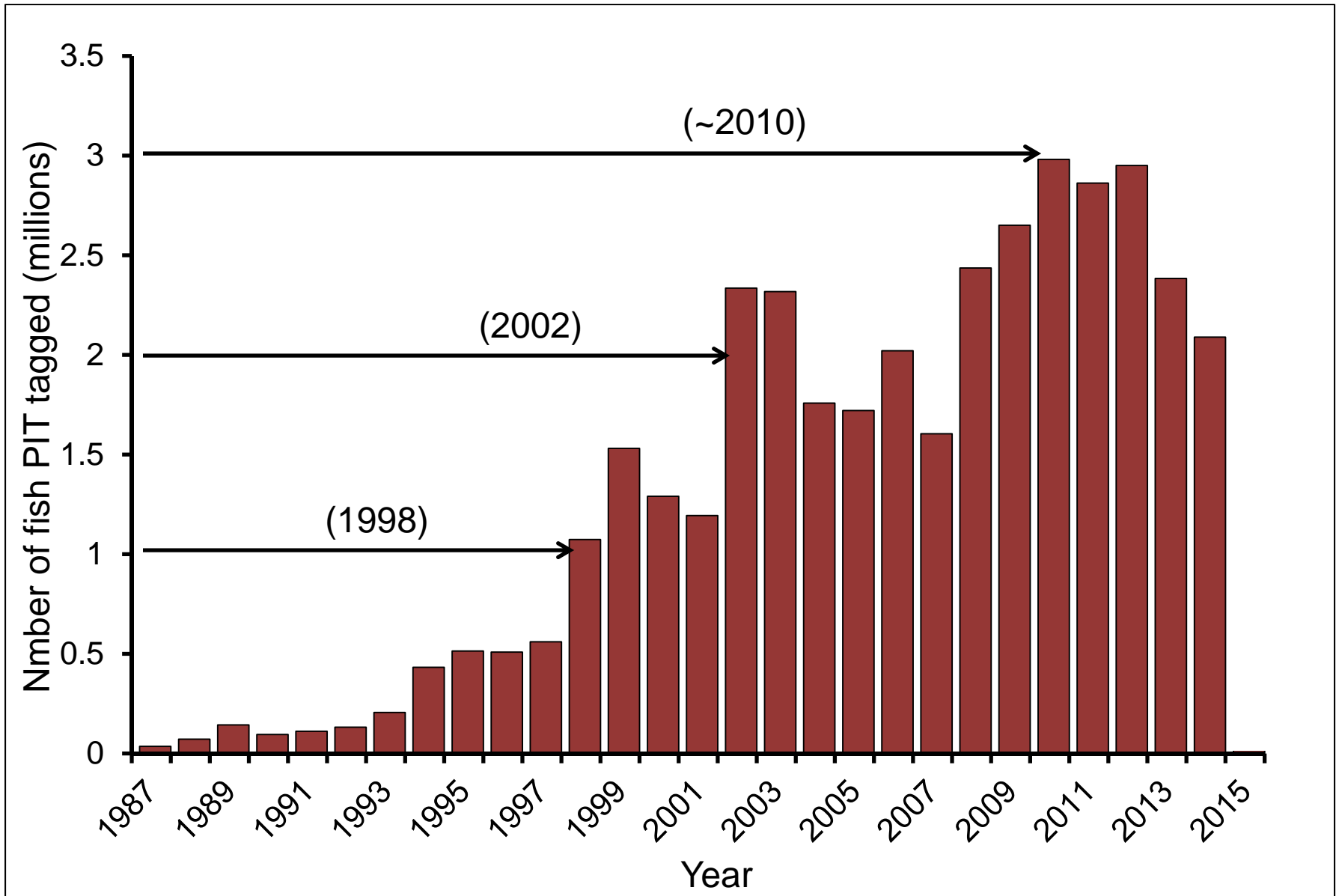
1. Give you a feel for PIT tag technology and how it is being used for fish research and management.
2. Show what is going on with PIT tags in the Columbia River Gorge.

Passive Integrated Transponder tags
“PIT tags”
ISO FDX-B, 12 mm, 134.2 kHz





Number of PIT tags used in the Columbia River Basin, 1987-2014



Data from: PTAGIS website; April 2015

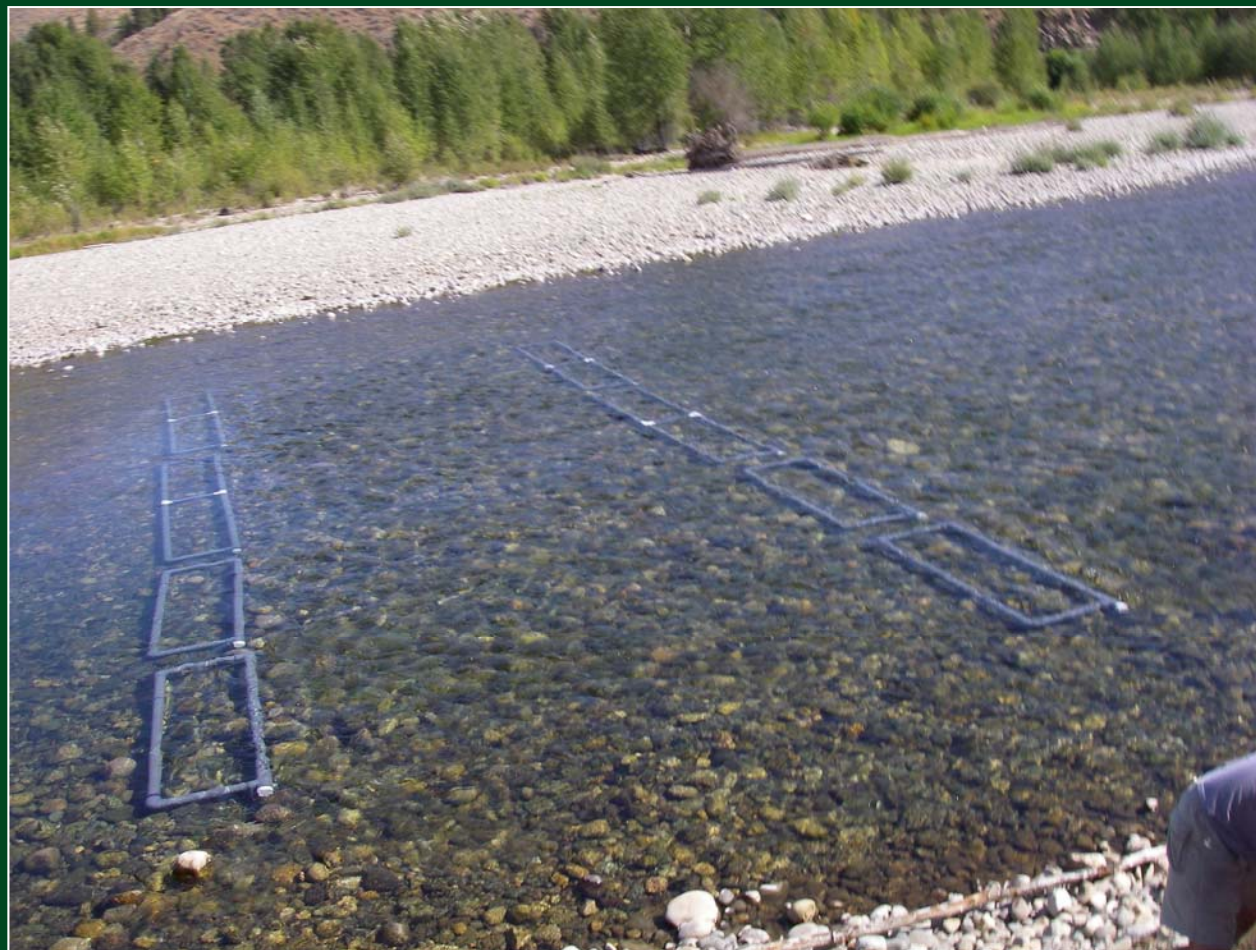
Our first installment:
Rattlesnake Creek
August 2001



