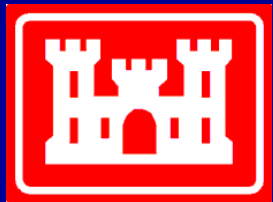


2016 Willamette BiOp Hatchery Research, Monitoring, and Evaluation:

PRELIMINARY OBSERVATIONS ON CHINOOK SALMON ABUNDANCE, DISTRIBUTION AND DIVERSITY

Cameron Sharpe

Oregon Department of Fish and Wildlife
2017 Willamette Research Review



Acknowledgments

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TOPICS

- Redds and Deads
 - Escapement
 - pHOS
 - PSM
- Outplanting

REDDS

AUGUST: SPAWNING COMMENCES



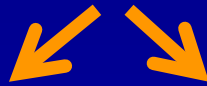
SEPTEMBER: REDDS ACCUMULATE, PEAK SPAWNING LATE



OCTOBER: SPAWNING ENDS, PEAK COUNT OBTAINED



SPAWNER ABUNDANCE (N_T) = PEAK COUNT * 2.5



$$N_W = N * (1 - \text{pHOS})$$

$$N_H = N_T * \text{pHOS}$$

DEADS

PROCESSABLE CARCASSES



CLIPPED

UNCLIPPED



OTOLITHS

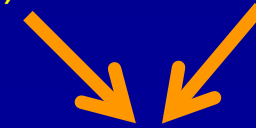
THERMAL MARKS

NO THERMAL MARKS



HATCHERY-ORIGIN (H)

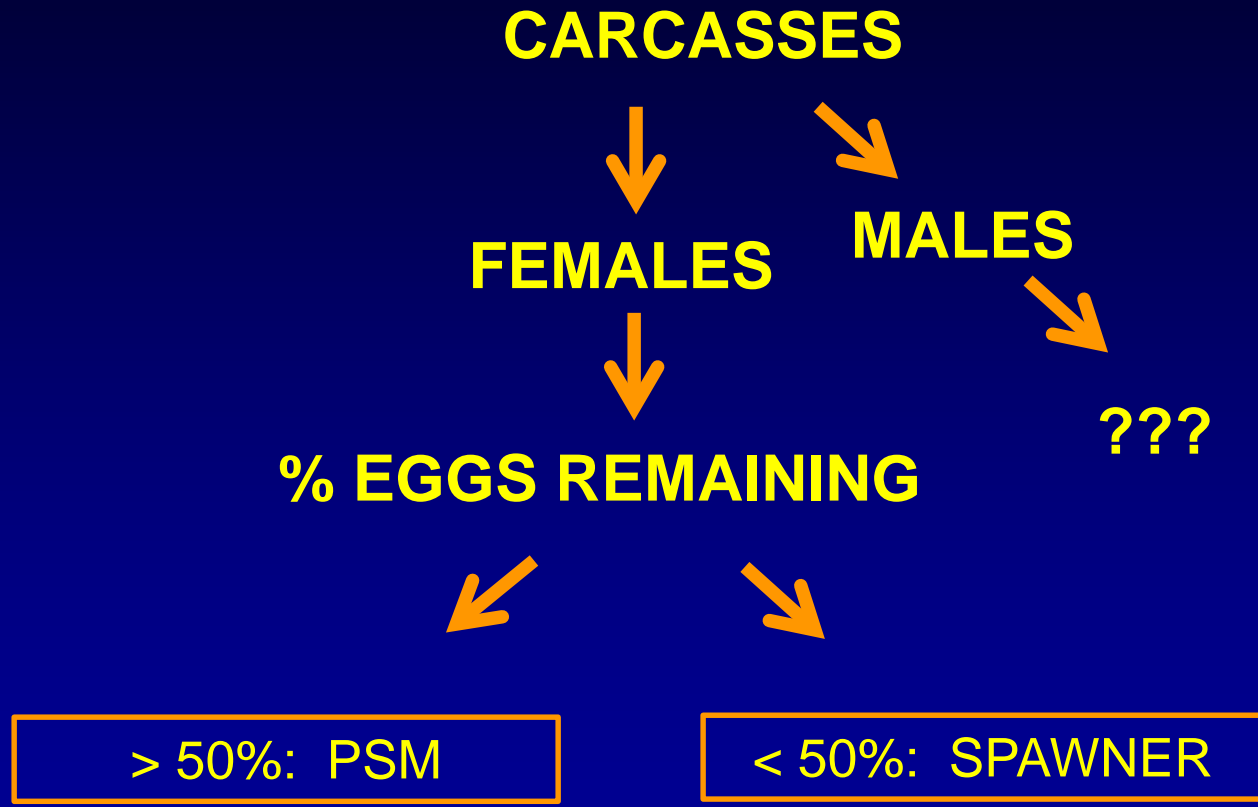
NATURAL-ORIGIN (W)



$$\text{pHOS} = H / (H + W)$$

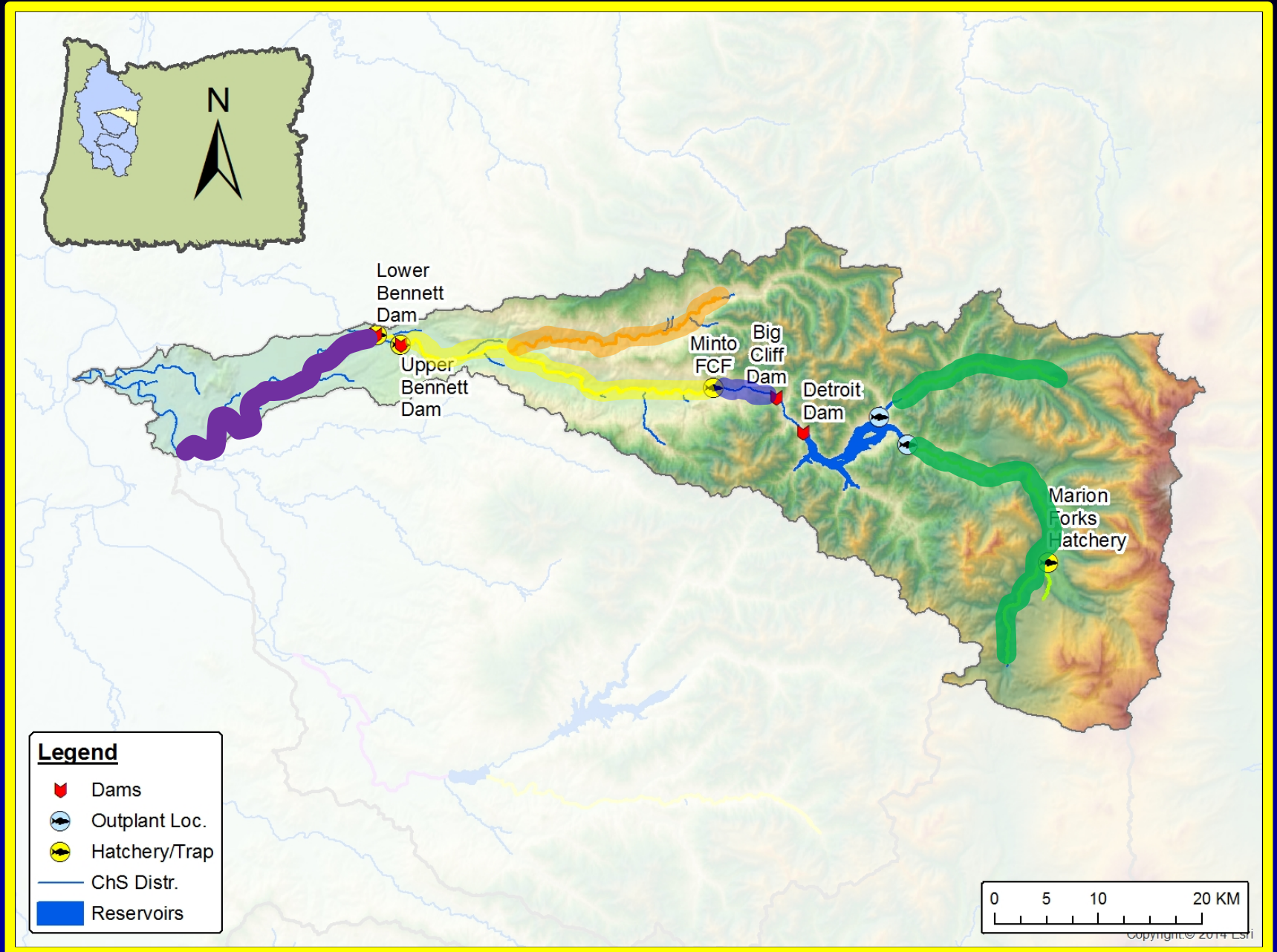


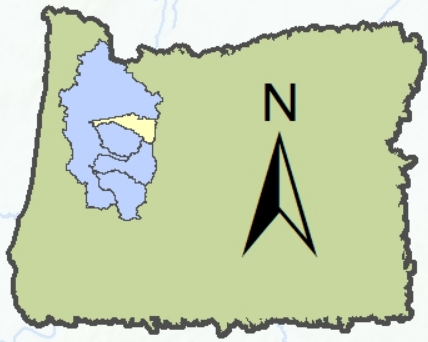
Prespawning Mortality (PSM)



0-20%: LOW; 20-50%: MODERATE; >50%: HIGH

North Santiam



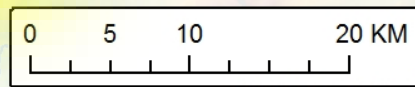


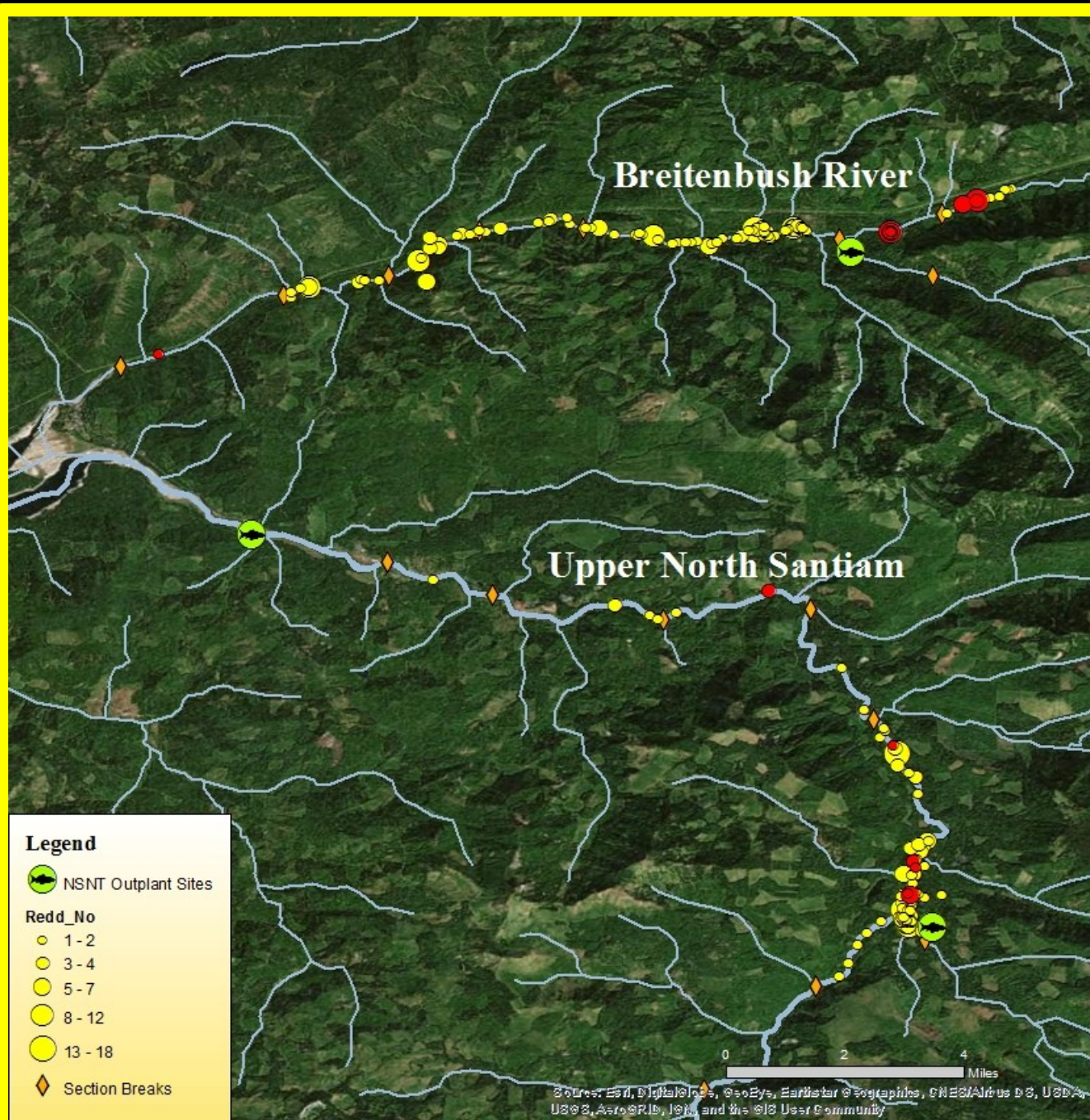
Below Detroit
Redds: 410
PSM: 3% (2/72)
pHOS: 59.3%

