Salmon Habitat Assessment for Conservation Planning on the Lower White Salmon River

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Background

- Condit Dam breached Oct 26, 2011
- Dam Removal complete Sept 14, 2012
- Re-vegetation projects in progress 2013-2014
- PacifiCorp owns 500-600 acres along the lower 6 river miles
- Mid-Columbia Fisheries Enhancement Group receives grant from Salmon Recovery Funding Board for conservation planning

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Conservation Planning Grant

- Provide habitat information
- Hold public meeting
- Promote discussion among interest groups
- Explore habitat protection scenarios and funding strategies for protecting highest priority habitat

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Interests

- ESA listed species-LCR salmon recovery domain and the MCR steelhead recovery sub-domain
- Tribal rights "to hunt and fish at all usual and accustomed places"
- PacifiCorp, neighboring property owners, cabin owners, public, and local community
- Skamania and Klickitat Counties
- Columbia Gorge National Scenic Area
- Recreational resource – fishing, private & commercial boating, access, conservation, and other recreation
- Timber, agriculture (and irrigation), residential, business

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ESA Listed Salmonids

Species	ESU/DPS	Status	Federal Register Notice	
Chinook salmon (*Oncorhynchus tshawytscha*)	LCR Chinook salmon	Threatened	70 FR 37160	6/28/2005
Coho salmon (*O. kisutch*)	LCR coho salmon	Threatened	70 FR 37160	6/28/2005
Chum salmon (*O. keta*)	CR chum salmon	Threatened	70 FR 37160	6/28/2005
Steelhead (*O. mykiss*)	MCR steelhead	Threatened	71 FR 834	1/5/2006
Bull trout (*Salvelinus confluentus*)	CR bull trout	Threatened	63 FR 31647	6/10/1998
Critical Habitat Designation	LCR Chinook salmon, CR chum salmon, LCR coho salmon, MCR steelhead		70 FR 52630	9/2/2005
Critical Habitat Designation	CR bull trout		75 FR 2269	1/14/2010

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Salmonid Life History Stages

- Adult: migratory, holding, and spawning
- Incubation (eggs, alevin)
- Emergent (fry)
- Parr (juveniles)
- Smolt out migration

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Salmonid Habitat Criteria

- Adult holding and spawning
  - Pools, cover, varied substrate, fines < 20%
- Incubation (eggs and alevin)
  - Fines < 20%, limited scour/high flows
- Emergent (fry)
  - Low velocities, shallow depths, cover
- Parr (juveniles) and smolt migrants
  - Faster, deeper water, cover, LWD, boulder, cobble

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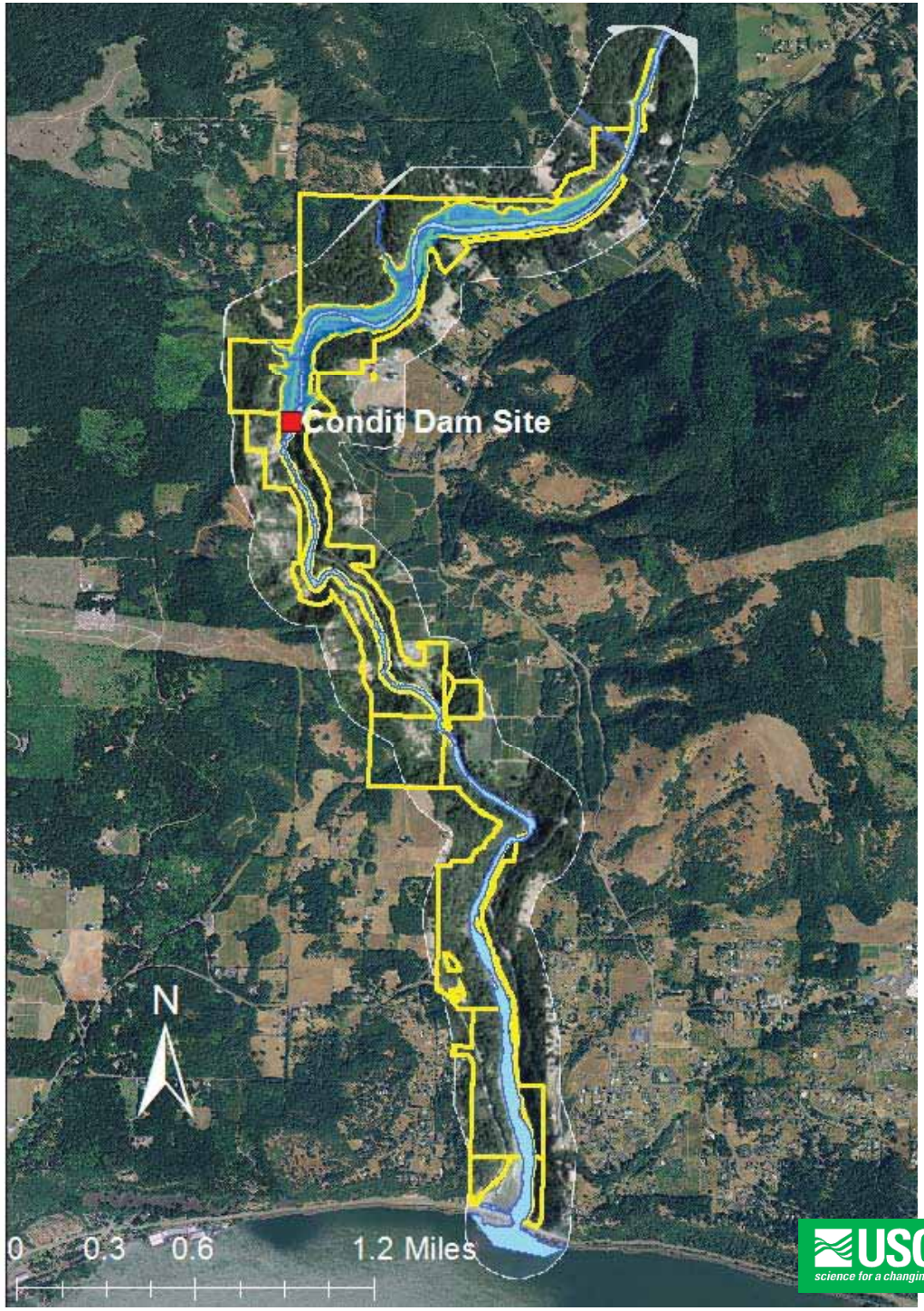
Conservation Planning Area

