

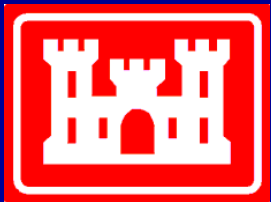
# 2015 Willamette BiOp Hatchery Research, Monitoring, and Evaluation:

## PRELIMINARY OBSERVATIONS

Cameron Sharpe

Oregon Department of Fish and Wildlife

2016 Willamette Research Review



# Acknowledgments

- Funding: US Army Corps of Engineers and Federal Sport Fish Restoration Fund

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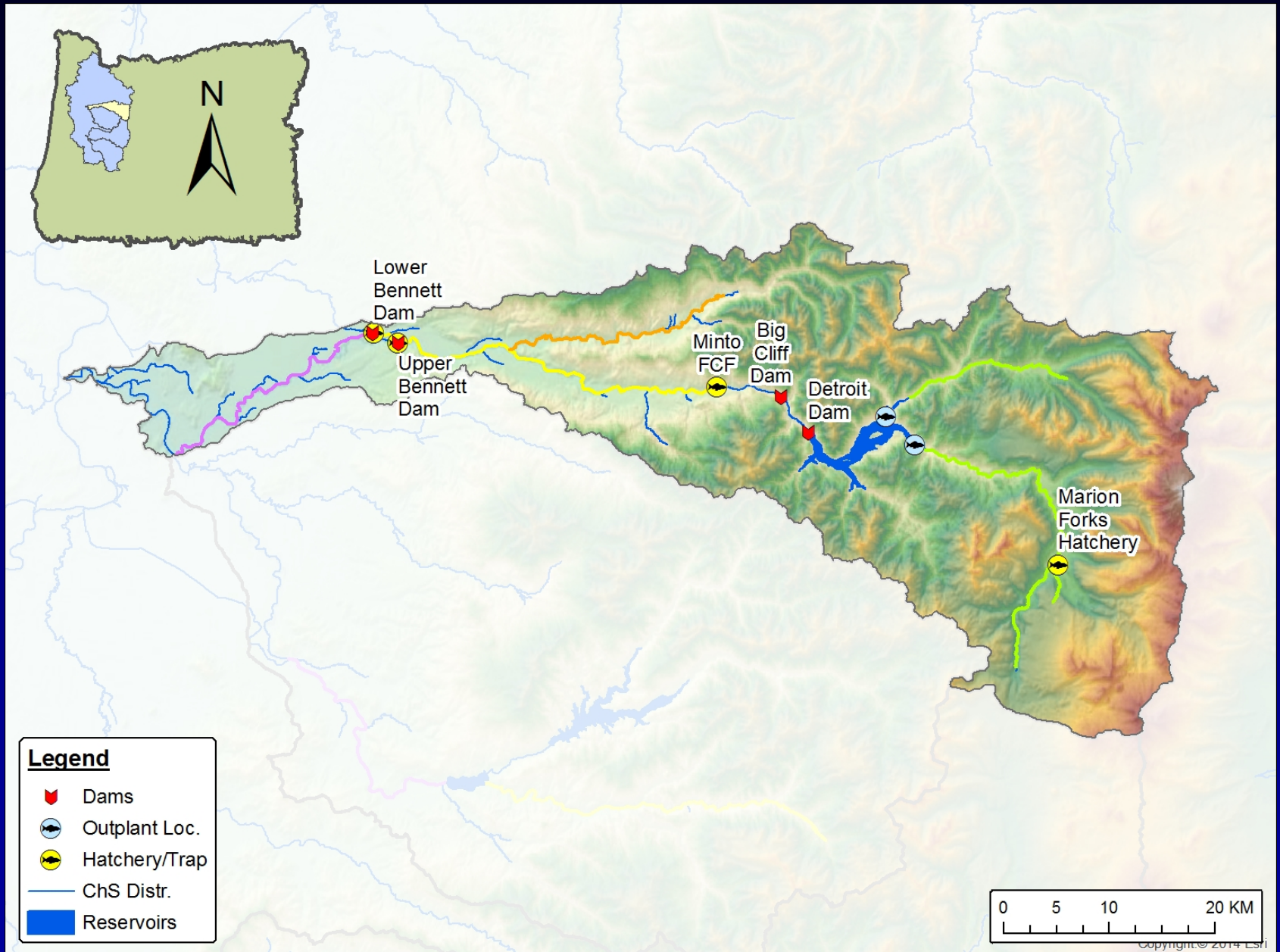


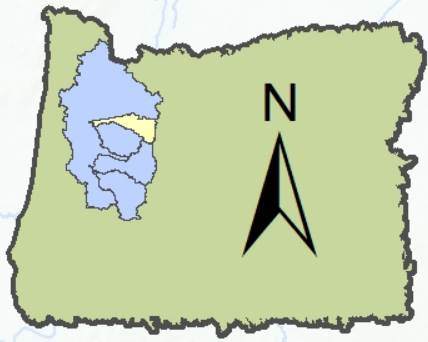
# TOPICS

- Redds and Deads
- pHOS projections\*
- PSM
- Outplanting

\*Need Otolith data

# North Santiam



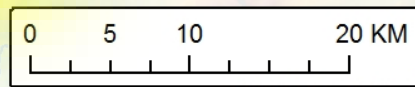


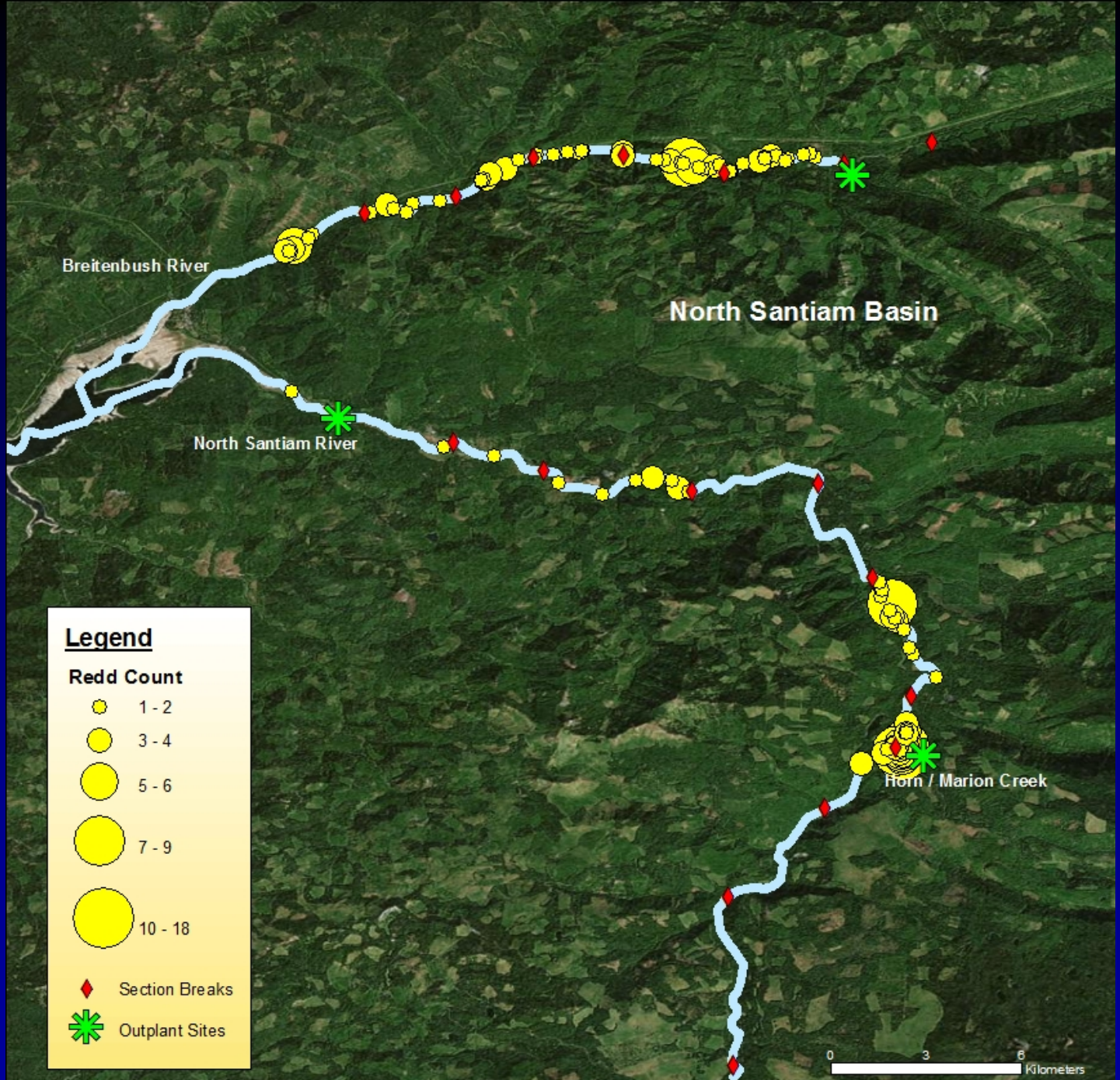
**Below Detroit**  
**Redds: 239**  
**PSM: 63%**  
**pHOS: 70.9%**