Above Detroit
Redds: 481
PSM: 5% (3/58)
pHOS: 100%

Legend

- Dams
- Outplant Loc.
- Hatchery/Trap
- ChS Distr.
- Reservoirs

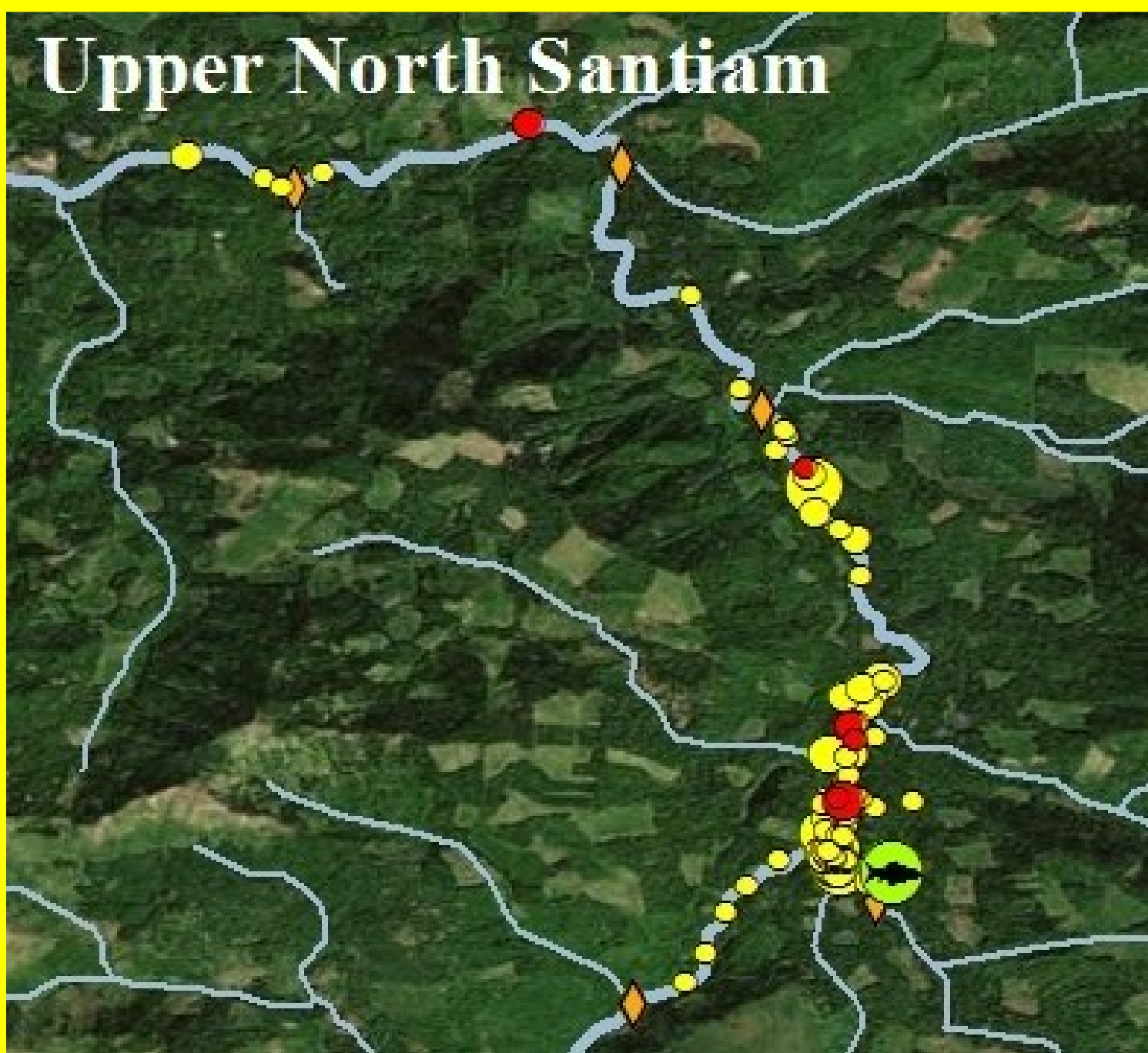




**321 Females
Outplanted
249 Redds
Observed**

**483 Females
Outplanted
240 Redds
Observed**

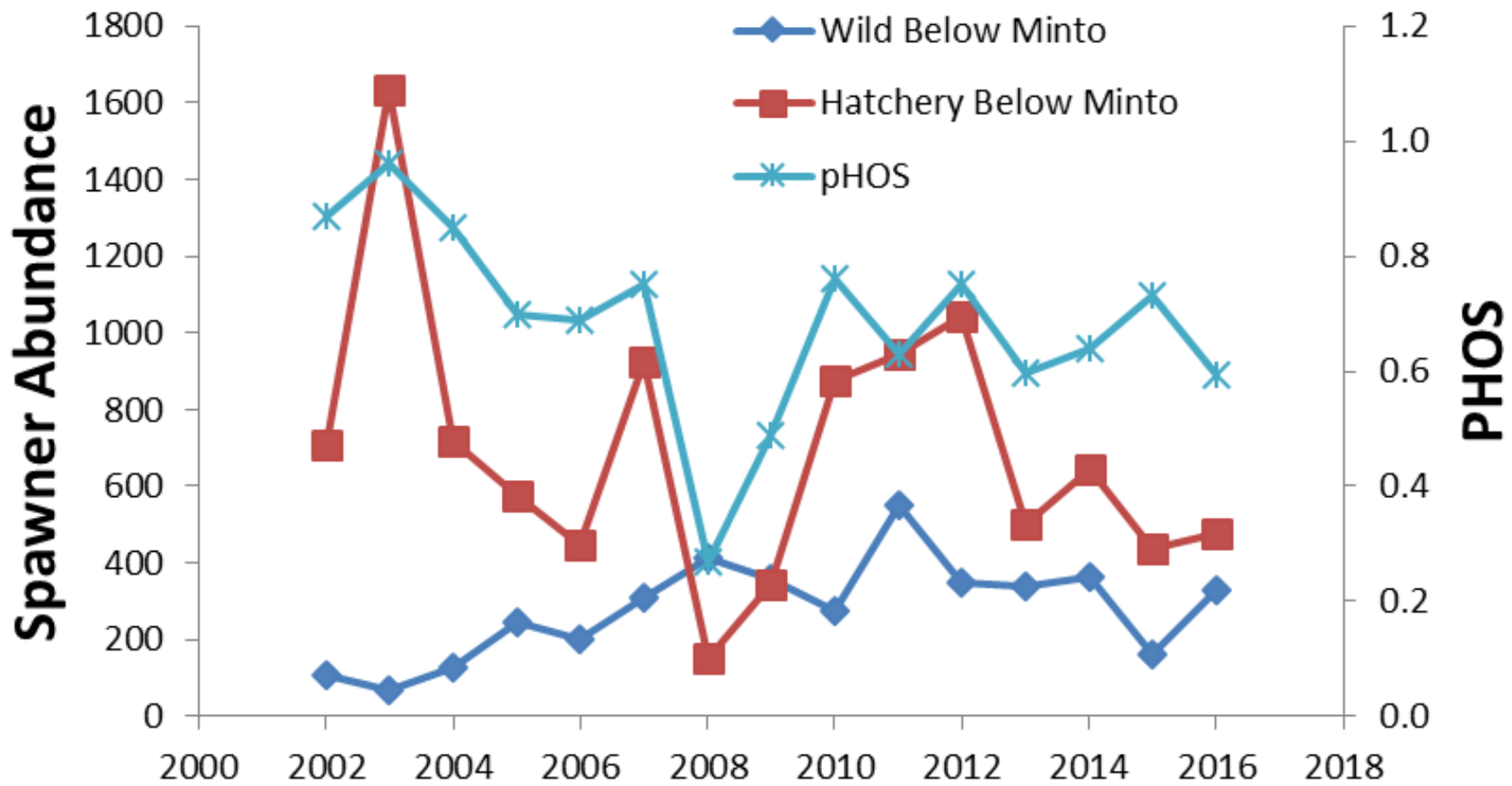
Upper North Santiam

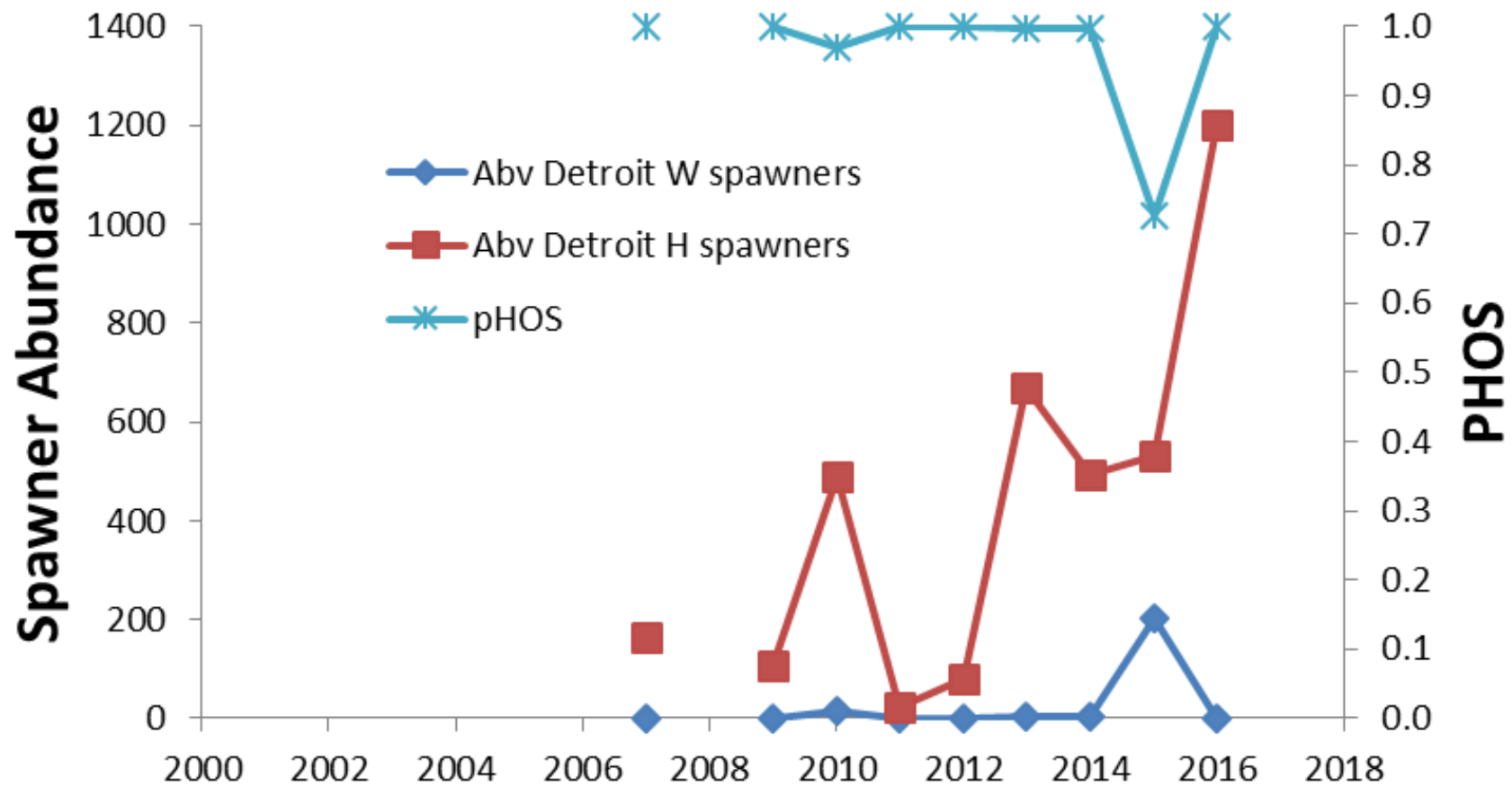




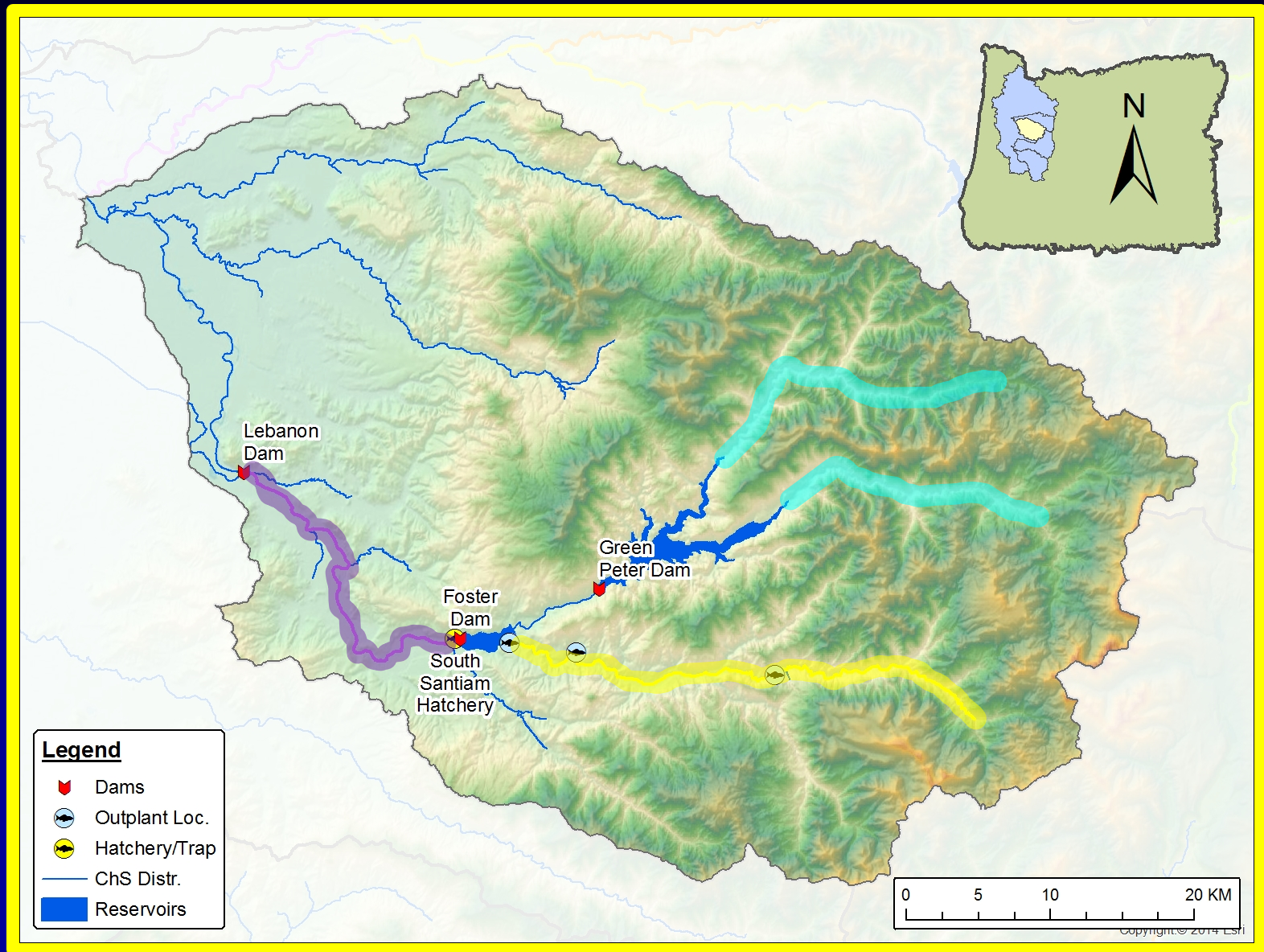
**529
Unclipped
CHS
Released
(214
Females)**

**90 Redds
Observed**





South Santiam



Below Foster

Redds: 1,200

PSM: 4% (20/530)

pHOS: 92.2%

Above Foster

Redds: 162

PSM: 11% (5/47)

pHOS: 35.2%




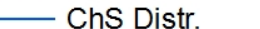
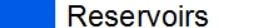
Lebanon Dam