PacifiCorp provided Lidar data
and
orthophotos for the project area
from August 2013

Site of former Northwestern Lake
and PacifiCorp property



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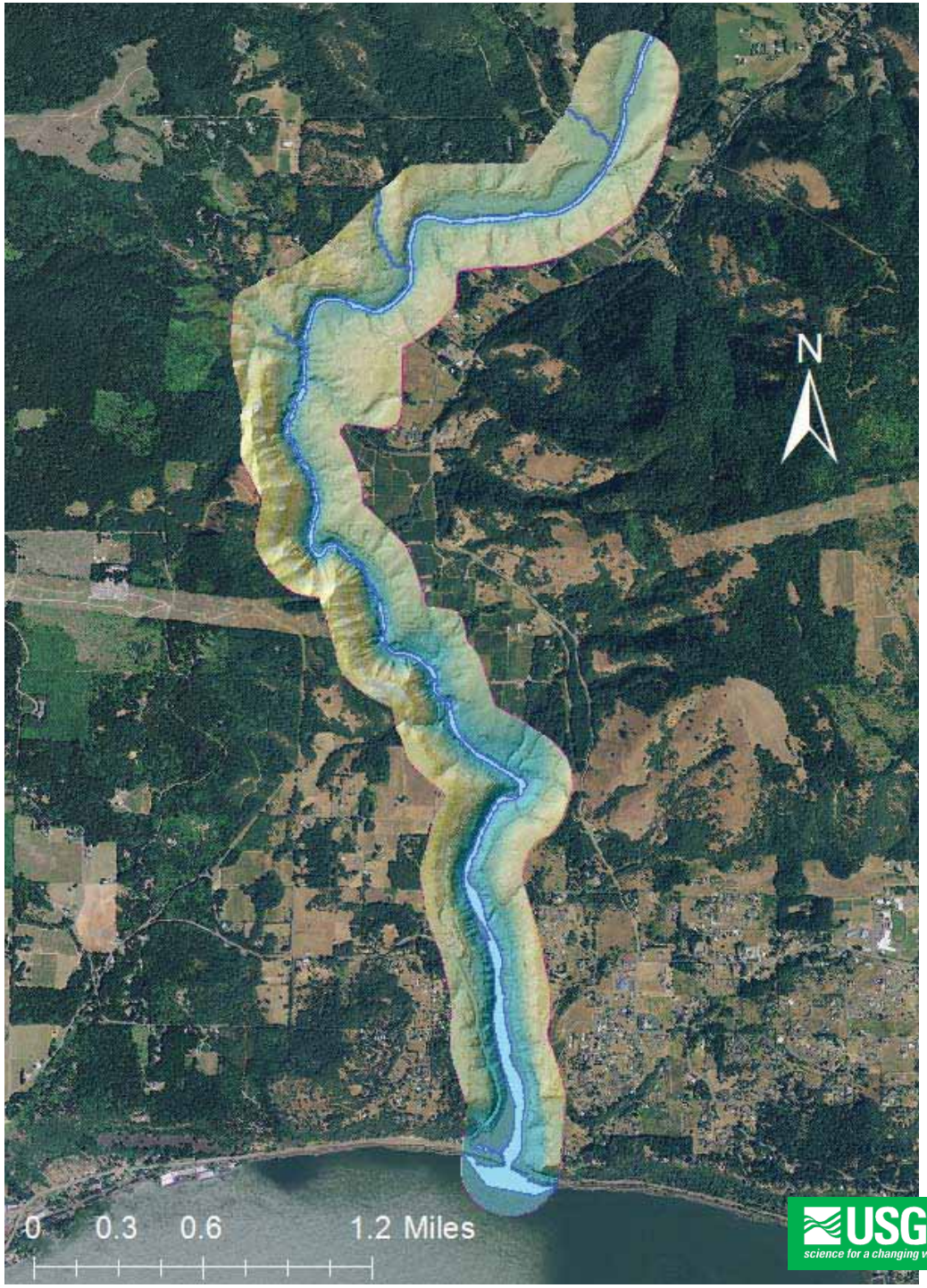
Digital Elevation Model