Development of PIT tag detectors for diverse and increasingly larger locations



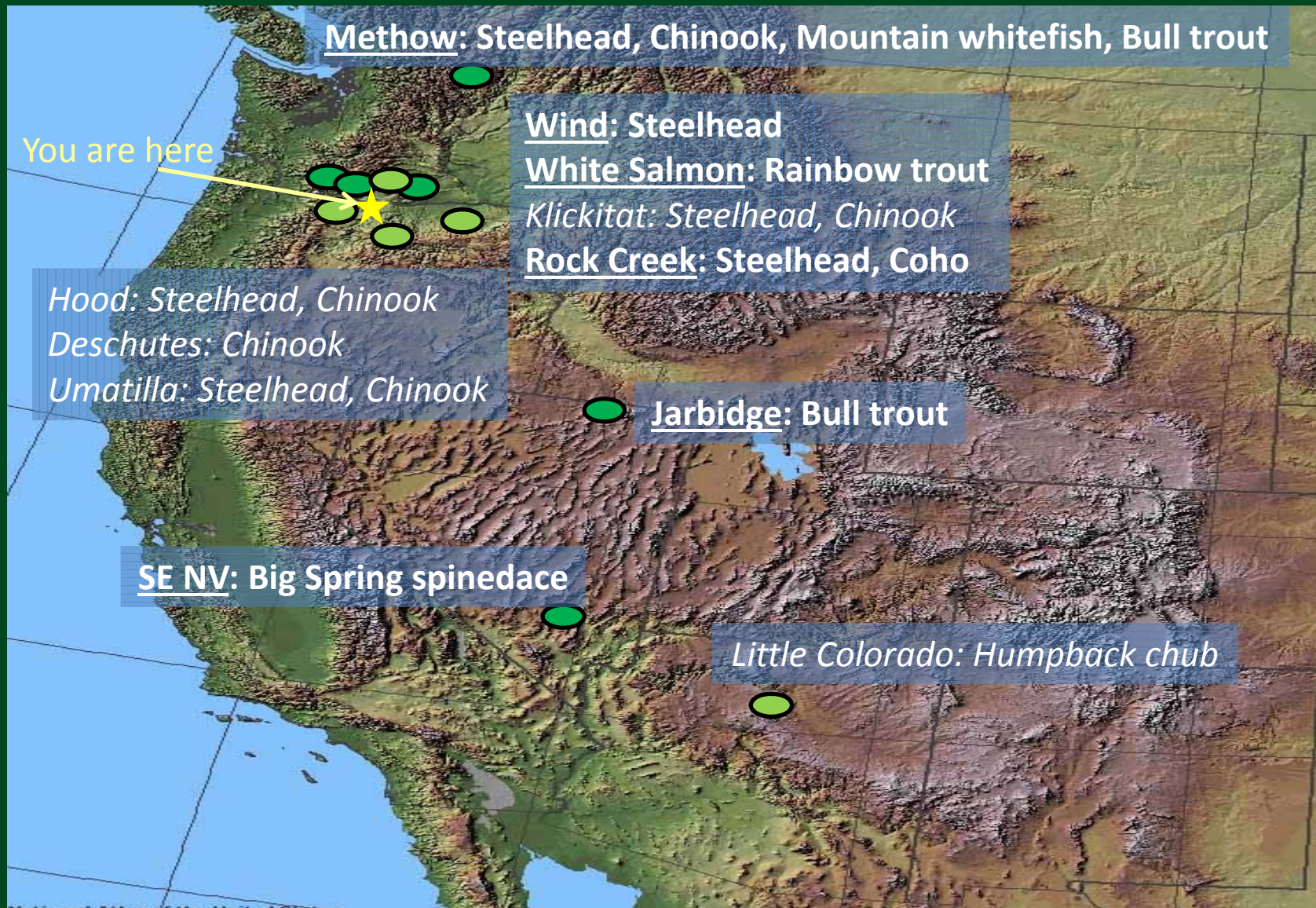
N=35
(Small systems)