**Above Detroit**  
**Redds: 293**  
**PSM: 12%**  
**pHOS: 66.9%**

**Legend**

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



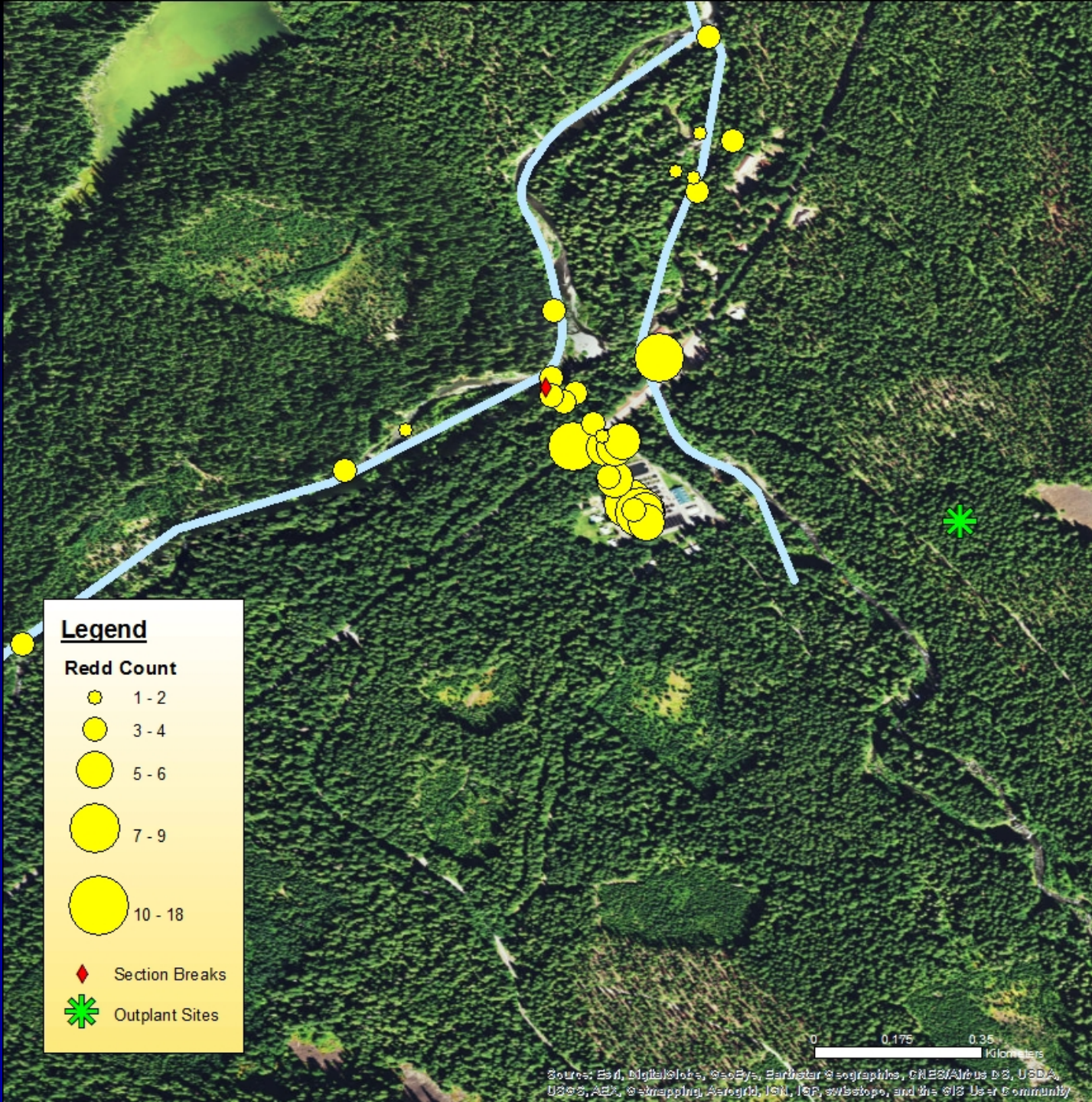


Breitenbush River

North Santiam Basin

North Santiam River

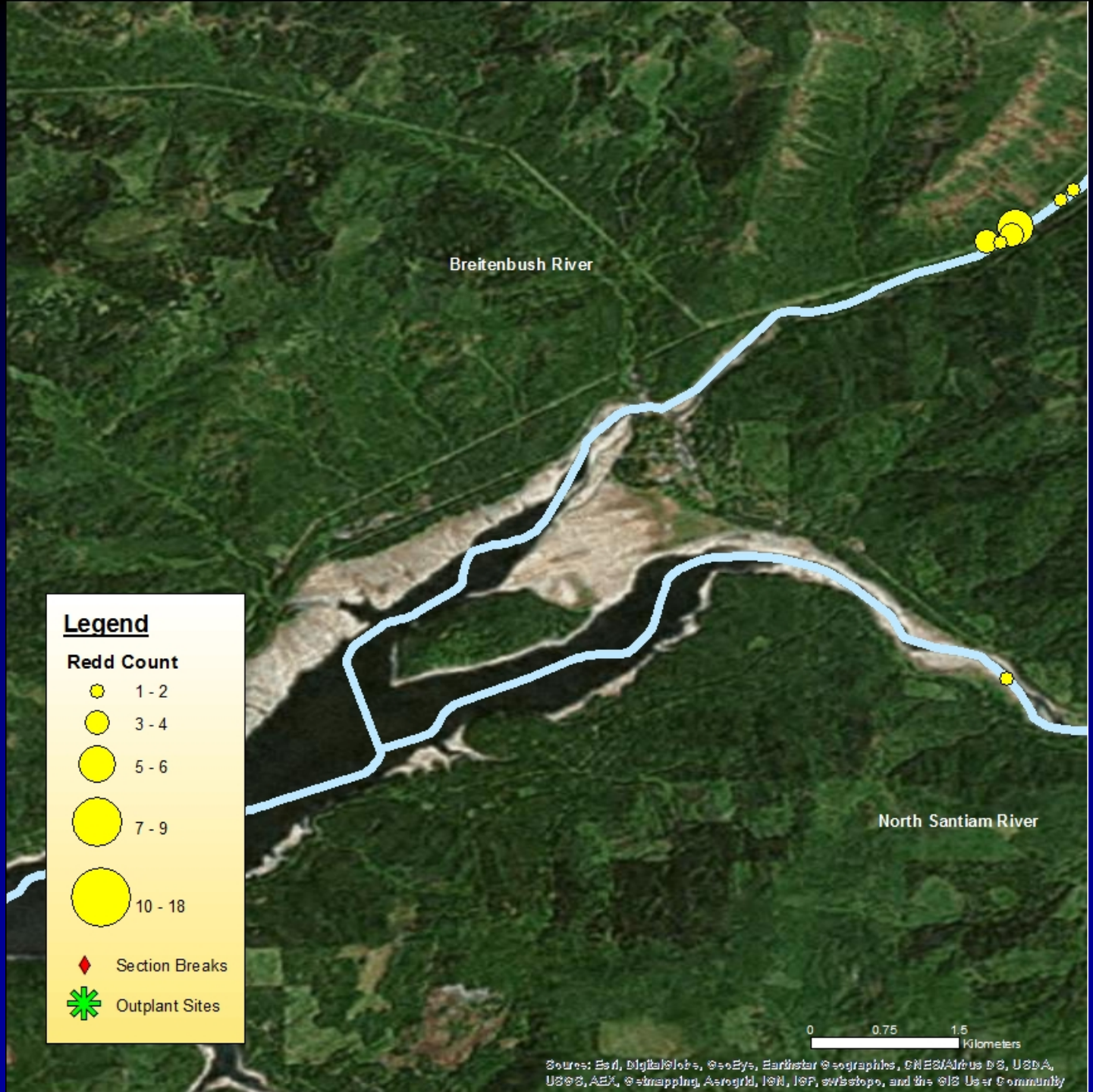