Green Peter Dam

Foster Dam

South Santiam Hatchery

Legend

-  Dams
-  Outplant Loc.
-  Hatchery/Trap
-  ChS Distr.
-  Reservoirs

0 5 10 20 KM

Foster Dam September, 2015

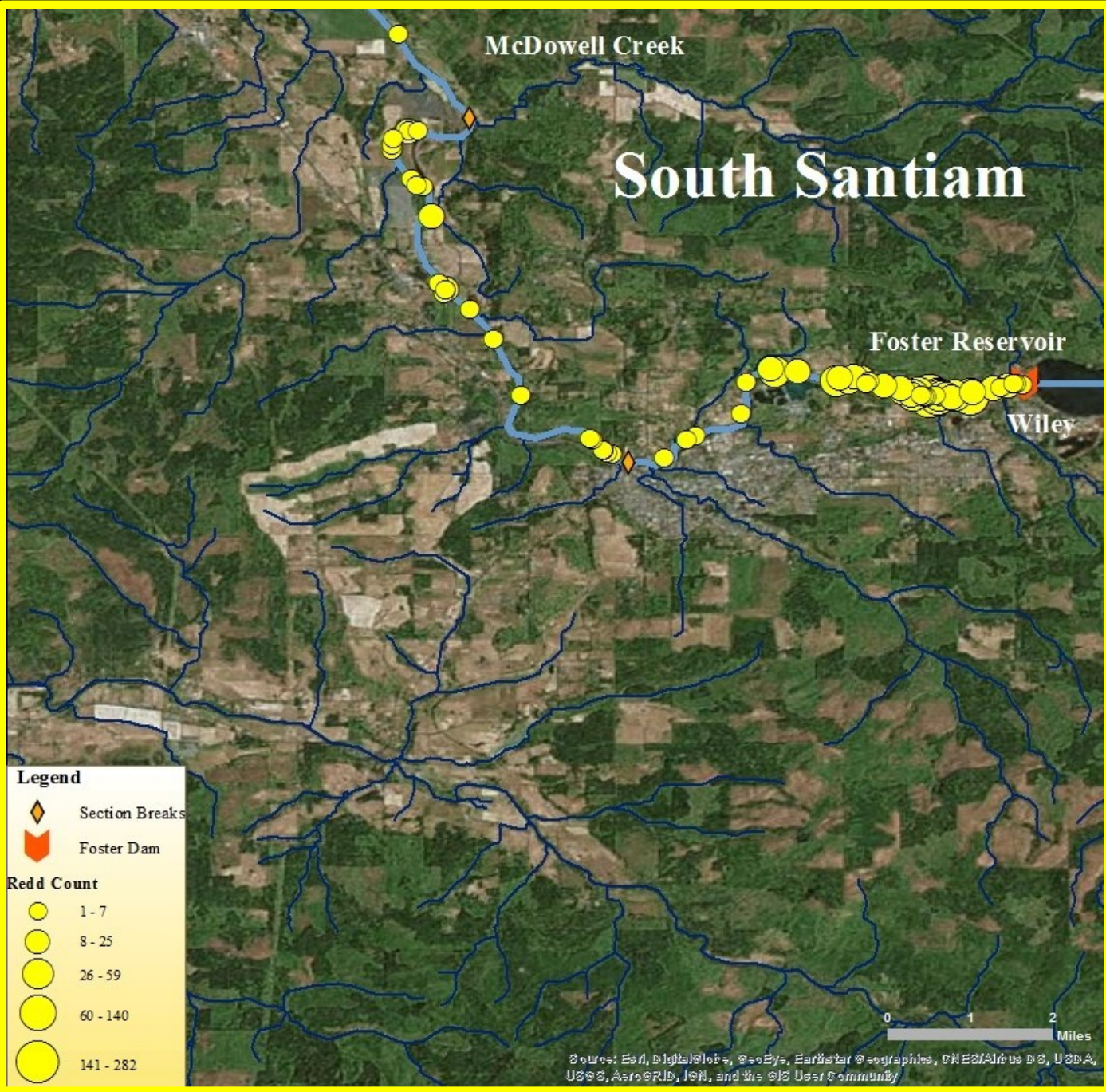
Legend
Andrew Wiley Park

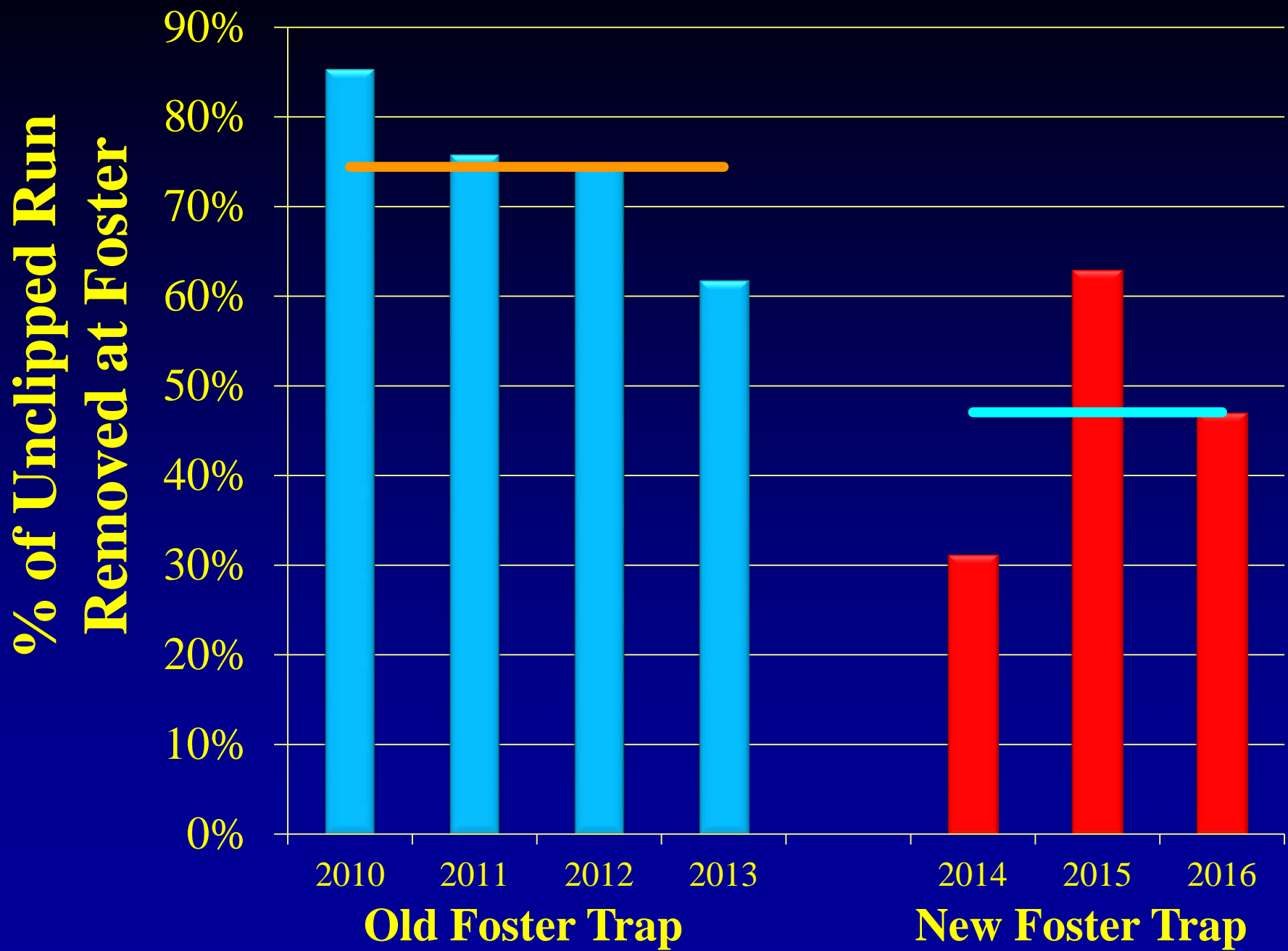
NEW FOSTER

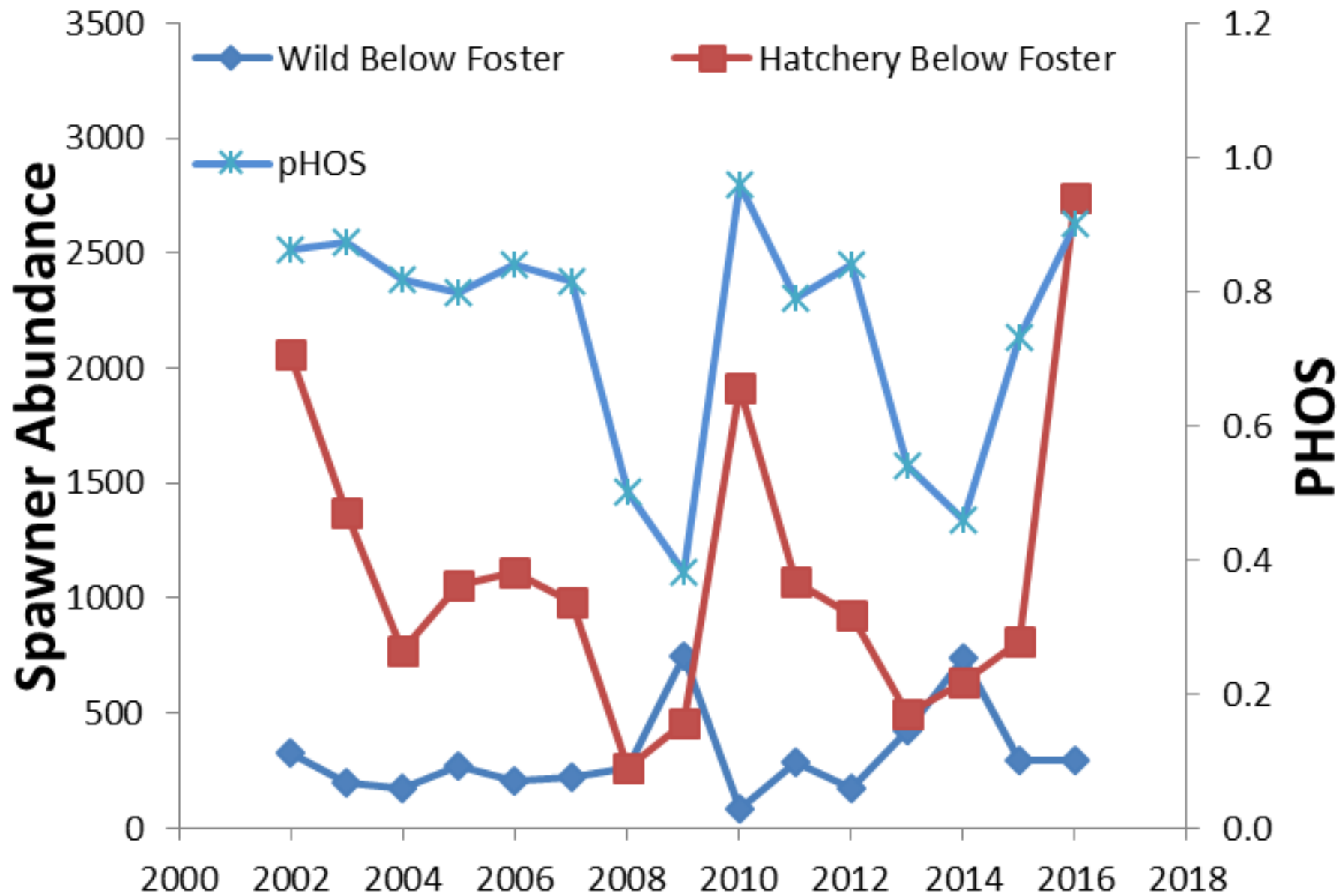
Google earth

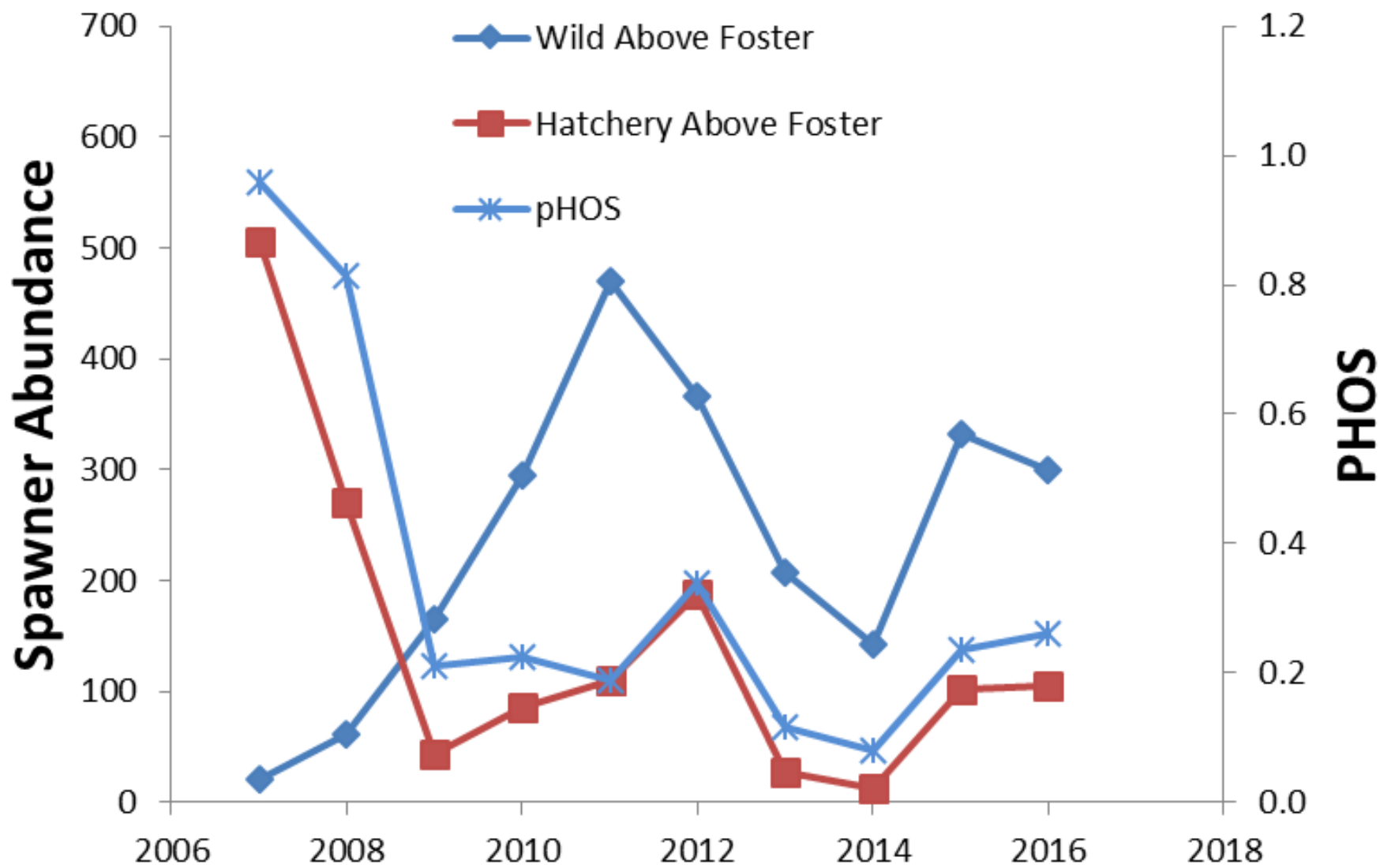