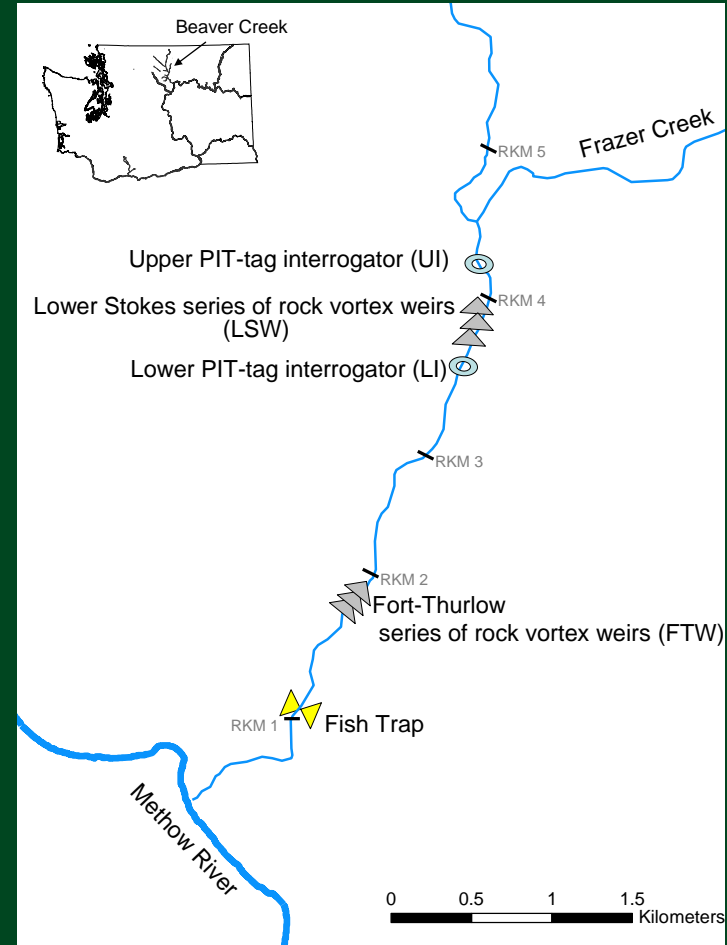
N=25 Large, multiplexing systems

Project Locations: Current and Recent Past

A Compendium of Questions Addressed

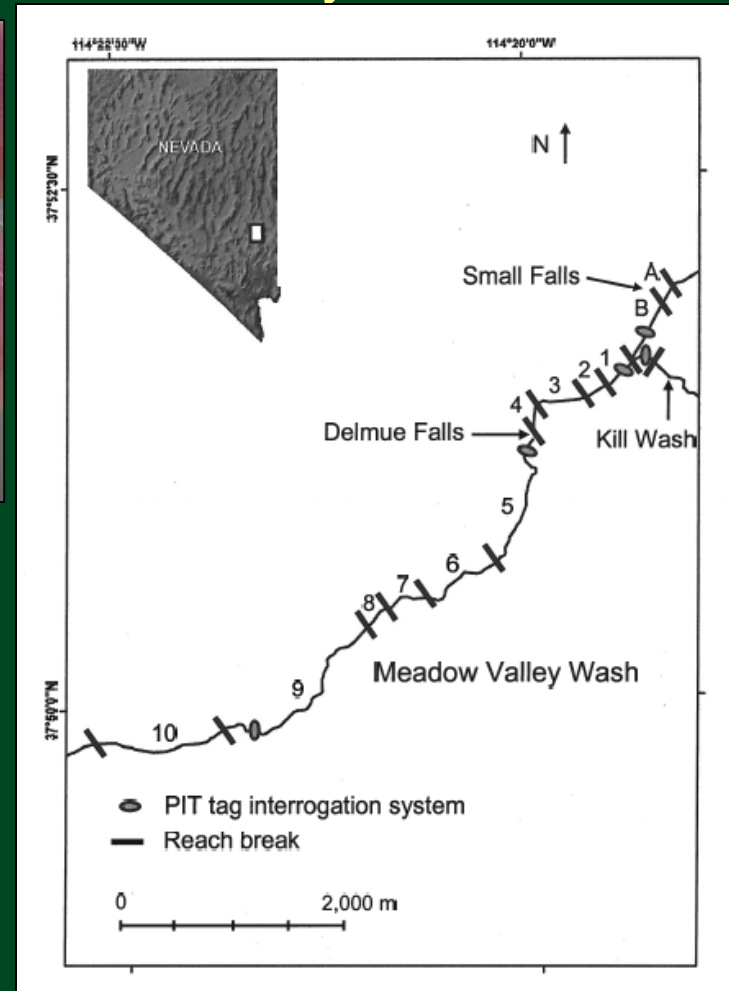


Using PIT tag technology to assess effectiveness of small dam removal in Beaver Creek, WA



Martens, K.D., and P.J. Connolly. 2010. Effectiveness of a Redesigned Water Diversion using Rock Vortex Weirs to Enhance Longitudinal Connectivity for Small Salmonids. *NAJFM* 30:1544-1552.

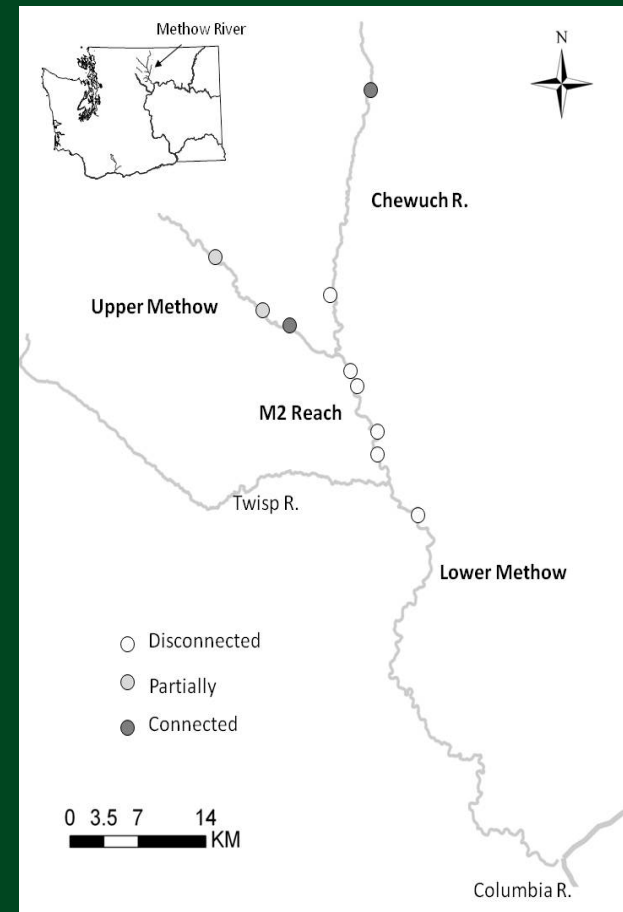
Using PIT tags to investigate timing and extent of movement by Big Spring Spinedace in Meadow Valley Wash, NV



Jezorek, I. G., and P. J. Connolly. 2013. Distribution and movement of Big Spring spinedace (*Lepidomeda mollispinis pratensis*) in Condor Canyon, Meadow Valley Wash, Nevada. *Western North American Naturalist* 73:323-336.