Habitat characteristics

- Moderate in-stream complexity- boulders, overhanging bedrock, and large woody debris
- Narrow basalt canyons
- Riffles, runs, fewer pools, some cascades



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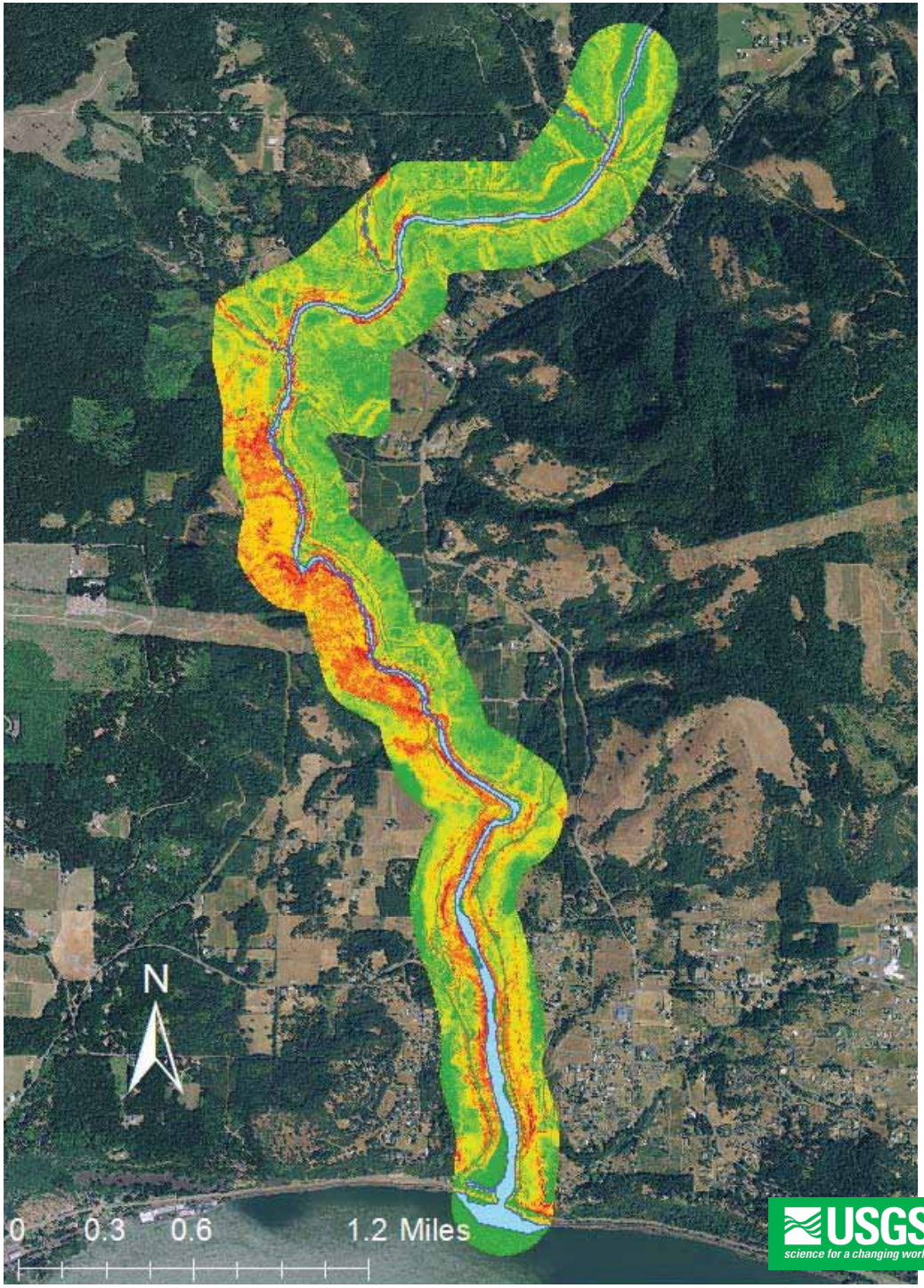
Shoreline Slopes