100 ft



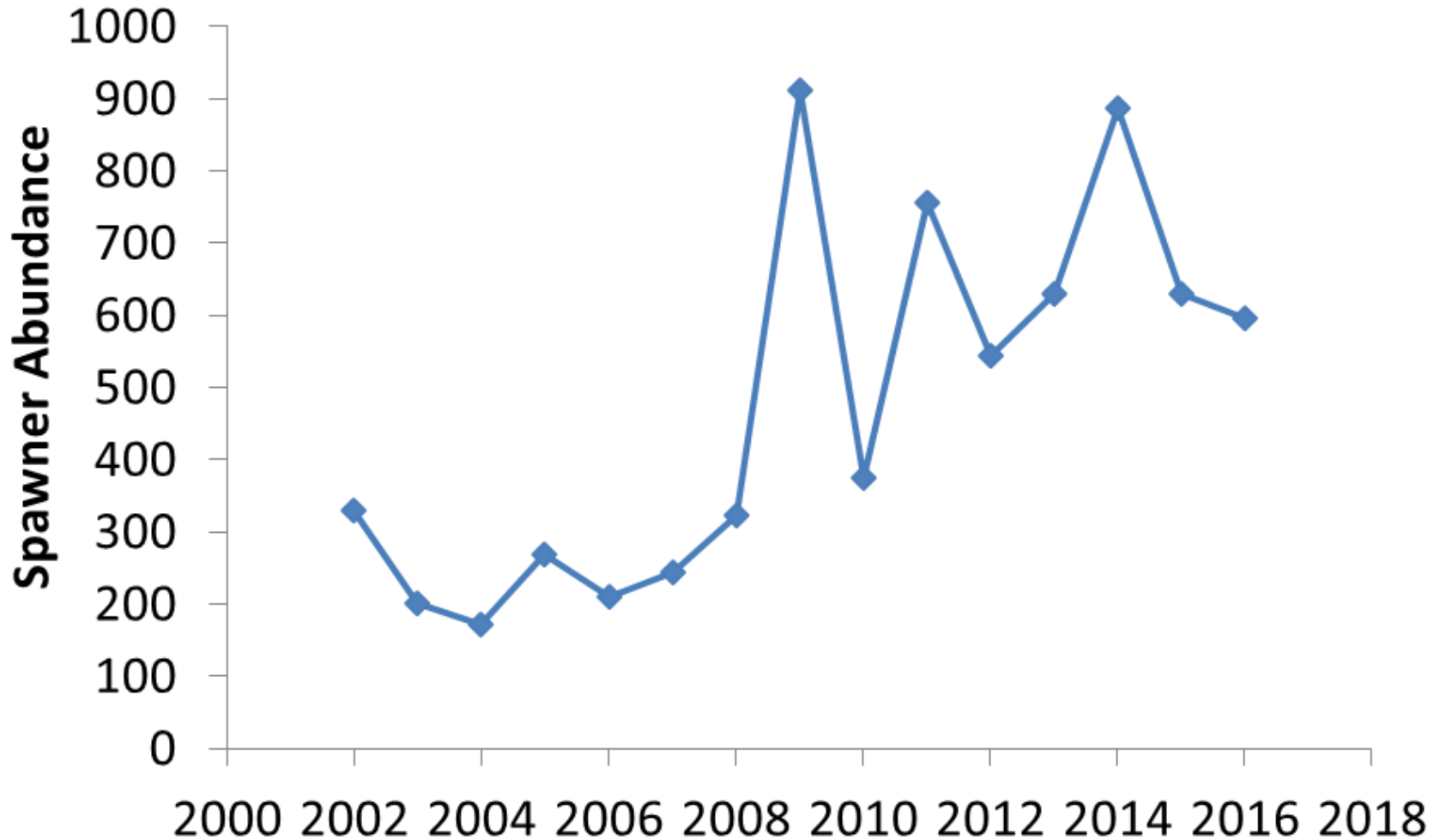




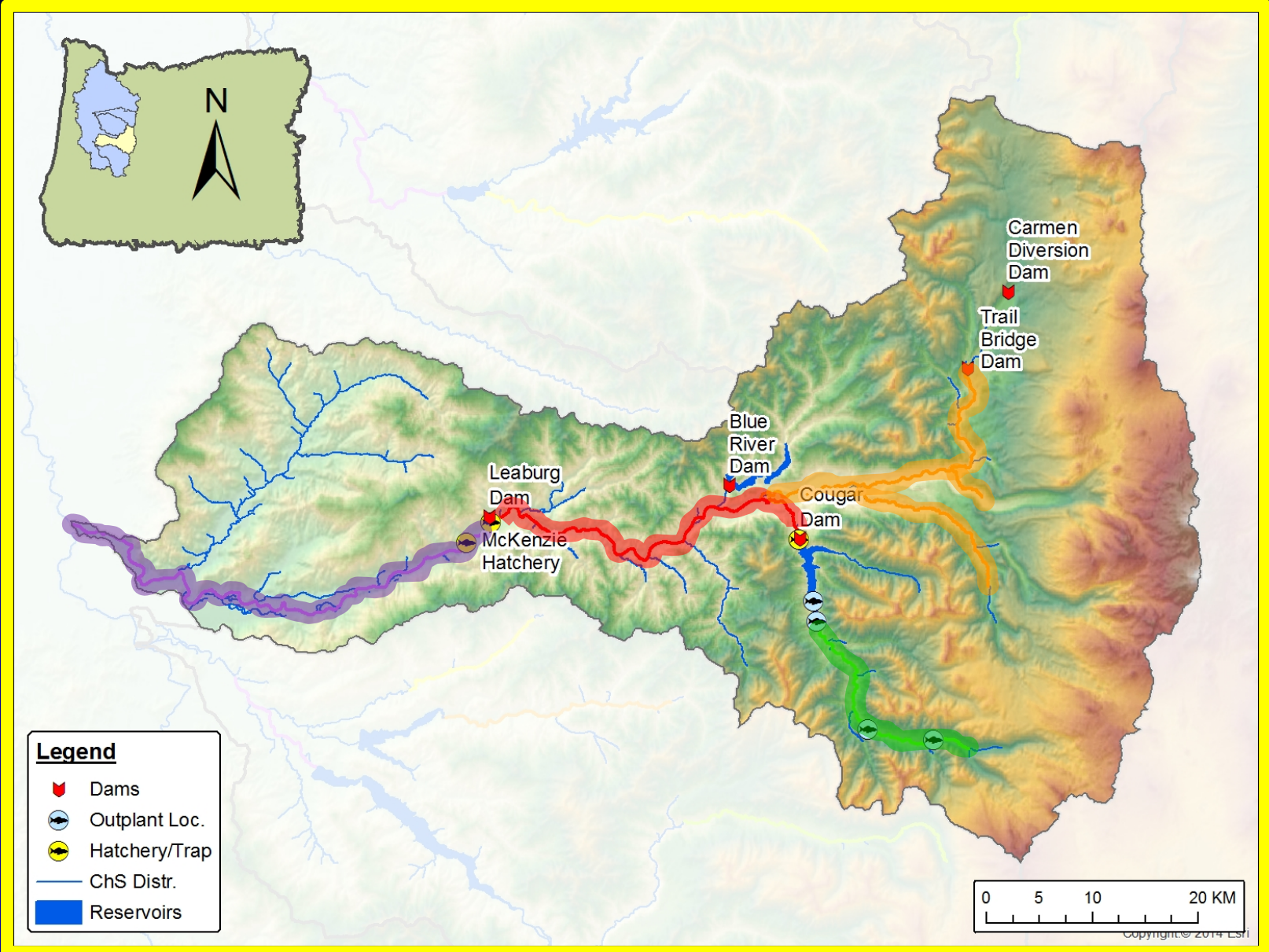


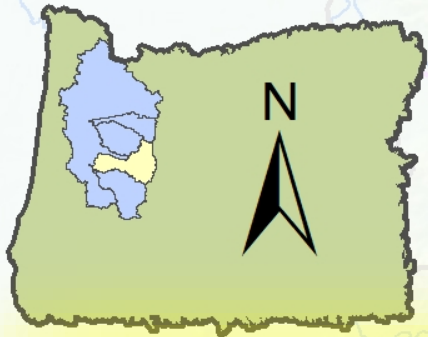


SSNT: Basinwide Natural-origin Spawner Escapement



McKenzie





Below Leaburg
Redds: 180
PSM: 17% (10/60)
pHOS: 91.3%

Leaburg Dam
McKenzie Hatchery

Blue River Dam

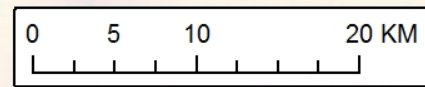