Using PIT tag technology to assess juvenile salmonid production in side channels of the Methow River, WA

At low flow:
Disconnected
Partially connected
Fully connected



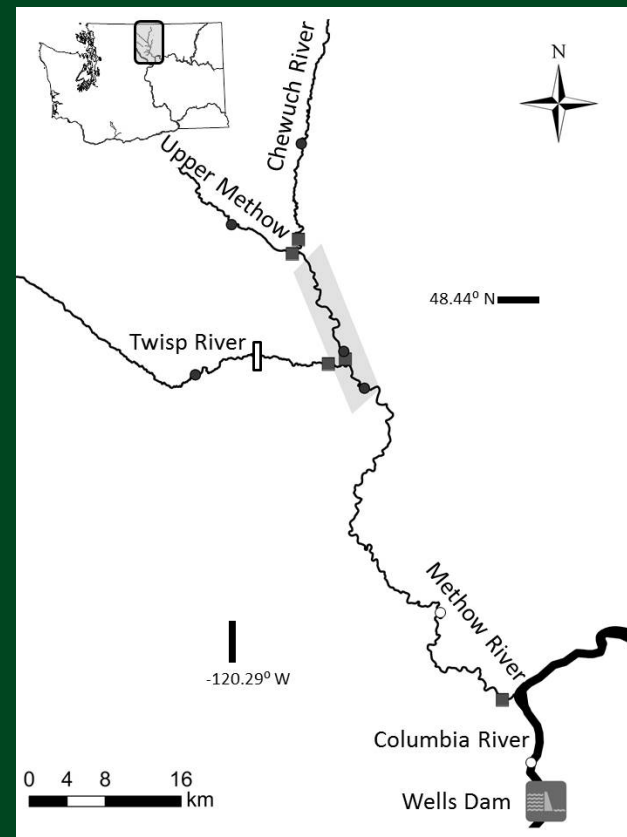
Martens, K. D., and P.J. Connolly. 2014. Juvenile anadromous salmonid production in upper Columbia River side channels with different levels of hydrological connection. *TAFS* 143:757-767.

Using PIT tag technology to assess distribution and movement of bull trout in the Jarbidge River, NV



Allen, M.B., P.J. Connolly., M.G. Mesa, J. Charrier, and C. Dixon. 2010. Movement and distribution of bull trout in the upper Jarbidge River watershed, Nevada. U.S. Geological Survey Open-File Report: 2010-1033.

Using PIT tagging and otolith chemistry to assess movement, age, and growth of mountain whitefish in the Methow Subbasin



Benjamin, J. R., L. A. Wetzel, K. D. Martens, K. Larsen, and P. J. Connolly. 2014. Spatio-temporal variability in movement, age, and growth of mountain whitefish (*Prosopium williamsoni*) in a river network based upon PIT tagging and otolith chemistry. *CJFAS* 71:131-140.

PIT tagging =====>

Record of Future Movements

+

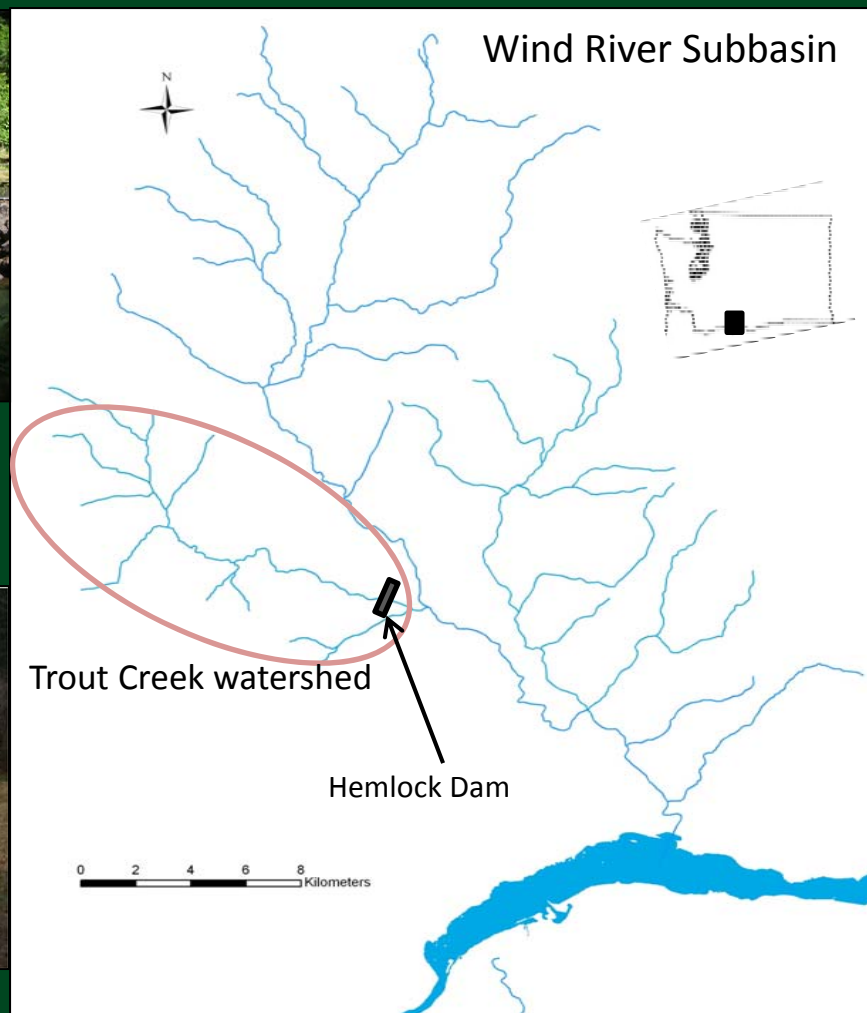
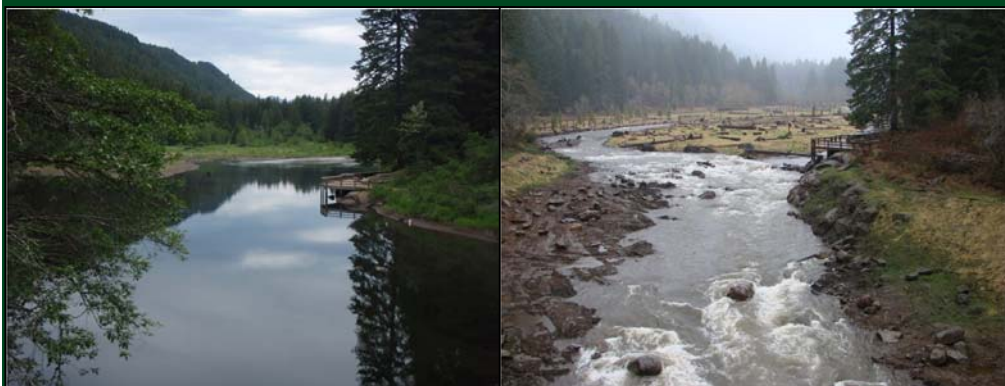
<===== Otolith chemistry