Identify areas more likely for development and aid in conservation habitat discussions

Legend

- 0 - 9.0
- 9.0 - 18.7
- 18.7 - 29.1
- 29.1 - 39.5
- 39.5 - 53.0
- 53.0 - 88.3



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Water Surface Elevation and Reaches

Legend

Water surface elevation

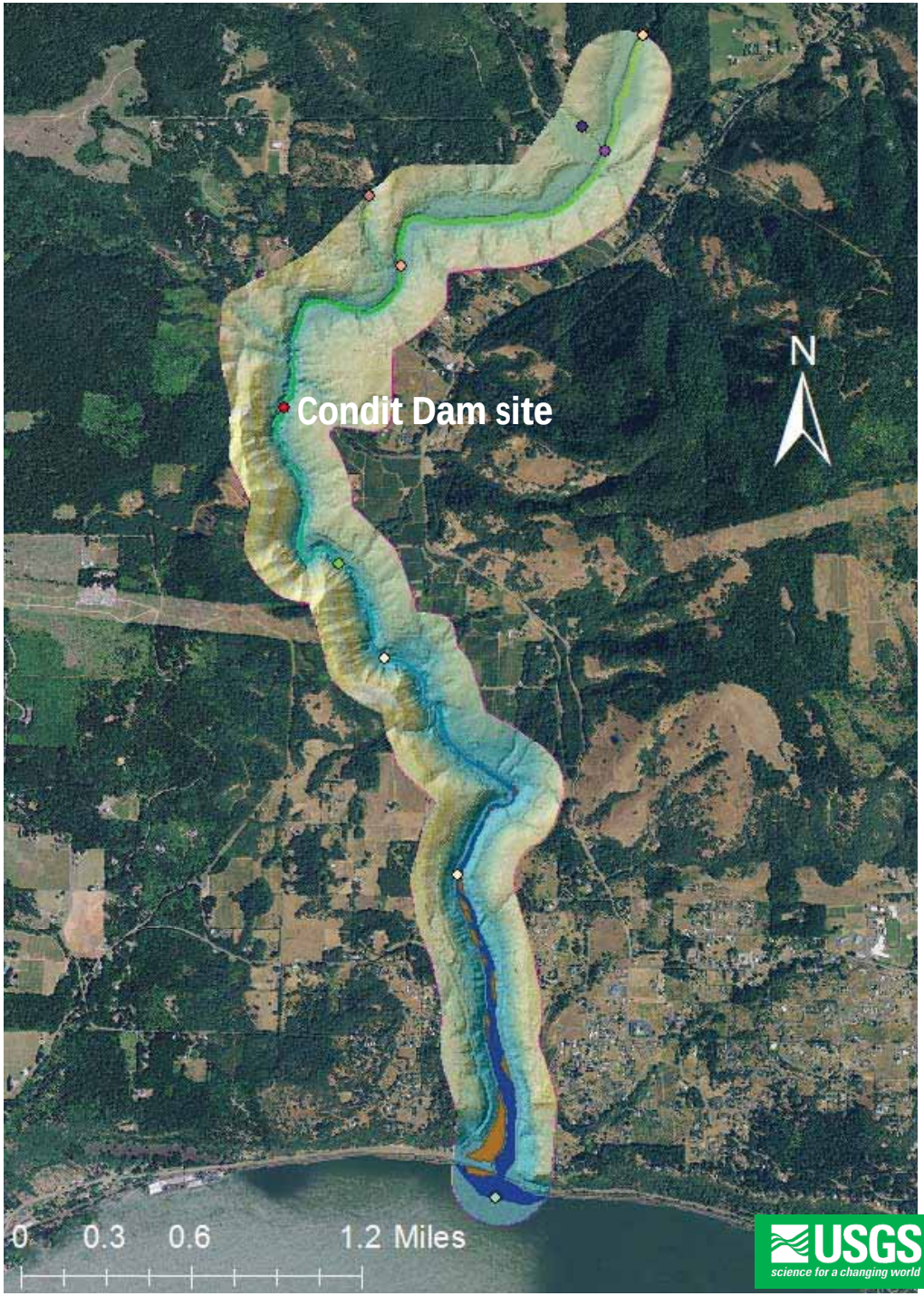
Value feet

High : 332.392

Low : 78.441

Reach Breaks

- **B1(Buck Cr)**
- **Condit Dam Site**
- **M1 (Mill Cr)**
- **WS 6 (end of lidar)**
- **WS 5 (Mouth Buck Cr)**
- **WS 4 (Mouth Mill Cr)**
- **WS 3 (Steelhead Falls)**
- **WS 2 (Powerhouse)**
- **WS 1 (Bonneville influence)**
- **WS 0 (confluence)**



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Study Reaches