Horn / Marion Creek



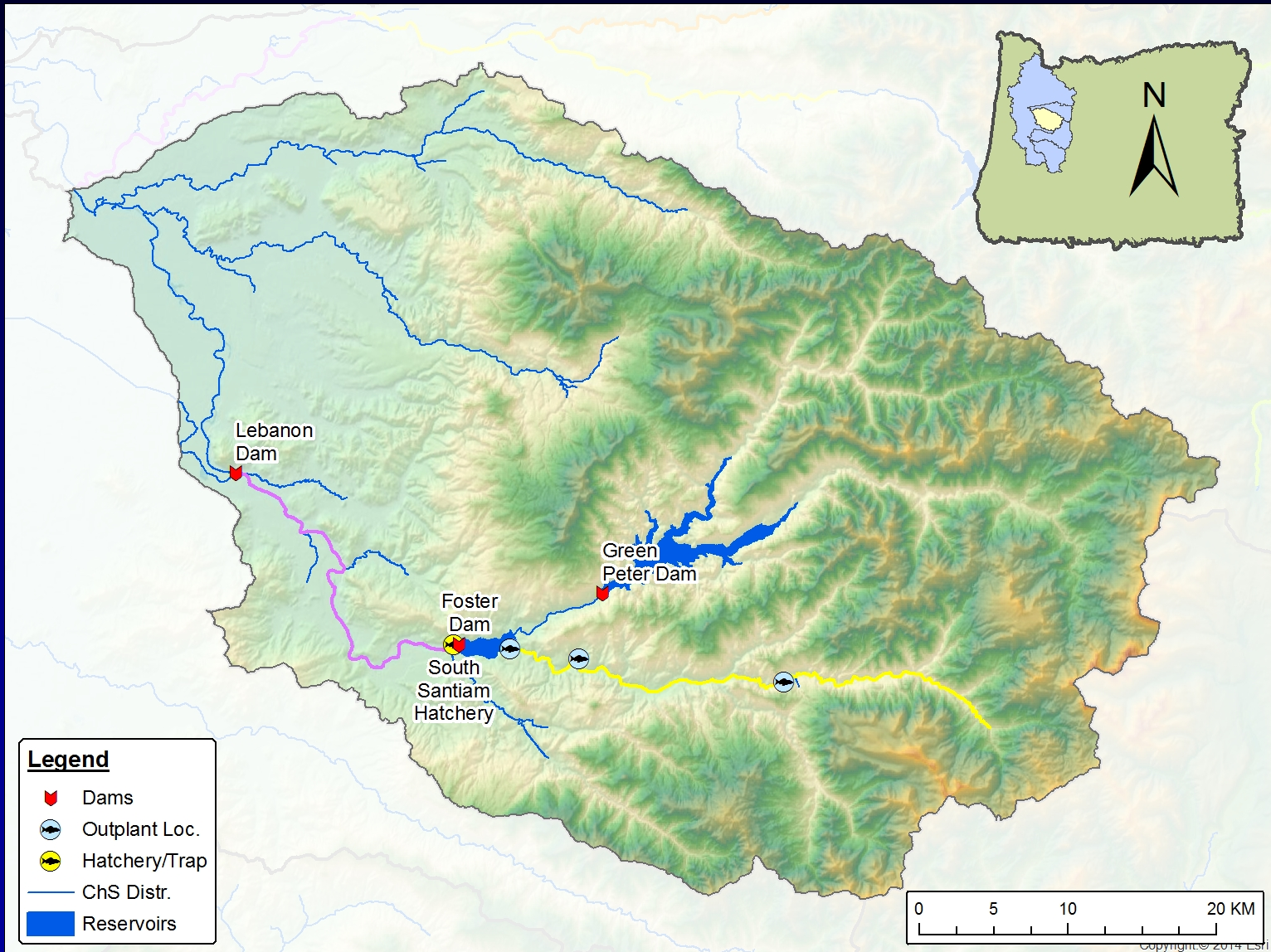
# Above Detroit Asynchronicity

- 1,521 ChS Outplanted
- Peak Redd Count = 293
- Redds \* 2.5 = 293 \* 2.5 = 733 Live Spawners
- PSM = 12%
- 733 Live Spawners / (1 - PSM) = 833
- 1,521  $\neq$  833