Cougar Dam

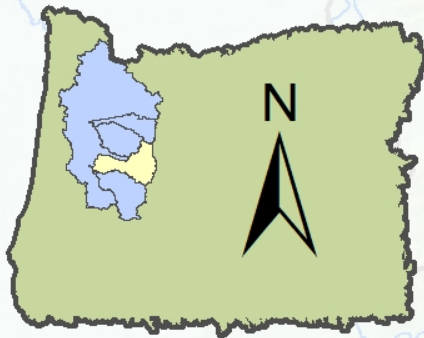
Carmen Diversion Dam
Trail Bridge Dam

Legend

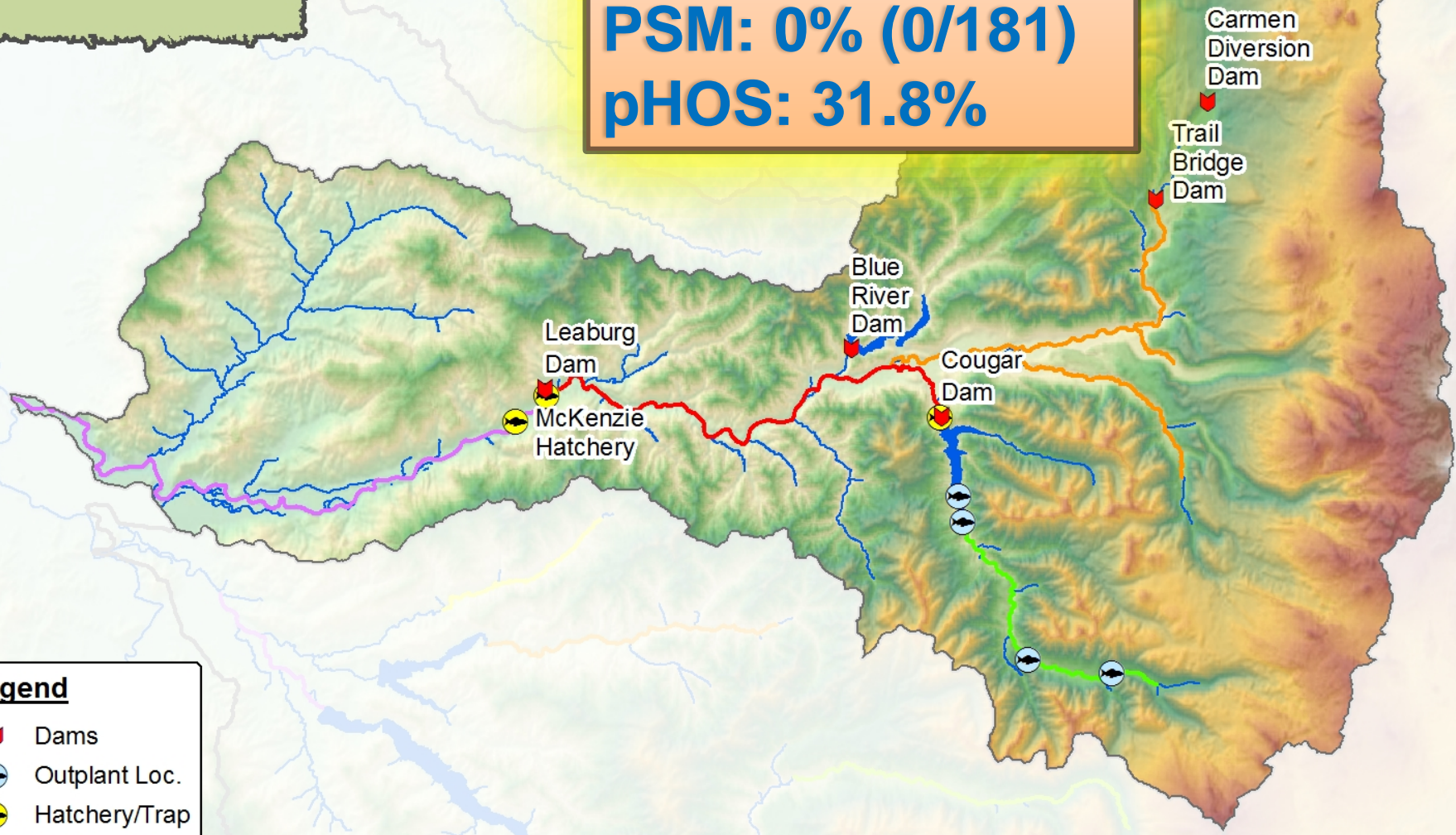
- Dams
- Outplant Loc.
- Hatchery/Trap
- ChS Distr.
- Reservoirs

249 Hatchery
ChS Removed



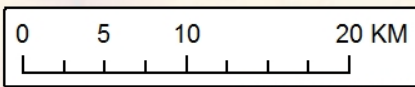


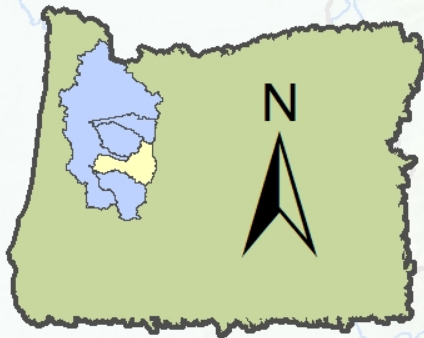
Above Leaburg
Redds: 1,117
PSM: 0% (0/181)
pHOS: 31.8%