Reach name	Description	River miles	Length (ft)	Slope (%)
WS1	Confluence to end of Bonneville influence	0 – 1.1	6,255	0.2
WS2	End of Bonneville influence to powerhouse	1.1 – 2.2	5,746	0.7
WS3	Powerhouse to steelhead falls	2.2 – 2.6	2,130	1.1
WS4	Steelhead falls to Mouth of Mill Creek	2.6 – 4.2	8,251	1.2
WS5	Mouth of Mill Creek to mouth of Buck Creek	4.2 – 5.2	5,172	0.7
WS6	Mouth of Buck Creek to end of Study area (Lidar data set)	5.2 – 5.7	2,284	0.7
M1	Mill Creek mouth to PacifiCorp property line		1,906	4.4
B1	Buck Creek mouth to PacifiCorp property line		715	4.3

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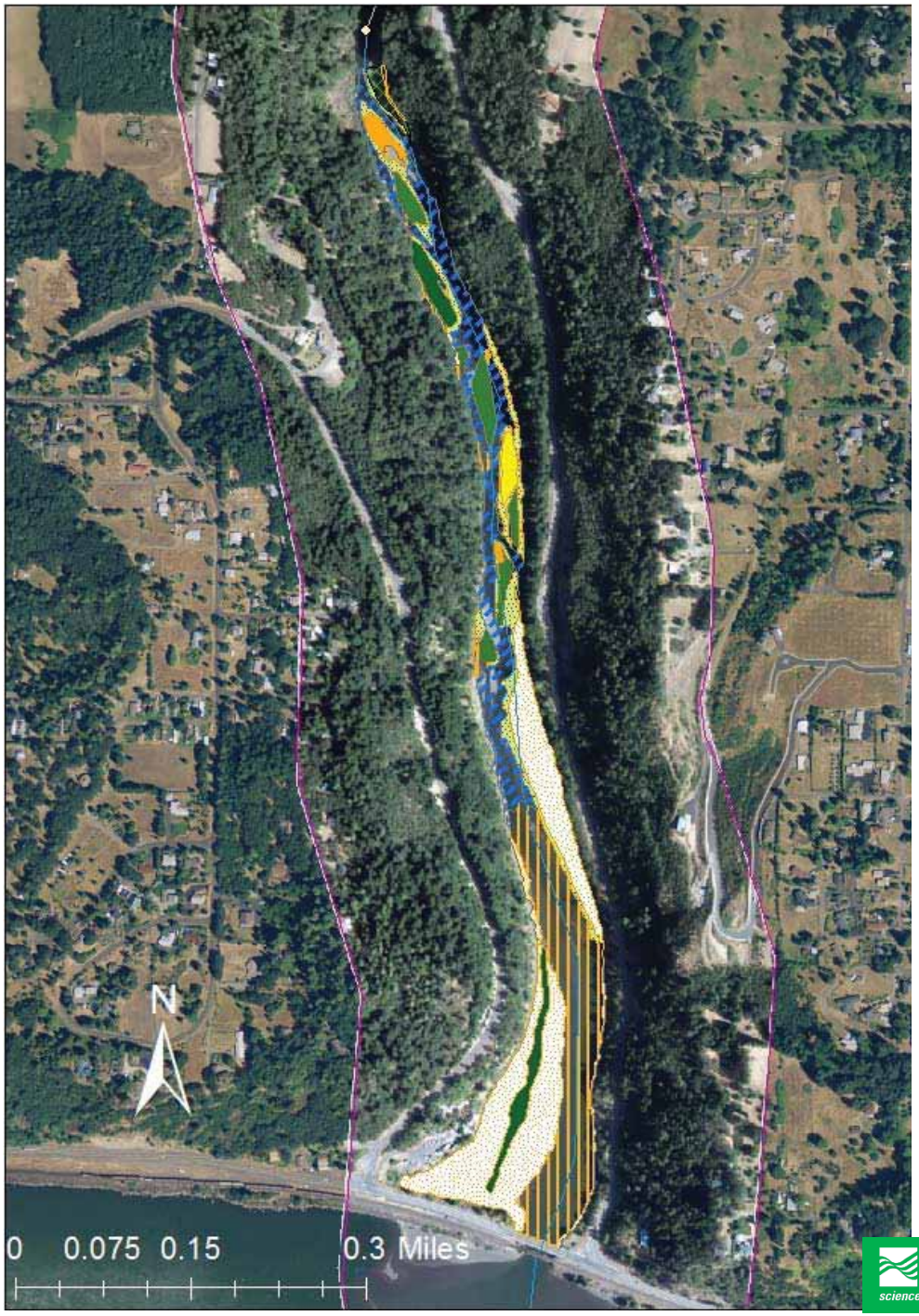
Substrate from 2012