# South Santiam

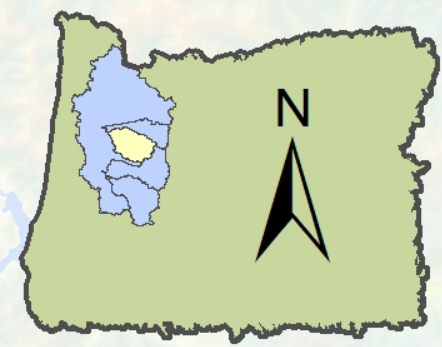


# Below Foster

Redds: 444

PSM: 12%

pHOS: 69.6%



# Above Foster

Redds: 174

PSM: 40%

pHOS: 0%

Lebanon Dam

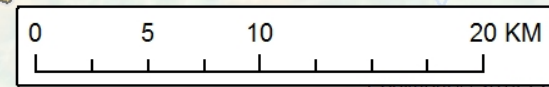
Green Peter Dam

Foster Dam

South Santiam Hatchery

## Legend

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



Foster Dam September, 2015

Legend  
Andrew Wiley Park

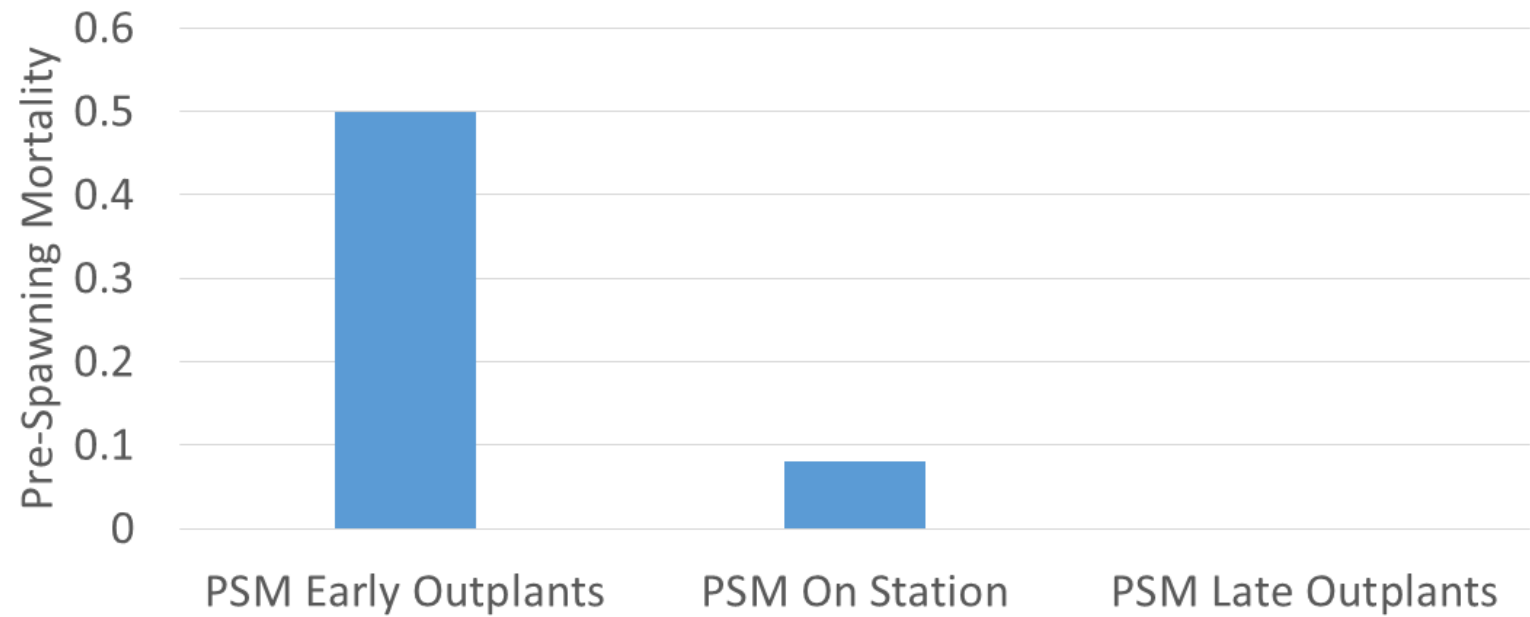
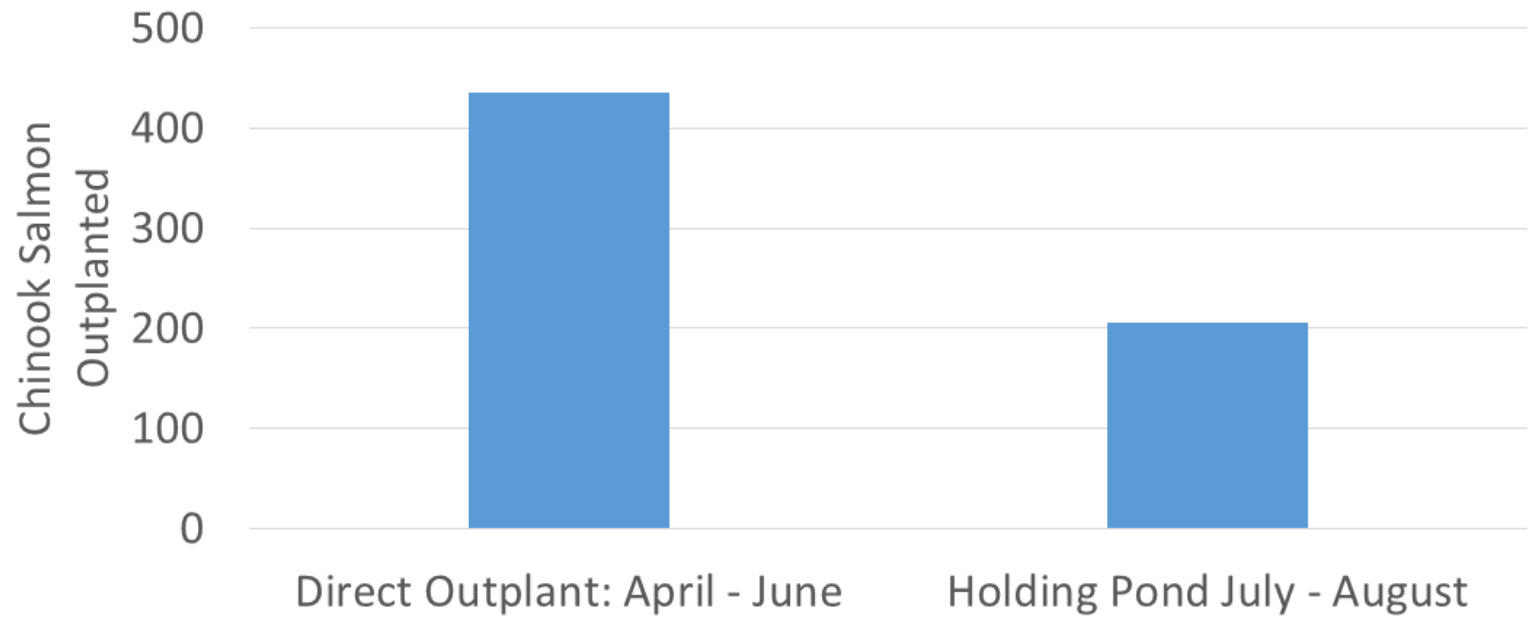
# NEW FOSTER