Record of Past Movements

Using PIT-tag technology to estimate adult steelhead returns to Trout Creek following removal of Hemlock Dam



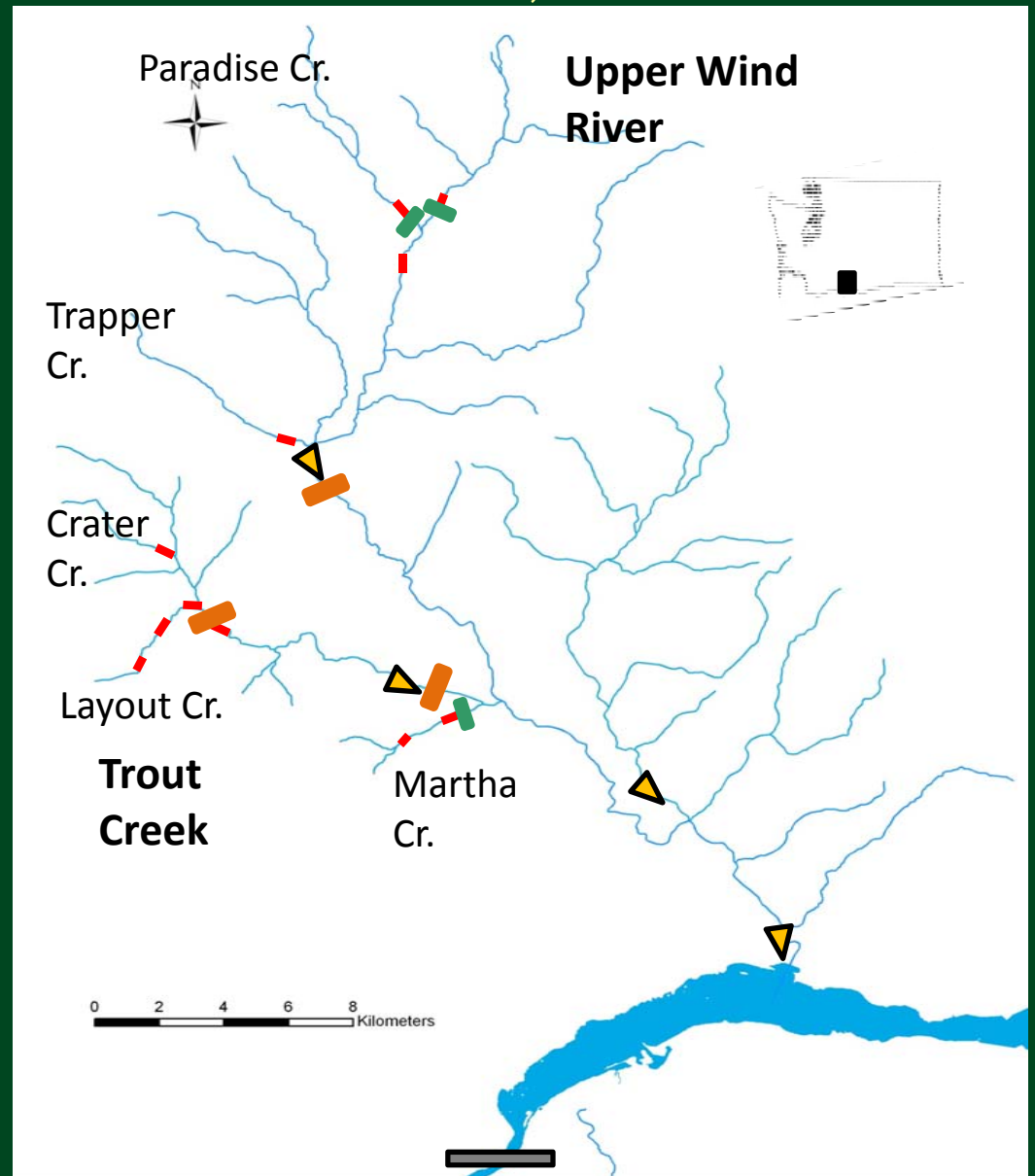
Ladder and trap removed in 2009.
Required a new method to count adult steelhead.
WDFW + USGS effort.



Using PIT tag technology to investigate life-history strategies of juvenile steelhead in the Wind River, WA



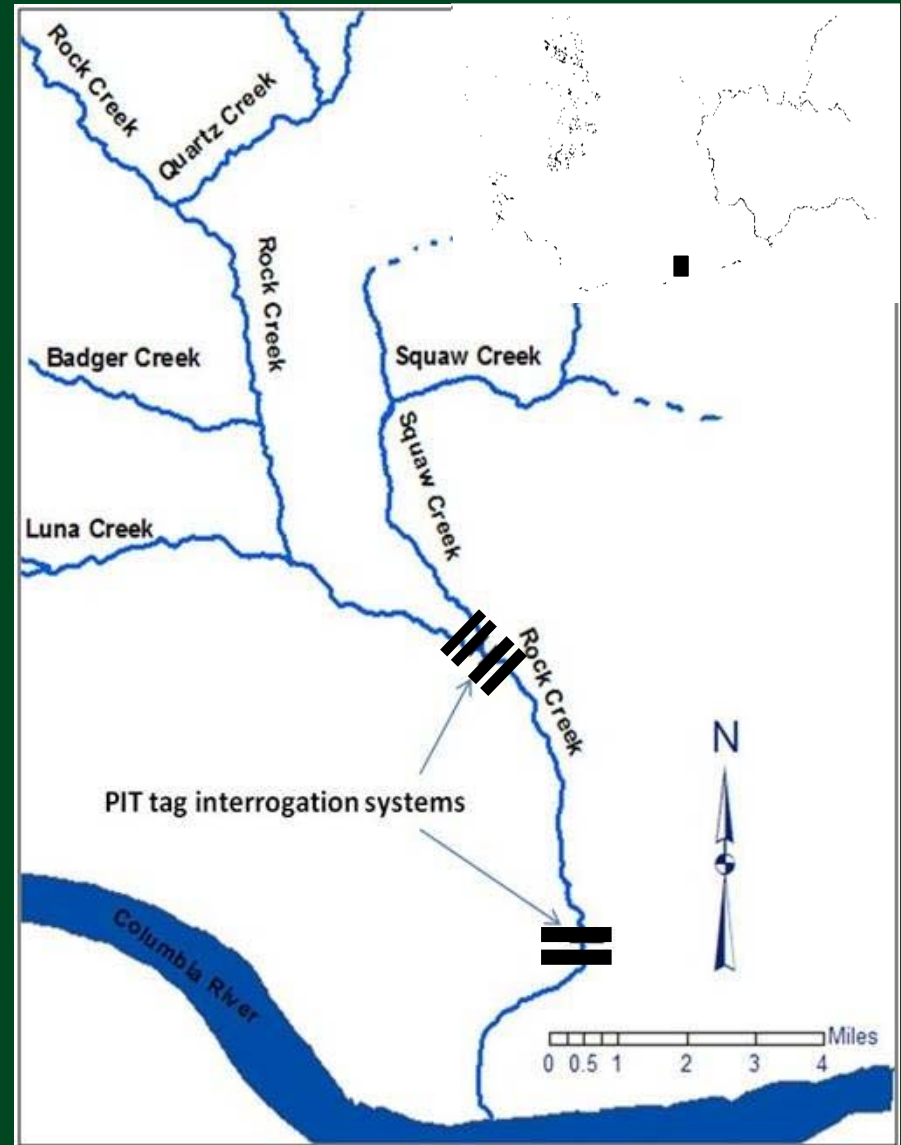
- Tagging of Age-0 and age-1 steelhead parr in headwaters.
- Recaptures through electrofishing, and WDFW smolt (n=4) and adult trap (n=1).
- Detections at instream readers (n=6) as juveniles and adults.
- Detections at Bonneville Dam as smolts and adults.