Legend

Substrate

- Boulders
- Coarse Gravel
- Coarse Gravel/Bar
- Coarse Gravel/Cobble/Bar
- Cobble/Bar
- Cobble/Boulder
- Cobble/Coarse Gravel/Bar
- Medium Gravel
- Medium Gravel/Bar
- Fines
- Fines/Bar



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River 2D Hydrodynamic Model

Legend

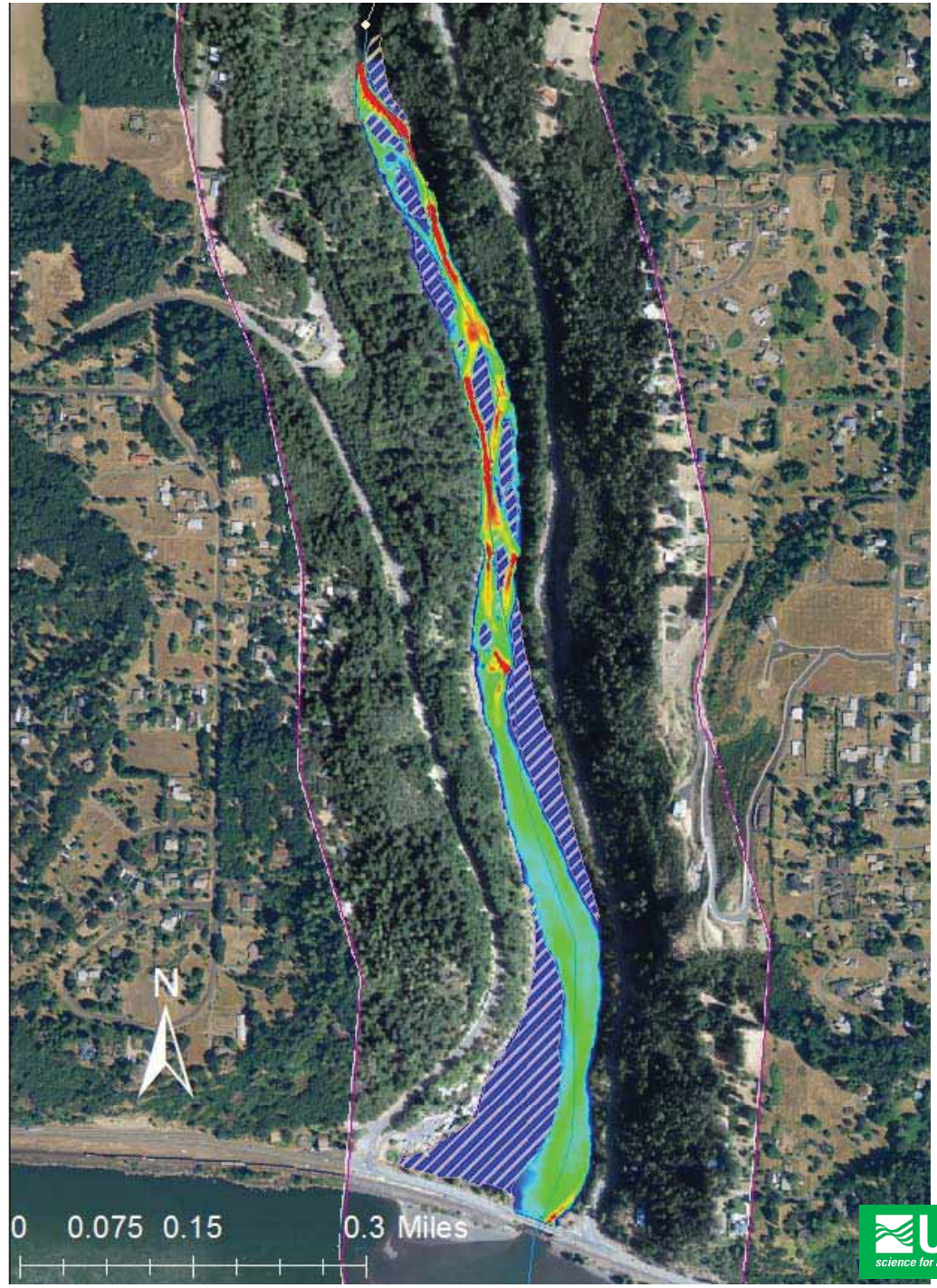
Model 880 cfs

Velocity (m/s)

High : 4.67244

Low : 0

2012 Bars



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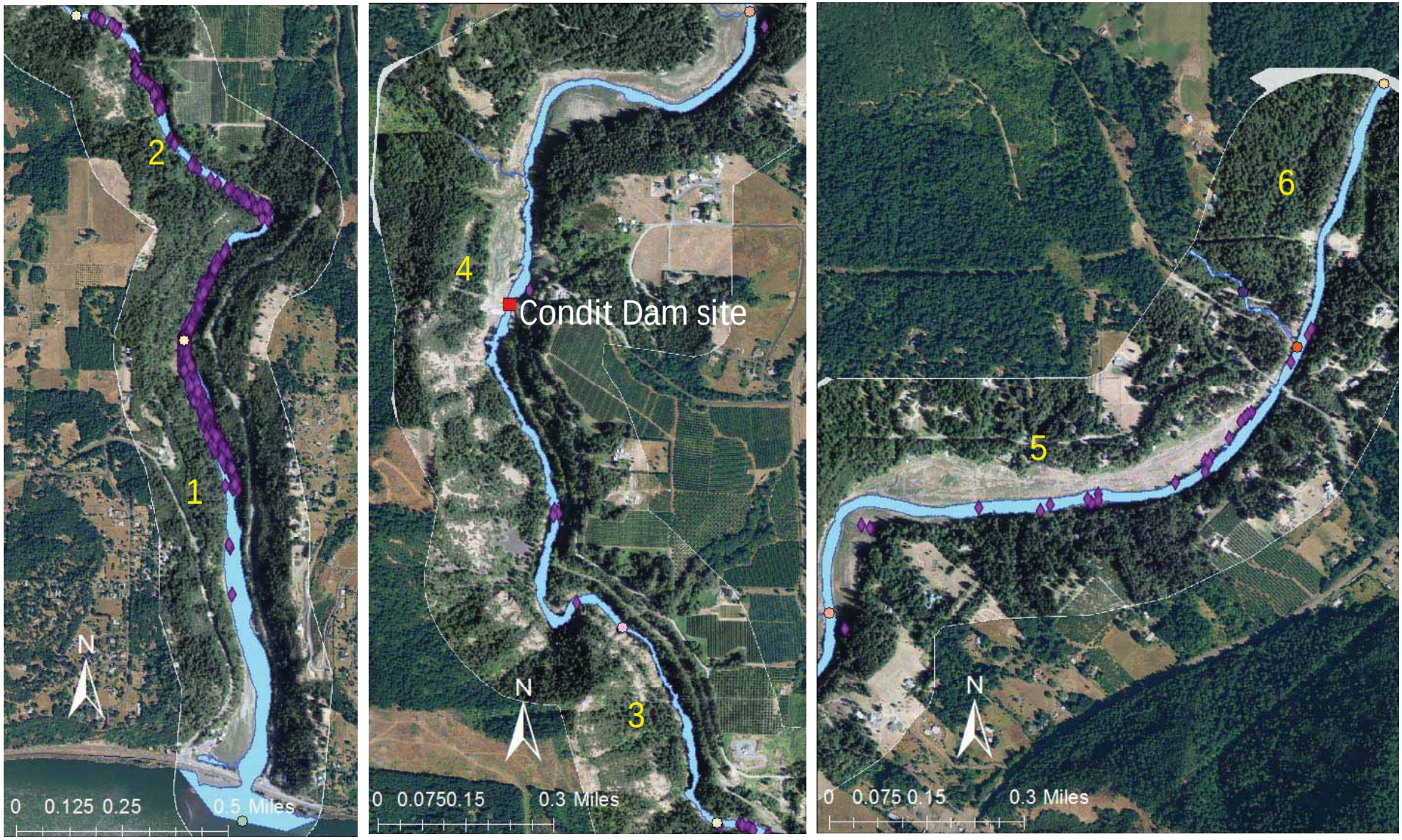
Chinook Redd Observations USFWS 2012