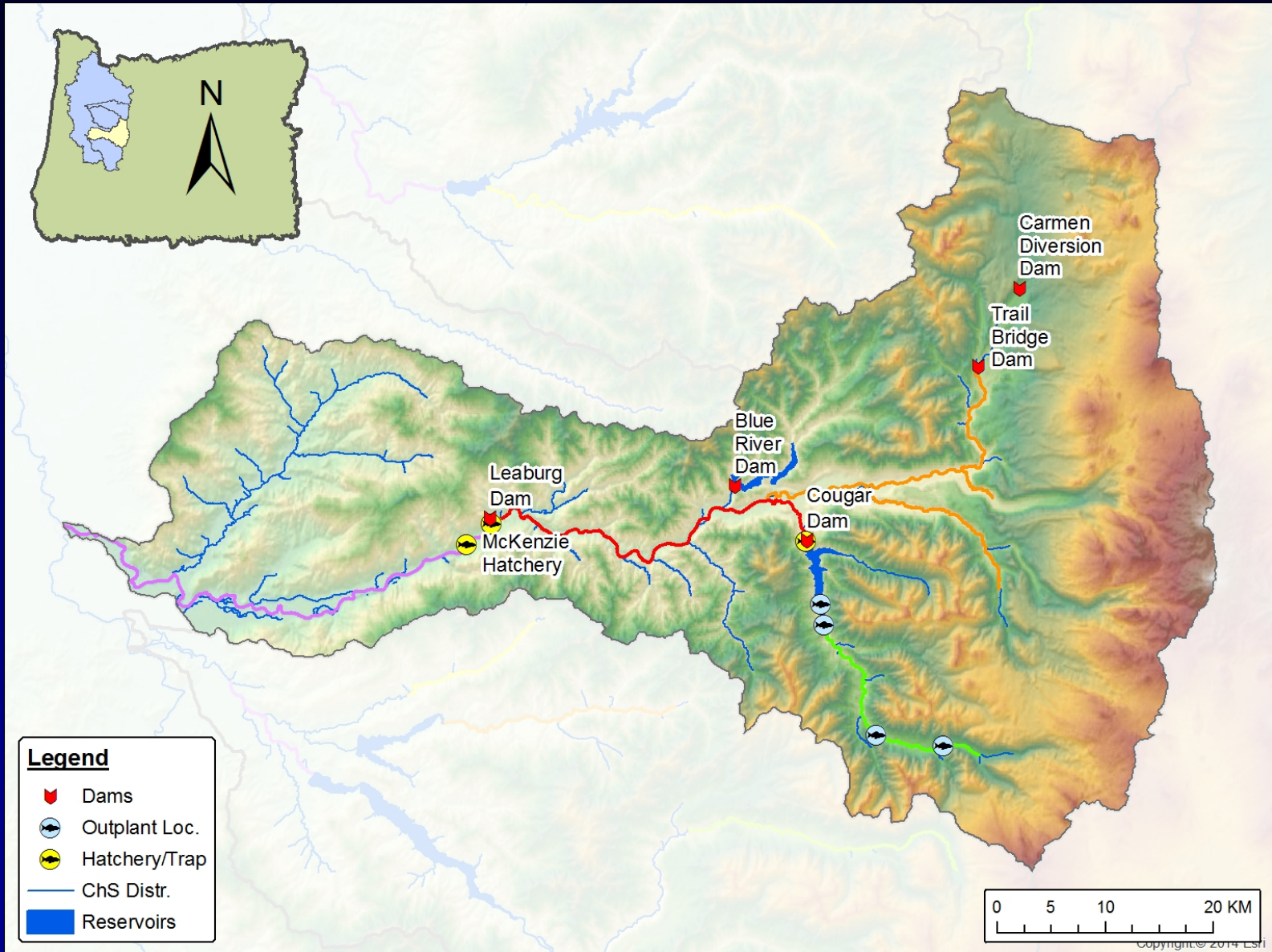
Google earth

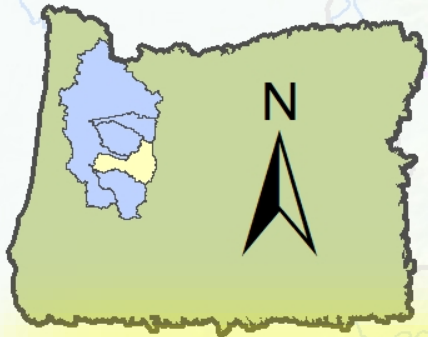


100 ft



# McKenzie





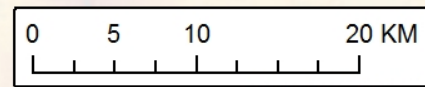
**Below Leaburg**  
**Redds: 160**  
**PSM: 35%**  
**pHOS: 66.2%**