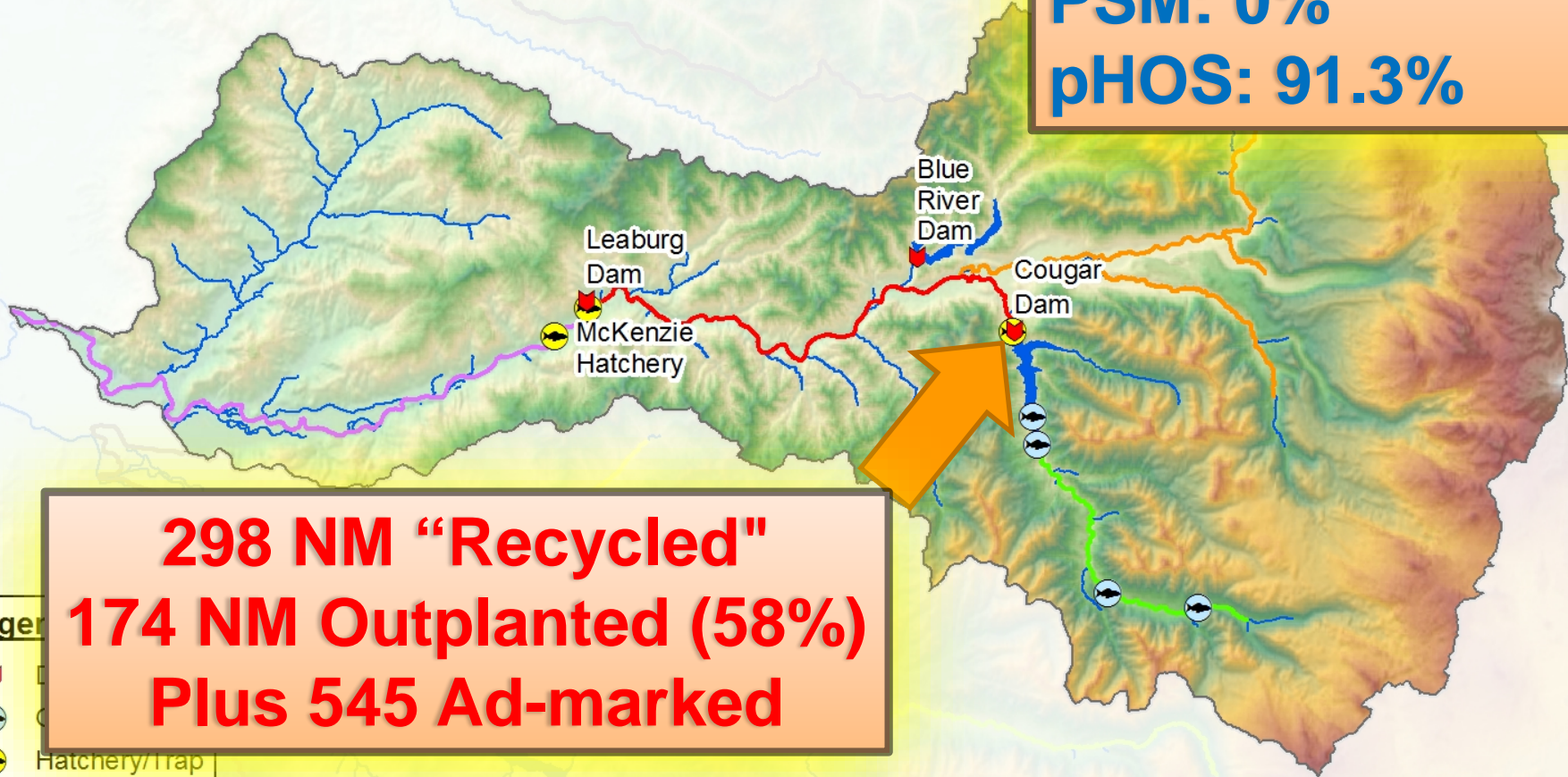
Legend

- Dams
- Outplant Loc.
- Hatchery/Trap
- ChS Distr.
- Reservoirs





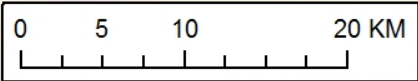
Above Cougar
Redds: 293
PSM: 0%
pHOS: 91.3%