Using PIT-tag technology to assess
fish distribution, growth, and survival
in Rock Creek, WA



The network of PIT tag interrogation systems, Rock Creek





Install in Little Colorado River (Arizona)
Two arrays, Six 20-ft antennas in each array





PIT-tag
Int. Sys.

Smolt
trap

Weir

24-7!

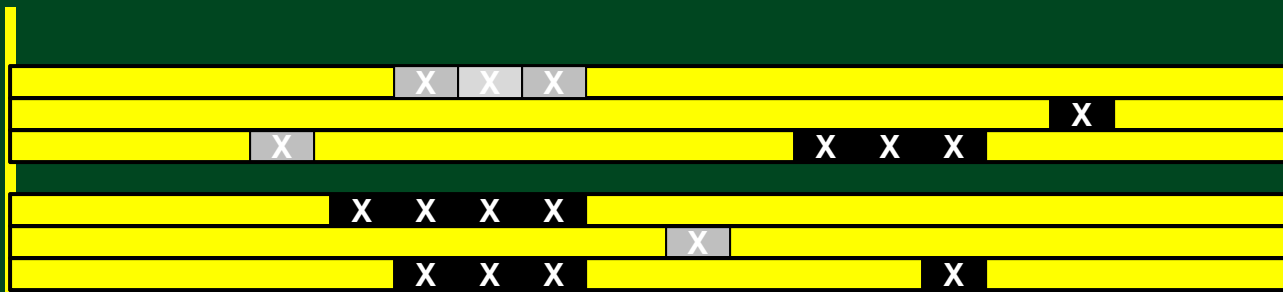
Low High Low High Low

Flow level

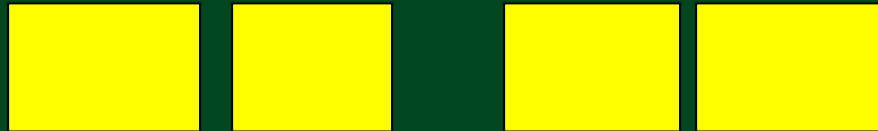
PIT-tag
Int. Sys.
2x3

A1

A2



Smolt
trap



Weir



Low High Low High Low

Flow Level & Time

Events

Millings

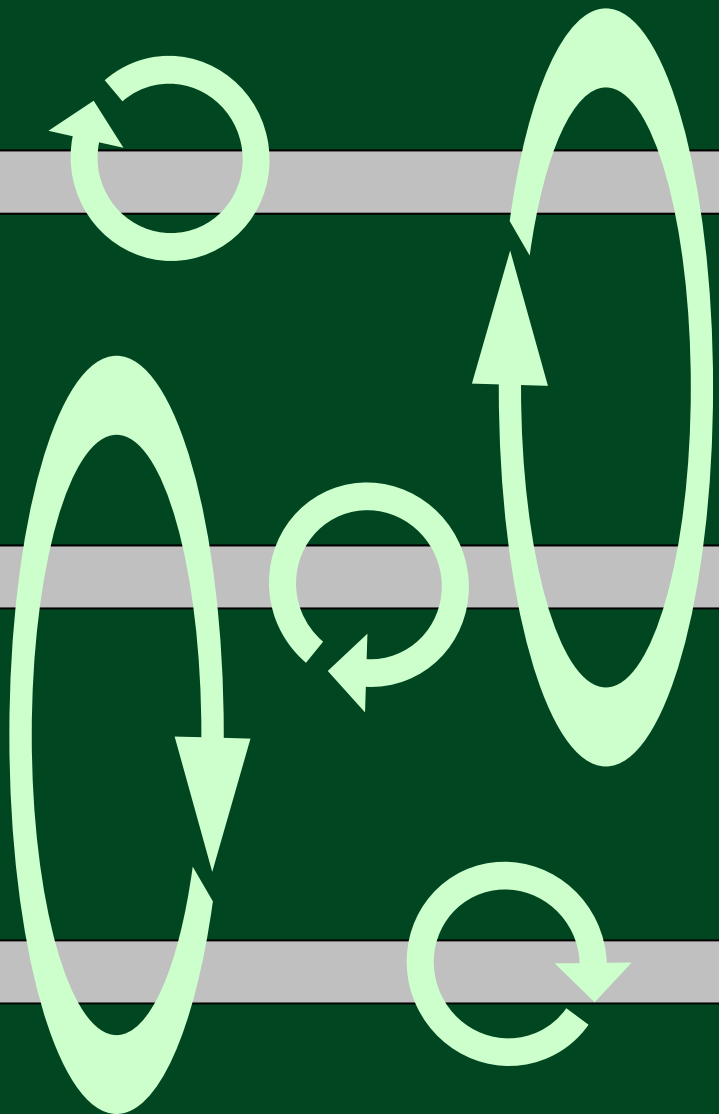
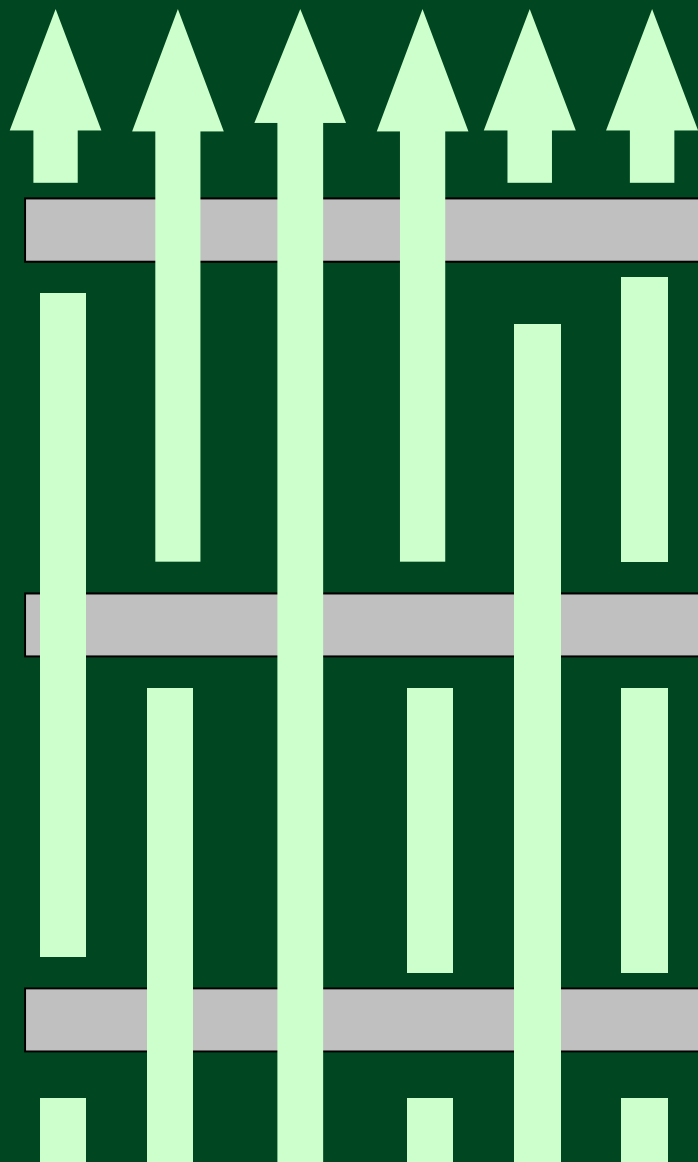
Flow