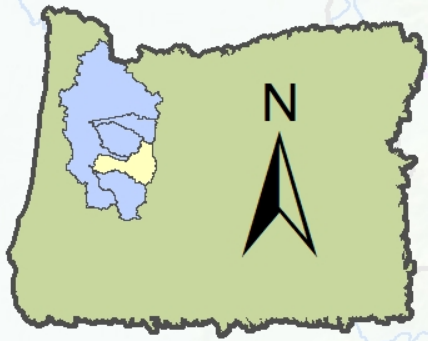


**178 Hatchery**  
**ChS Removed**

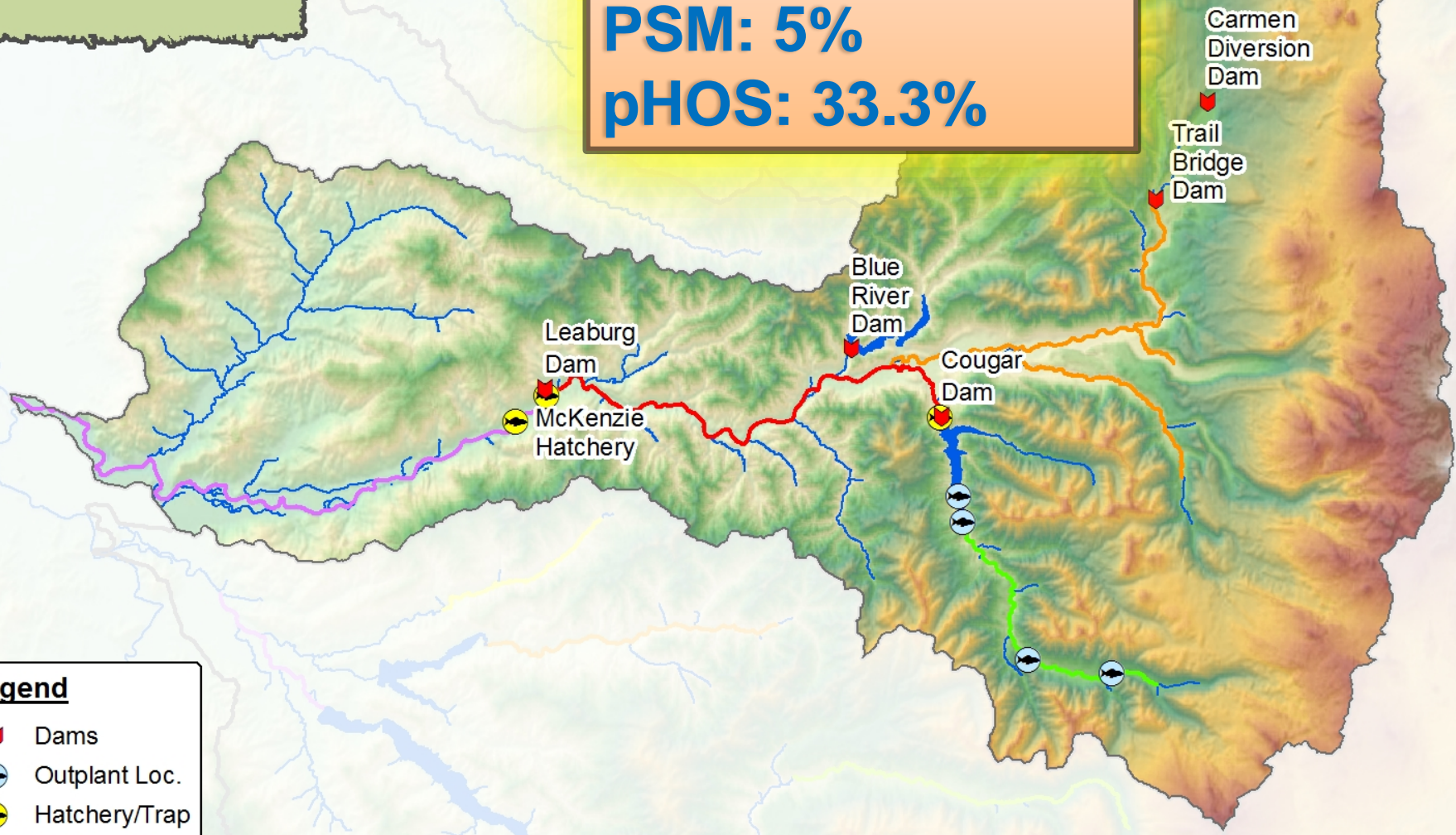
**Legend**

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



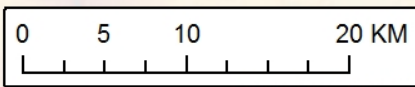


**Above Leaburg**  
**Redds: 984**  
**PSM: 5%**  
**pHOS: 33.3%**

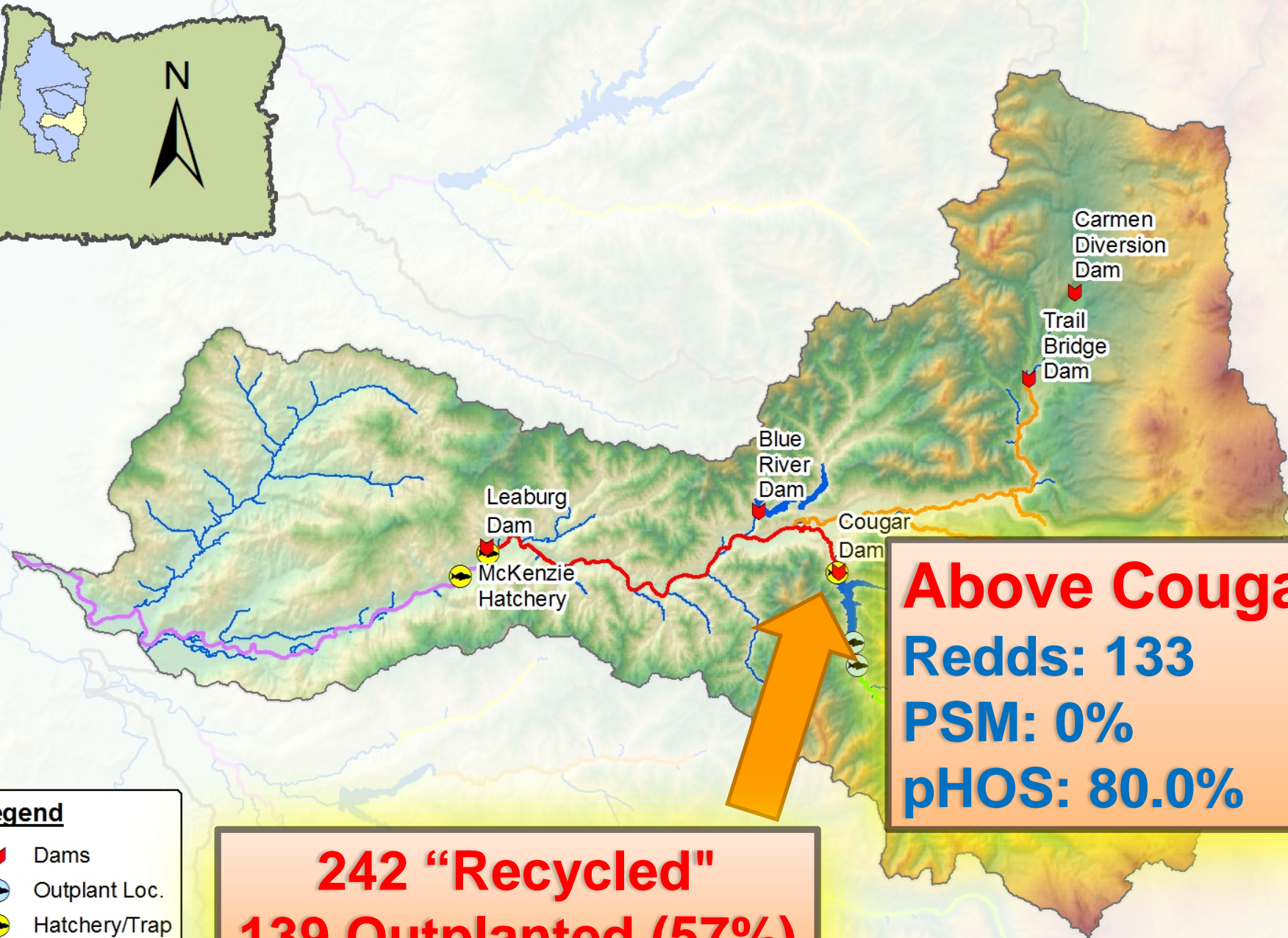
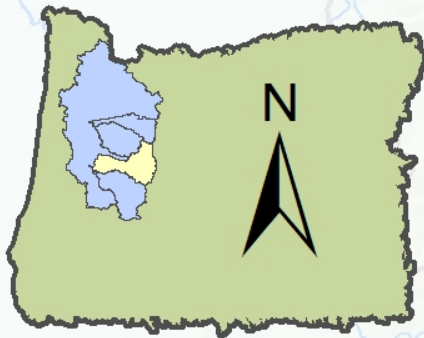