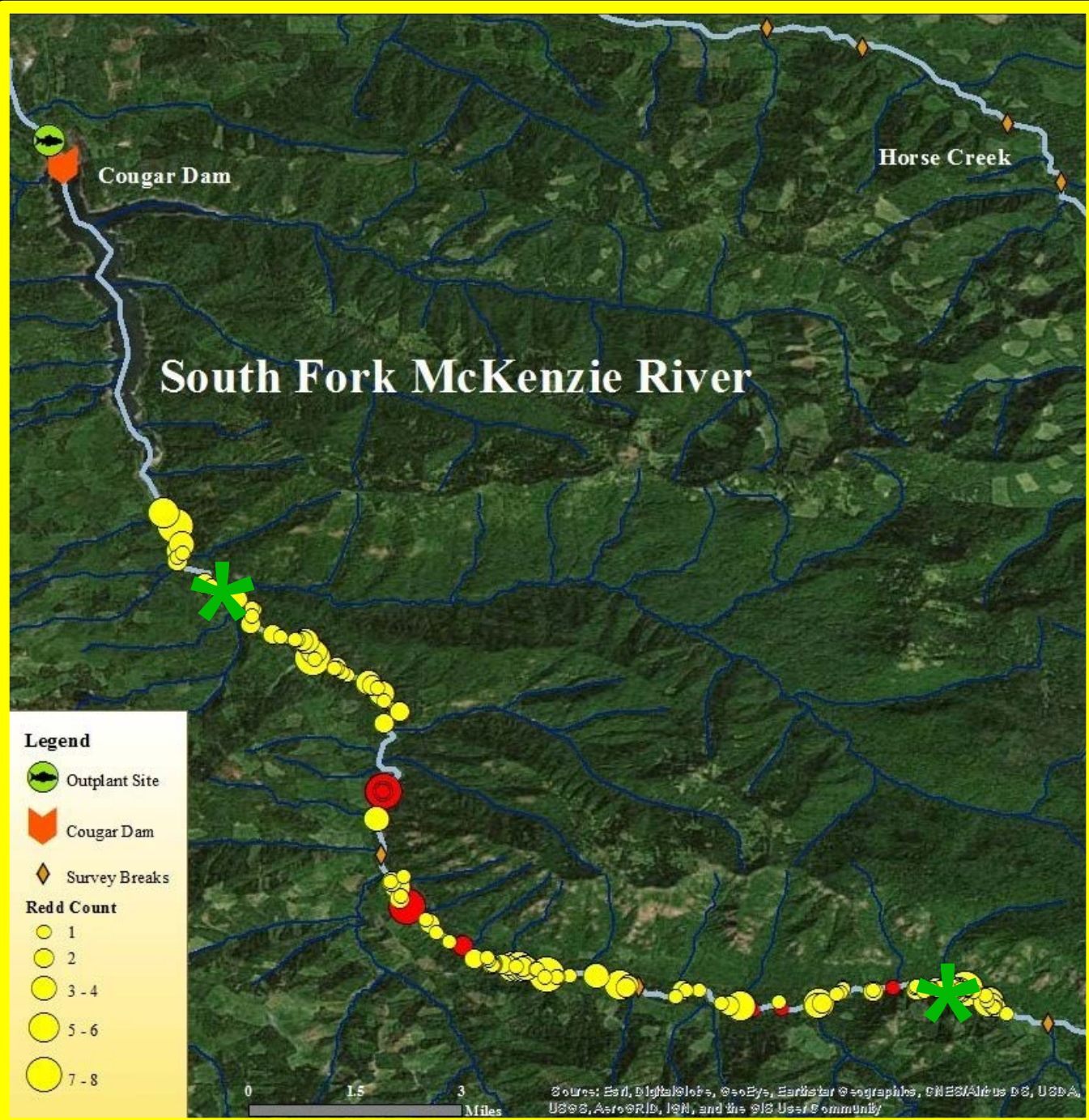


298 NM "Recycled"
174 NM Outplanted (58%)
Plus 545 Ad-marked

Legend

- Dam
- Fish Passage
- Hatchery/Trap
- ChS Distr.
- Reservoirs



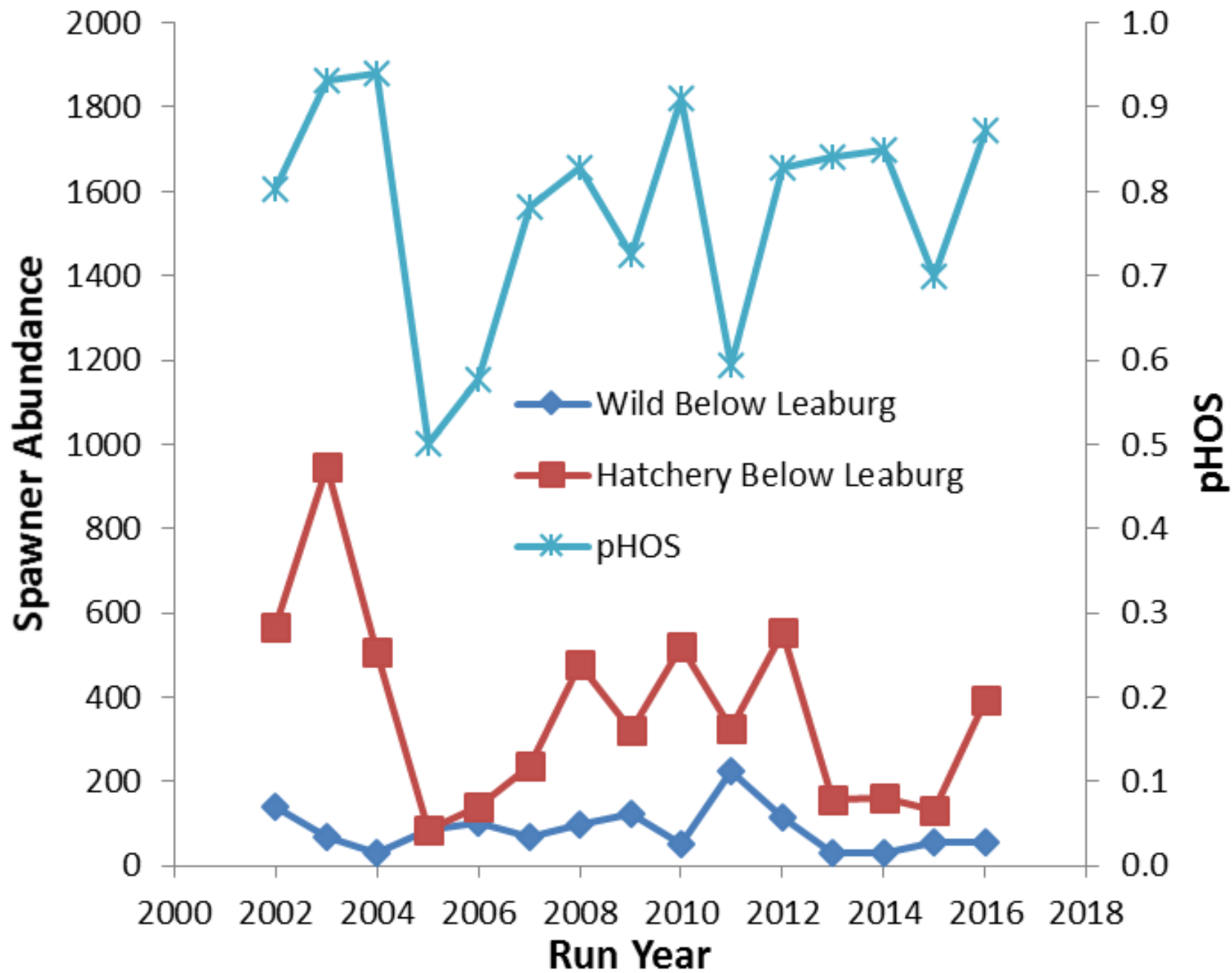


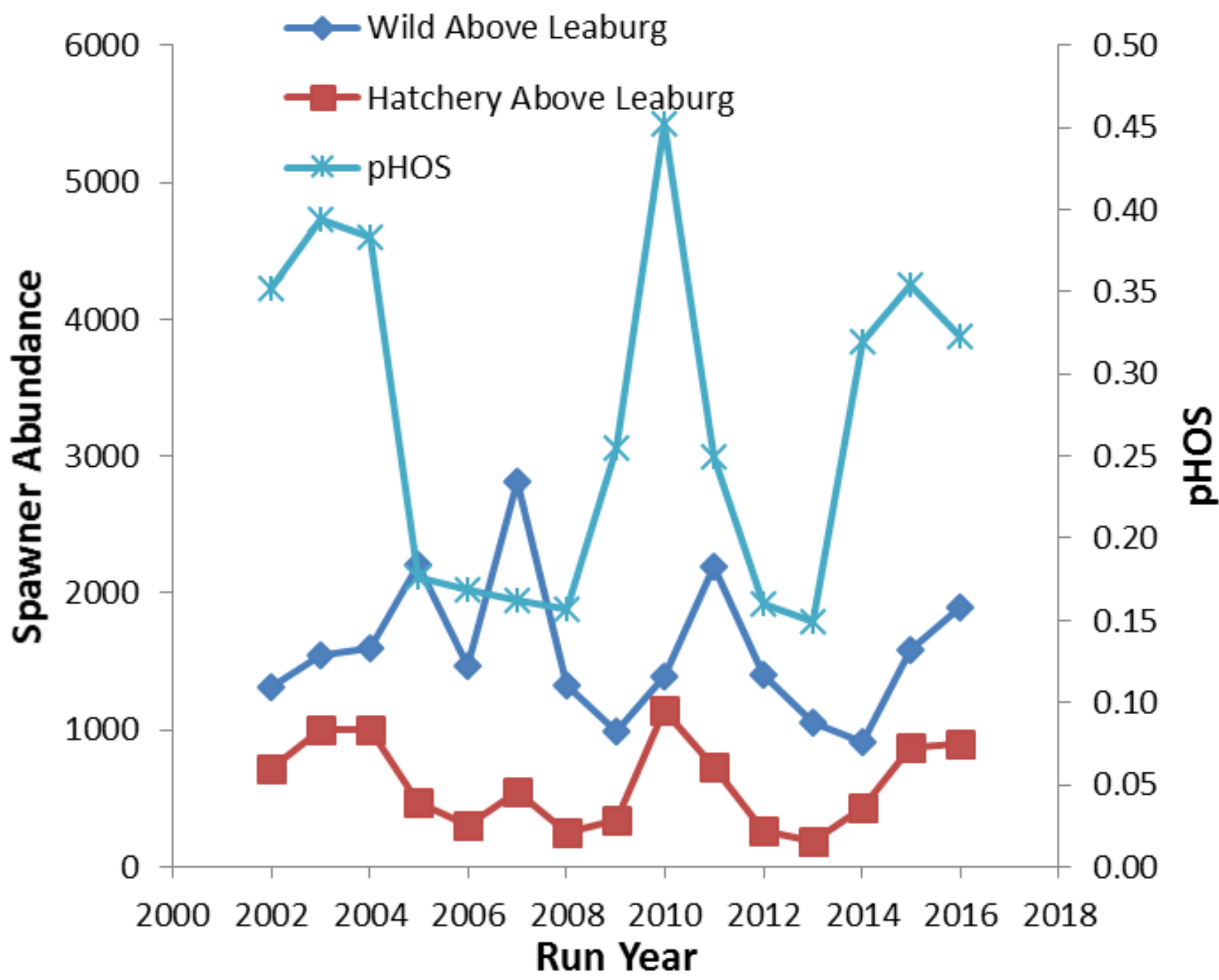
REDD DISTRIBUTION 2016 ABOVE COUGAR

Brood Year	Females Outplanted	Estimated PSM Rate	Females Adjusted for PSM	Redds (Peak)	Redds/Female
2009	629	0.62	239	274	1.15
2010	320	0.2	256	190	0.74
2011	336	0	336	241	0.72
2012	448	0	448	249	0.56
2013	337	0.25	253	146	0.58
2014	462	0	462	222	0.48
2015	456	0.09	415	133	0.32
2016	410	0	410	293	0.71

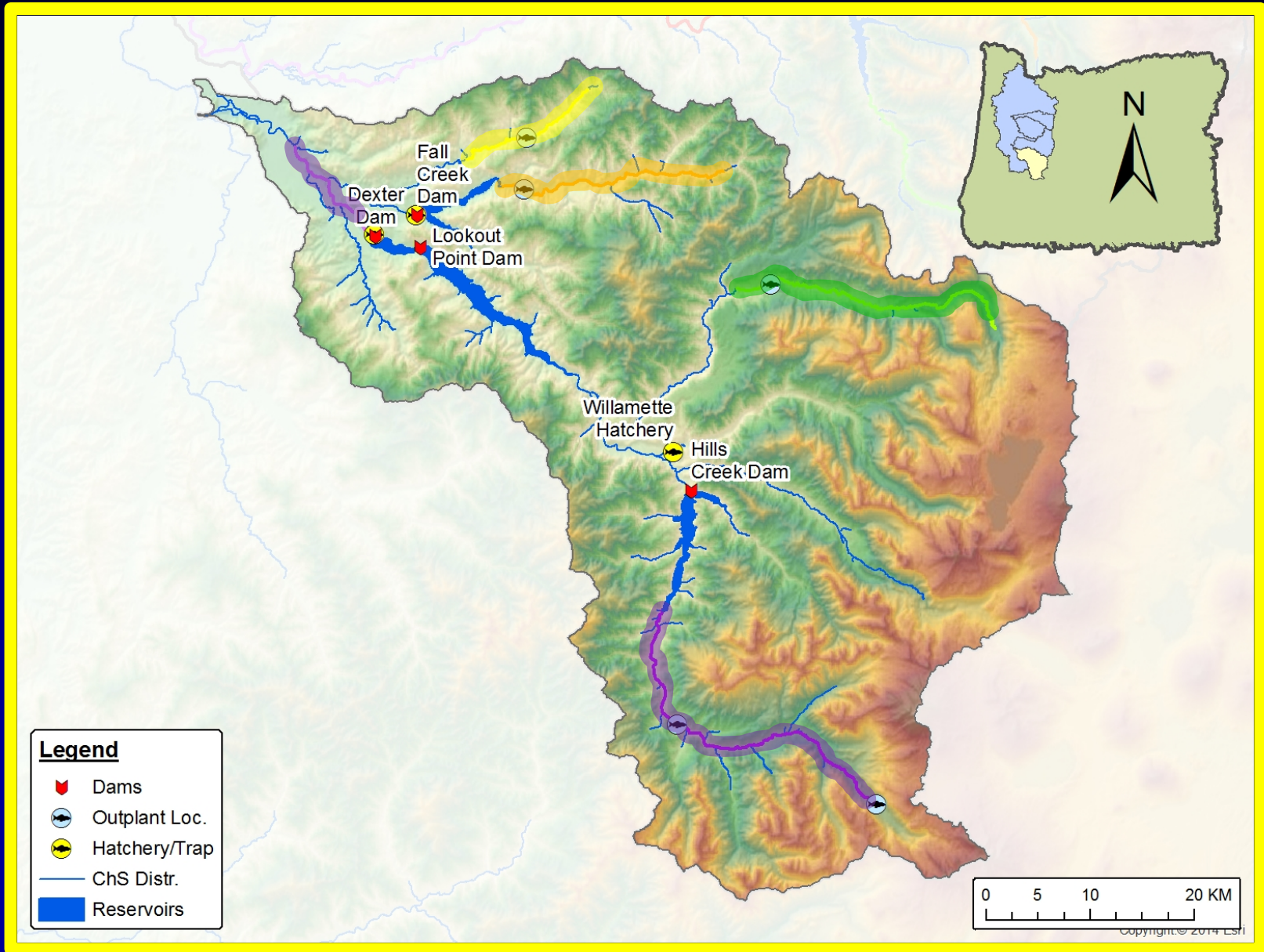


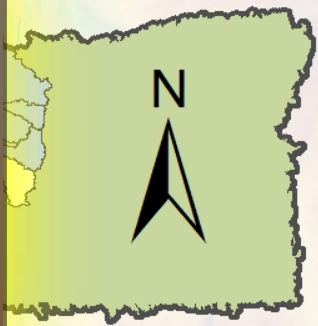
REDD DISTRIBUTION 2016 BELOW COUGAR





Middle Fork Willamette





Fall Cr
Redds: 98
PSM: 15% (3/20)
pHOS: 0%

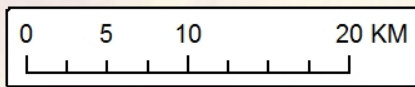
Below Dexter
Redds: 7
PSM: 96% (50/52)
pHOS: 78%