Array A

Array B

Array C



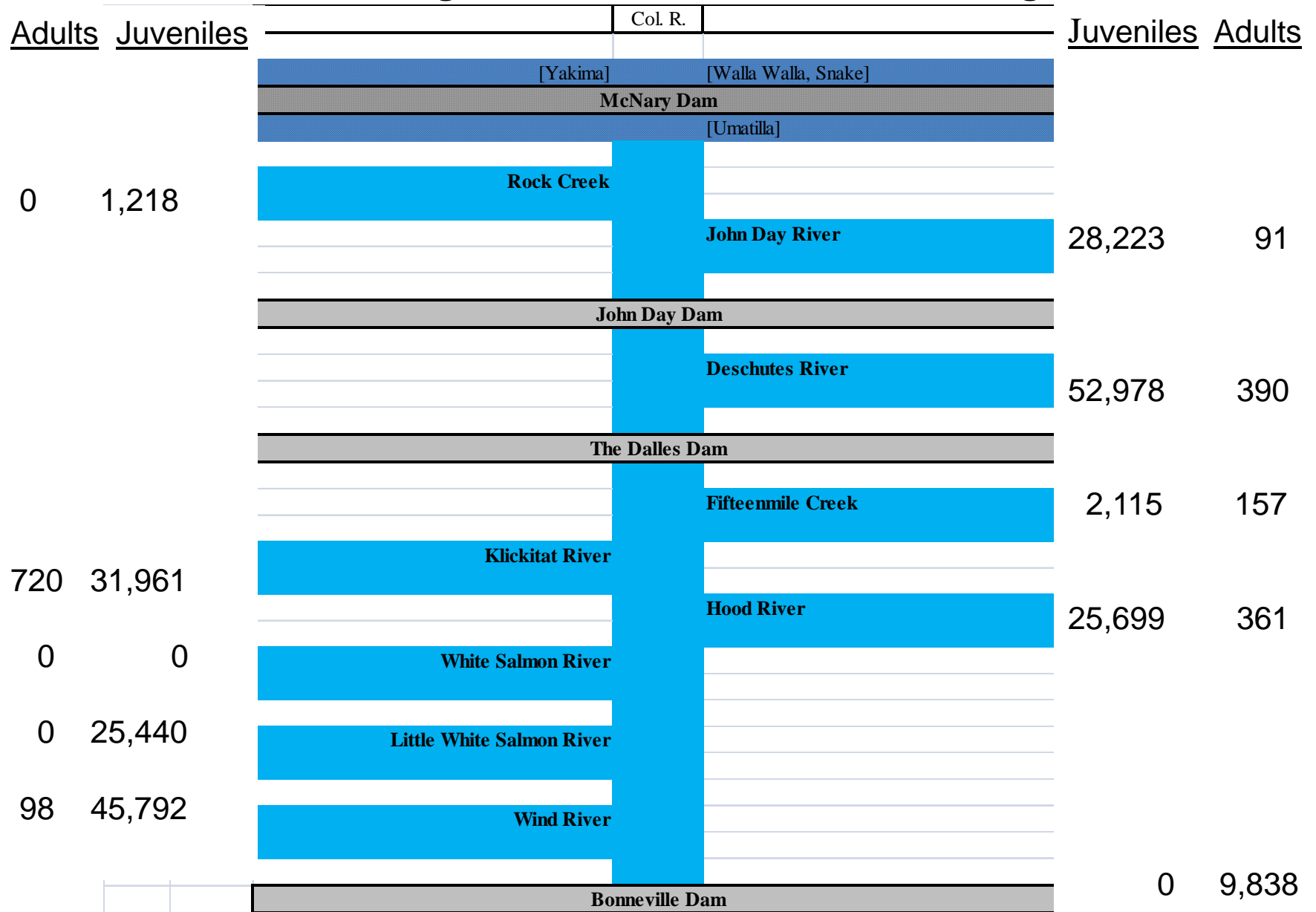


Measuring performance of two stationary
interrogation systems for detecting downstream
and upstream movement of PIT-tagged salmonids