**Legend**

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



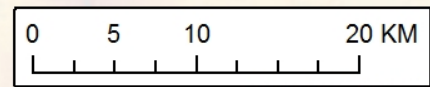


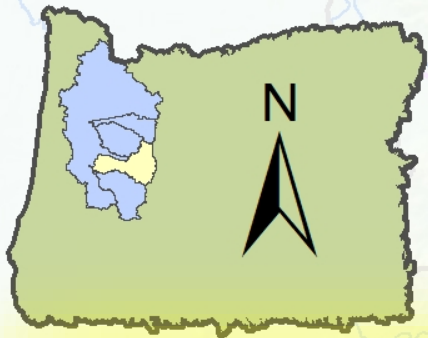


**Above Cougar**  
**Redds: 133**  
**PSM: 0%**  
**pHOS: 80.0%**

**242 "Recycled"**  
**139 Outplanted (57%)**

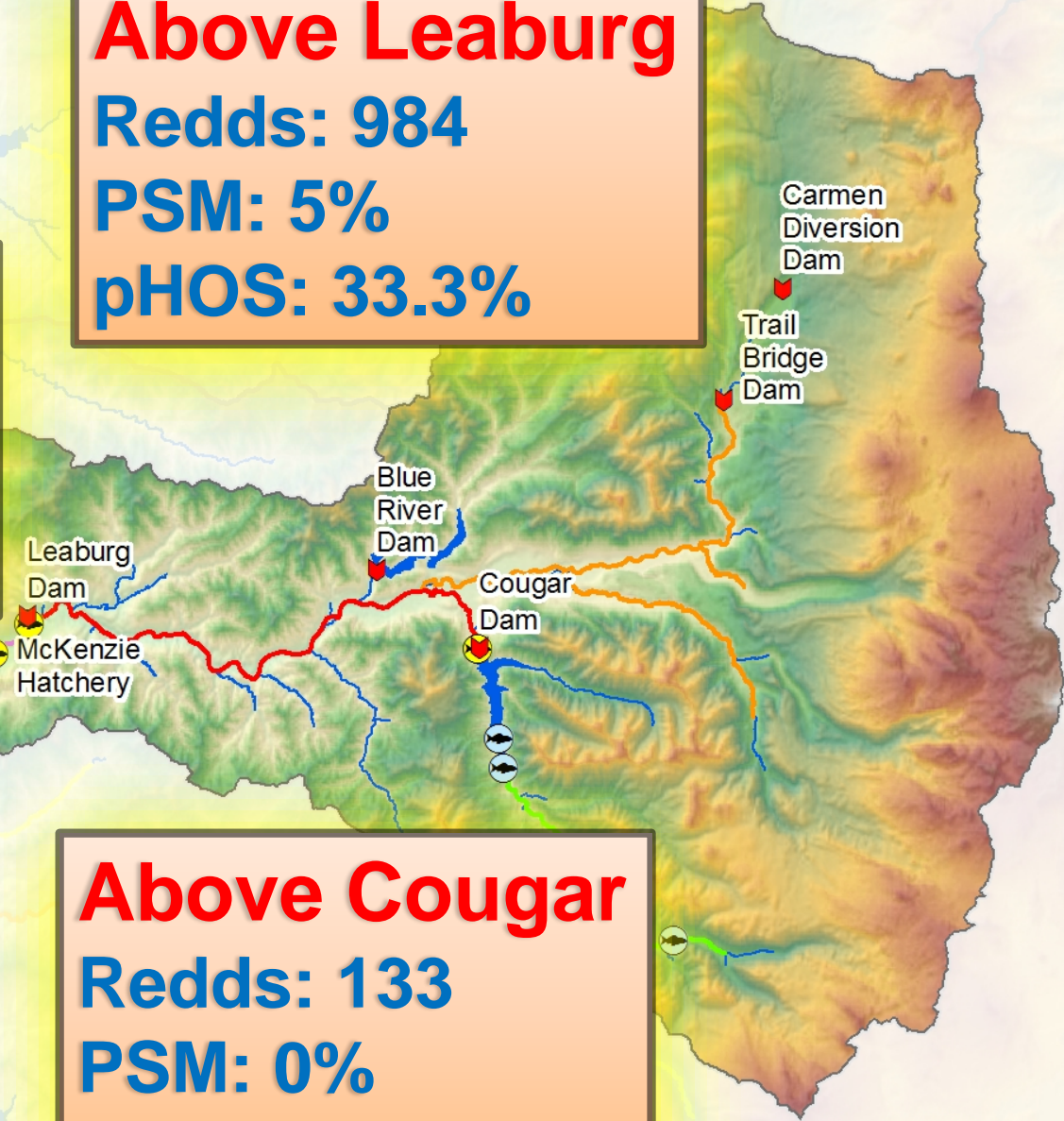
- Legend**
- Dams
  - Outplant Loc.
  - Hatchery/Trap
  - ChS Distr.
  - Reservoirs





**Below Leaburg**  
Redds: 160  
PSM: 35%  
pHOS: 66.2%

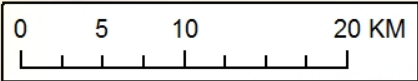
**Above Leaburg**  
Redds: 984  
PSM: 5%  
pHOS: 33.3%

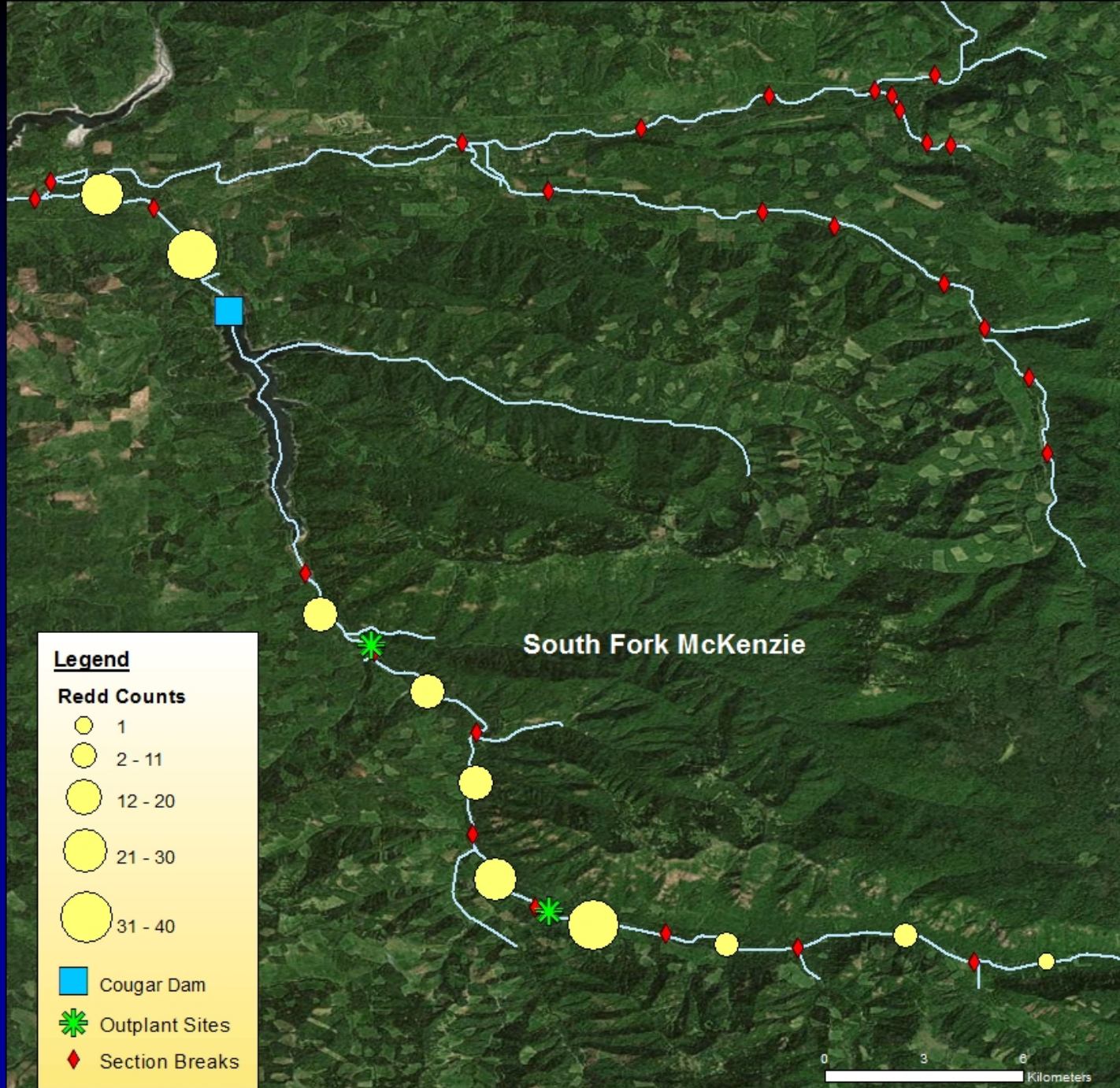


**Legend**

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

**Above Cougar**  
Redds: 133  
PSM: 0%  
pHOS: 80.0%



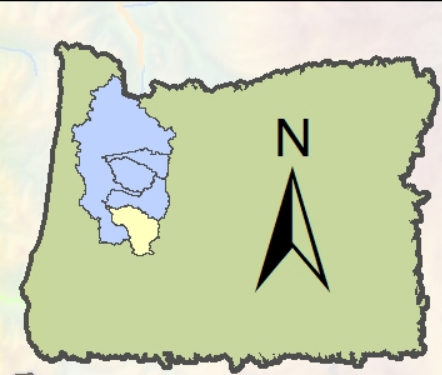


Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, Swisstopo, AeroGRID, IGN, IGP, swisstopo, and the GIS User Community