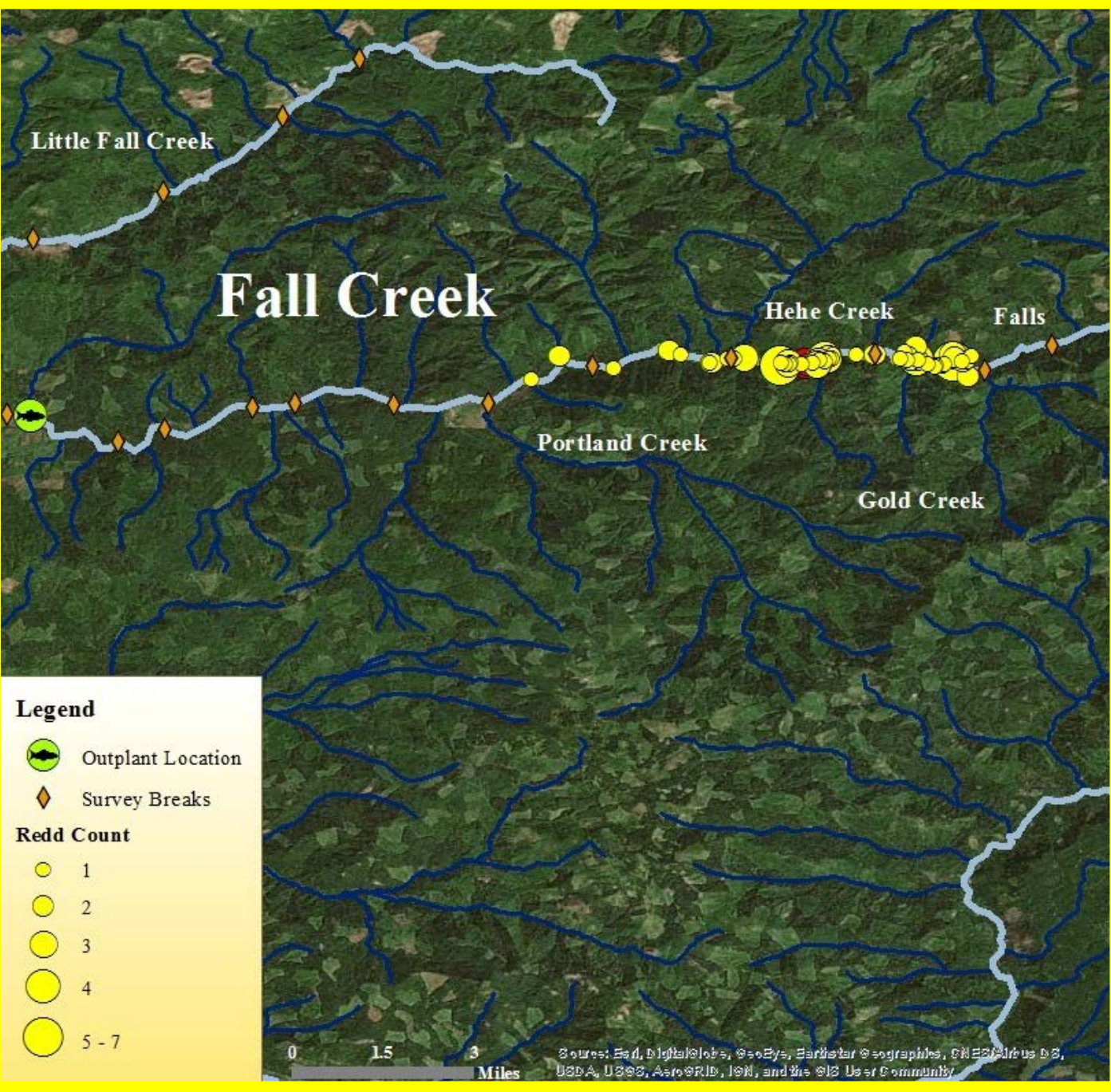
NFMM
Redds: NA
PSM: NA
pHOS: NA

Above Hills
Redds: NA
PSM: NA
pHOS: NA

Legend

- Dams
- Outplant Loc.
- Hatchery/Trap
- ChS Distr.
- Reservoirs





Little Fall Creek

Fall Creek



Hehe Creek

Falls






Portland Creek

Gold Creek

Legend

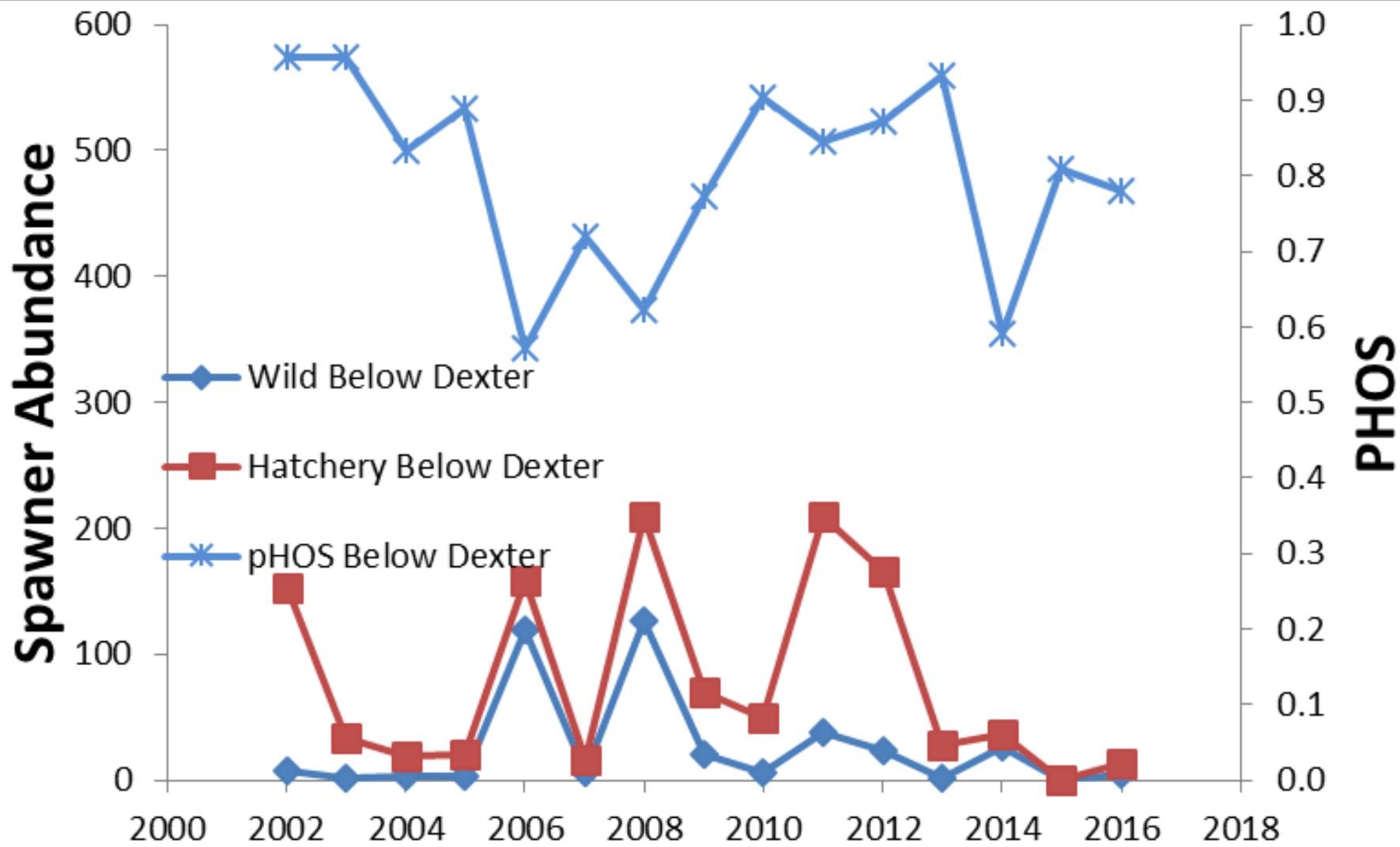
-  Outplant Location
-  Survey Breaks

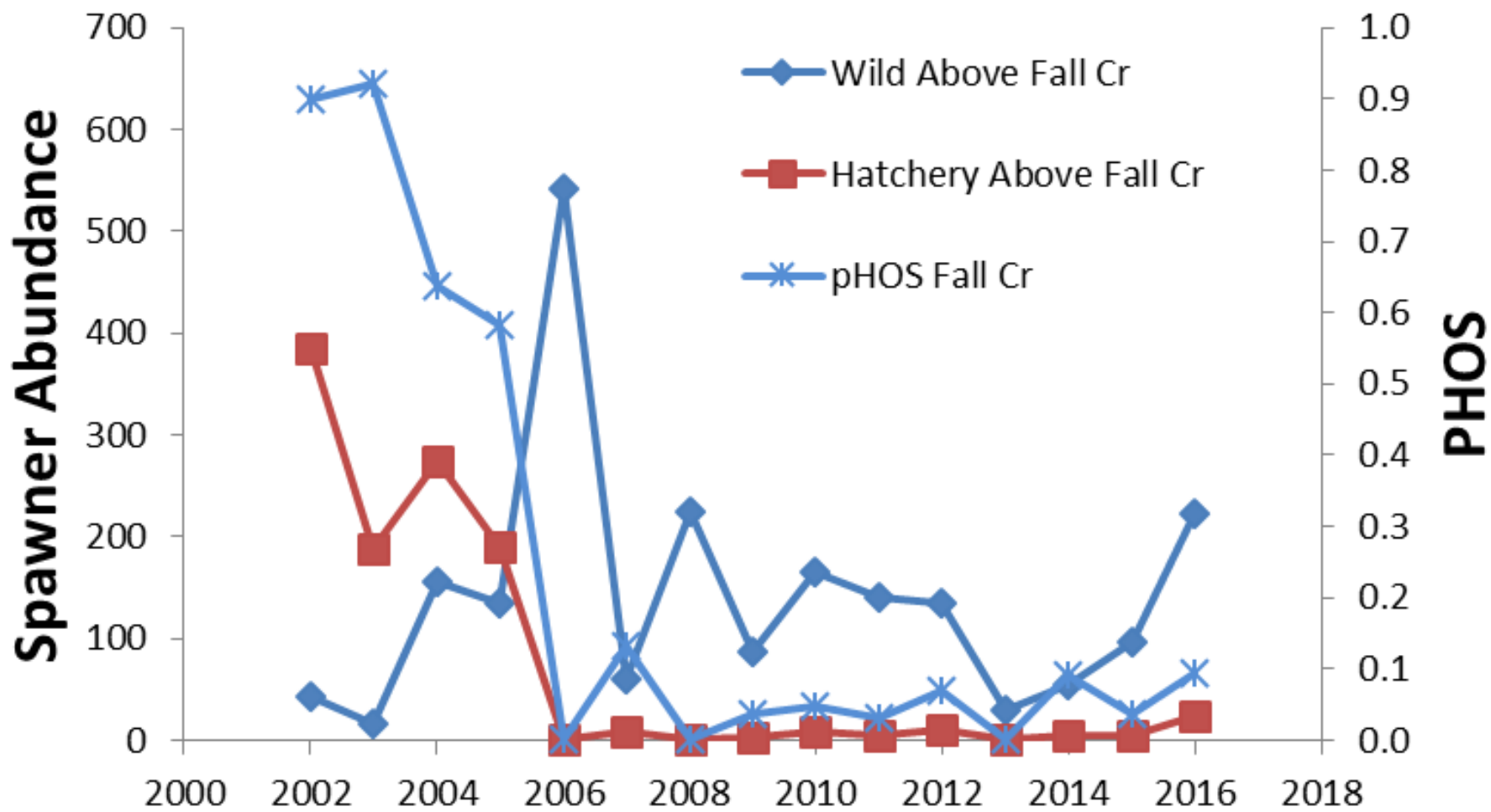
Redd Count

-  1
-  2
-  3
-  4
-  5 - 7

0 1.5 3 Miles

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





Outplanting



RECENT HISTORICAL OUTPLANTS

	North Santiam		South Santiam		McKenzie	Middle Fork Willamette		
Year	Abv Detroit Outplant		Abv Foster Outplant		Abv Cougar Outplant	Abv Fall Cr Outplant	Abv LOP Outplant	Abv Hills Cr Outplant
2002	2,677		765		4,771	1,381	3,765	3,328
2003	2,914		556		2,981	1,939	1,695	1,500
2004	2,511		2,580		3,409	2,805	2,703	2,011
2005	614		936		868	802	798	1,052
2006	1,843		932		1,018	613	827	694
2007	994		403		743	339	555	176
2008	216		686		874	283	513	0
2009	900		445		1,387	354	1,253	927
2010	2,444		720		510	540	1,502	1,357
2011	151		1,221		345	365	1,741	1,576
2012	257		975		952	338	2,520	2,043
2013	1,138		927		629	467	1,966	2,113
2014	872		408		697	456	1,065	1,005
2015	1,521		572		757	259	1,086	1,897
2016	1,238		277		719	424	687	671
TOTAL	20,290		12,403		20,660	11,365	22,676	20,350
			GRAND TOTAL		107,744			

The Progression

Dumping
(Some critters will appreciate the meat)



Outplanting
(Hey! Our evil plan is working)



Reintroduction
(Next step delisting)

NSNT	SSNT	McK	Fall Cr	NFMEF	MF
					X
				X	
X		X			
	X		X		

**We have a Website (Sorry,
we don't tweet)**

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

(Or GOOGLE Corvallis Research)

A large, spotted fish, likely a salmon, is resting in a shallow stream. The fish is positioned horizontally across the middle of the frame, facing right. Its body is covered in dark spots, and its scales are wet and glistening. The stream is surrounded by mossy rocks and flowing water. The word "Questions?" is overlaid in large red text across the upper part of the image.

Questions?