Connolly, P.J., I.G. Jezorek,
K.D. Martens, and E.F. Prentice

2008. NAJFM 28:402-417

Number of PIT tags used in the Columbia River Gorge, 2013

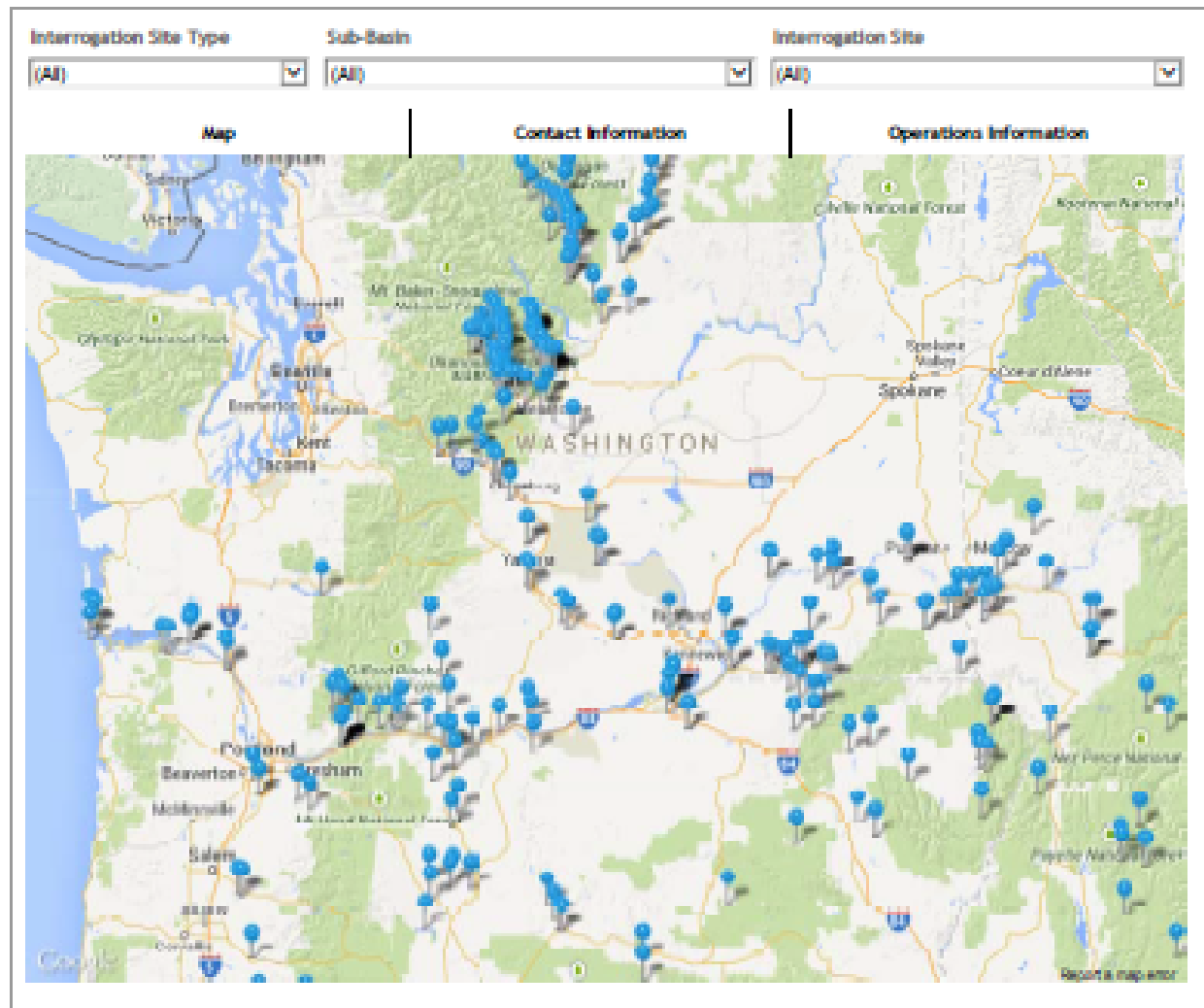


Total PIT tags put in Salmon and Steelhead in Gorge in 2013: 223,863 (~60%H; 40%W)

Number of PIT Tag Detectors in the Columbia River Gorge

No. upstream	Col. R.	No. upstream
	[Yakima] [Walla Walla, Snake]	
	DS? Yes-- McNary Dam --US? Yes	
	[Umatilla]	
1	Yes Rock Creek <i>RKM 5</i>	
	<u>RCL</u> (2 Arrays, 4 Antennas; 2009-present)	
	John Day River <i>RKM 32</i> Yes	7
	DS? Yes-- John Day Dam --US? No	
	Deschutes River <i>RKM 1</i> Yes	6
	<u>DRM</u> (2 Arrays, 12 Antennas; 2012-present)	
	DS? No-- The Dalles Dam --US? Yes	
3(+5)	N/Y (ladder only) Klickitat River <i>X</i>	3
	<u>158</u> (1 Array, 3 Antennas; 2011-present)	
	Hood River <i>RKM 0</i> Yes	0
	<u>HRM</u> (2 Arrays, 5 Antennas; 2012-present)	
0	No White Salmon River <i>X</i>	
(1)	No Little White Salmon River <i>X</i>	
4(+3)	N/Y (ladder only) Wind River <i>(RKM 2) X</i>	
	<u>SFL</u> (2 Arrays, 2 Antennas; 2009-2010)	
Total	DS? Yes-- Bonneville Dam --US? Yes	Total
8+	1 of 5 4 of 4	16+
	mouths mouths	

The network of registered PIT tag interrogation systems, Columbia River Basin



From: PTAGIS website; April 2015

Complete Tag History For: ▼

PDF

Start

Tag Info

Site Info

Coord Info

Distribution Info

Mark and Release Information

Species-Run-Rear Type	Mark Site	Release Site	Release River Kilometer
Wild Steelhead (unknown run)	<u>WIND2R</u>	WIND2R - Wind River, Washington	251.008
Coordinator	Session Message	Tag File	
CCP - Charlie Cochran	TRAP EFFIC REL	CCP11141.LW	
Mark Date	Release Date	Conditional Comments (Flags)	Lgth (mm)
5/21/2011	05/21/2011	No Brand, Light Body Color	166
Capture Method	Text Comment		
Screw Trap	FA MA DS 8947-08 BR		

Recapture, Observation, and Mortality Information

History Summary
 Observation Detail
 Recap/Mort Detail

Date	Event Type	Site Code	Site Name	Event Site Type	Event Site RKM
06/19/2013	Obs	BO3	Bonneville WA Shore Ladder/AFF	Adult Fishway	234
06/19/2013	Obs	BO4	Bonneville WA Ladder Slots	Adult Fishway	234
10/02/2013	Obs	TRC	Trout Creek, Wind River	Instream Remote Detection System	251.017.002
03/03/2014	Obs	TRC	Trout Creek, Wind River	Instream Remote Detection System	251.017.002
03/11/2014	Obs	TRC	Trout Creek, Wind River	Instream Remote Detection System	251.017.002

COLUMBIA
BASIN

PIT Tag Information System



A crowning achievement of cooperation
within the Columbia River Basin!

Go out and
PIT tag something!