# Middle Fork Willamette



**Fall Cr**  
**Redds: 40**  
**PSM: 60%**  
**pHOS: 0%**



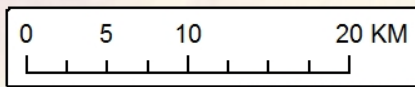
**Below Dexter**  
**Redds: 0**  
**PSM: 99%**  
**pHOS: 78%**

**NFMF**  
**Redds: 286**  
**PSM: 30%**  
**pHOS: 94%**

**Above Hills**  
**Redds: 138**  
**PSM: 89%**  
**pHOS: 100%**

**Legend**

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



# NFMMF Synchronicity

- 1,086 ChS Outplanted
- Peak Redd Count = 286
- Redds\*2.5 = 286 \* 2.5 = 715 Live Spawners
- PSM = 30%
- 715 Live Spawners / (1 - PSM) = 1,021
- 1,086  $\simeq$  1,021

# Outplanting



Subbasin	# Chinook Salmon Outplanted						$\Sigma$
	Unclipped			Clipped			
	M	F	J	M	F	J	
North Santiam	409	233	6	519	525	0	1,692
South Santiam	326	246	0	--	--	--	572
South Fork McKenzie	86	52	1	214	404	0	757
Fall Creek	111	125	23	--	--	--	259
Middle Fork Willamette	133	139	23	1,668	1,257	58	3,278
$\Sigma$	1,065	795	53	2,401	2,186	58	6,558



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, bold, red text across the upper portion of the image.

**Questions?**

<b>Subbasin</b>	<b>River</b>	<b>Surveys Conducted</b>	<b>Clipped</b>	<b>Unclipped</b>	<b>Unk</b>
<b>North Santiam</b>	<b>Breitenbush</b>	<b>49</b>	<b>48</b>		<b>10</b>
	<b>Horn Creek</b>	<b>18</b>	<b>51</b>	<b>45</b>	<b>1</b>
	<b>Little North Santiam</b>	<b>28</b>			
	<b>Marion Creek</b>	<b>15</b>	<b>12</b>	<b>6</b>	
	<b>North Fork Breitenbush</b>	<b>3</b>			
	<b>North Santiam</b>	<b>128</b>	<b>122</b>	<b>50</b>	<b>3</b>
	<b>Santiam abv Detroit</b>	<b>50</b>	<b>2</b>	<b>5</b>	<b>3</b>
	<b>South Fork Breitenbush</b>	<b>3</b>			
<b>South Santiam</b>	<b>South Santiam</b>	<b>50</b>	<b>305</b>	<b>133</b>	<b>7</b>
	<b>South Santiam abv Foster</b>	<b>148</b>		<b>68</b>	
<b>McKenzie</b>	<b>Horse Creek</b>	<b>28</b>		<b>24</b>	
	<b>Lost Creek</b>	<b>8</b>		<b>1</b>	
	<b>McKenzie</b>	<b>105</b>	<b>128</b>	<b>163</b>	<b>8</b>
	<b>South Fork McKenzie</b>	<b>35</b>	<b>7</b>	<b>18</b>	
	<b>SF McKenzie abv Cougar</b>	<b>76</b>	<b>8</b>	<b>2</b>	
<b>Middle Fork</b>	<b>Fall Creek</b>	<b>74</b>		<b>12</b>	
	<b>Little Fall Creek</b>	<b>21</b>	<b>1</b>	<b>4</b>	
	<b>Middle Fork</b>	<b>45</b>	<b>137</b>	<b>35</b>	
	<b>Middle Fork abv Hills Cr</b>	<b>60</b>	<b>167</b>		<b>22</b>
	<b>North Fork Middle Fork</b>	<b>67</b>	<b>94</b>	<b>6</b>	<b>11</b>
<b>Coast Fork Willam</b>	<b>Coast Fork Willamette</b>	<b>6</b>	<b>13</b>	<b>1</b>	
	<b>Mosby Creek</b>	<b>7</b>	<b>14</b>	<b>1</b>	<b>3</b>
	<b>Row River</b>	<b>8</b>	<b>28</b>		

Subbasin, section	Peak Redd Count	Spawner Abundance Estimate (redds*2.5)	Reach-specific pHOS	Hatchery-origin Abundance Estimate	Natural-origin Abundance Estimate
<b>North Santiam</b>					
Below Detroit Reservoir	239	598	73.8%	441	156
Above Detroit Reservoir	293	733	70.2%	514	218
<b>South Santiam</b>					
Below Foster Dam	444	1,110	71.1%	789	321
Above Foster Dam	174	435	11.8%	51	384
<b>McKenzie</b>					
Below Leaburg Dam	160	400	72.6%	290	110
Above Leaburg Dam	984	2,460	36.8%	905	1,555
S Fork McKenzie Above Cougar	133	333	81.0%	269	63
<b>Middle Fork Willamette</b>					
Below Dexter	0	0	85.2%	0	0
Little Fall Creek	0	0	0.0%	0	0
Fall Creek	40	100	0.0%	0	100
North Fork Middle Fork	286	715	96.0%	686	29
Above Hills Creek Reservoir	138	345	100.0%	345	0

Subbasin, section	Total Females	Unspawned Females	PSM	PSM Lower 95% CI	PSM Upper 95% CI
<b>North Santiam</b>					
Below Detroit Reservoir	100	63	63%	56%	70%
Above Detroit Reservoir	77	9	12%	5%	18%
<b>TOTAL</b>	177	72	41%	35%	47%
<b>South Santiam</b>					
Below Foster Dam	290	36	12%	9%	16%
Above Foster Dam	42	17	40%	28%	53%
<b>TOTAL</b>	332	53	16%	12%	20%
<b>McKenzie</b>					
Below Leaburg Dam	40	14	35%	22%	48%
Above Leaburg	143	7	5%	1%	8%
S Fork McKenzie Above Cougar	11	1	9%	-7%	25%
<b>TOTAL</b>	194	22	11%	7%	16%
<b>Middle Fork Willamette</b>					
Below Dexter	94	93	99%	97%	100%
Little Fall Creek	0	0	--	--	--
Fall Creek	5	3	60%	26%	94%
North Fork Middle Fork	47	14	30%	18%	41%
Above Hills Creek Reservoir	83	74	89%	84%	94%
<b>TOTAL</b>	229	184	80%	77%	84%