2013 Redd WDFW Survey Update

- Surveys from early August to mid-December
- High density spawning between RM 2.1 downstream to mouth for Fall Chinook
- For Spring Chinook, ~50% of observed spawning occurred above former Dam site

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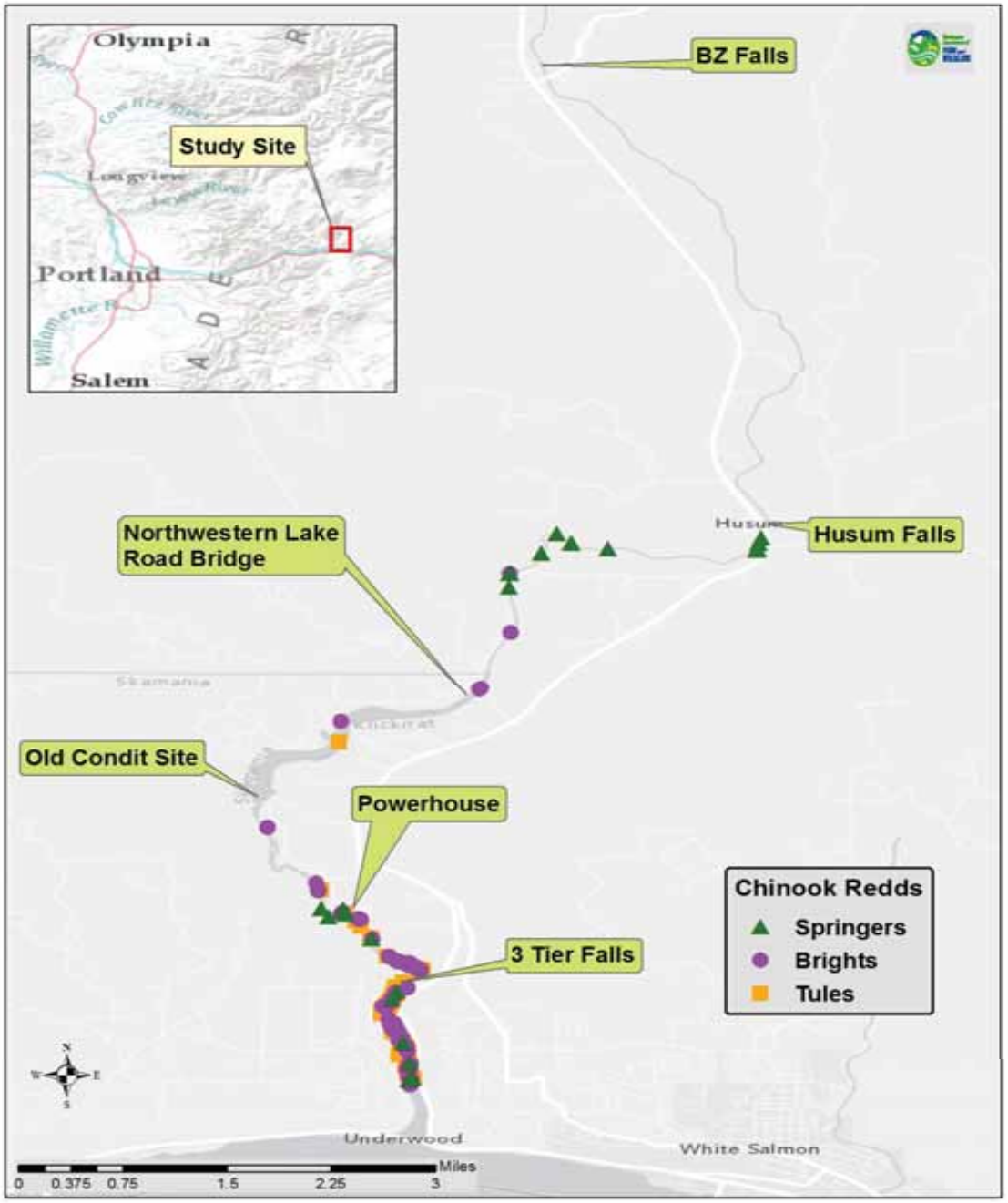
2013 WDFW Chinook Salmon Redd Observations



Map courtesy of WDFW

White Salmon R. Reach Ranking based on redd observations in 2012 and 2013

			Ranking		
Reach name	Description	River miles	Redd 2012	Redd 2013*	Slope (%)
WS1	Confluence to end of Bonneville influence	0 – 1.1	1	1	0.2
WS2	End of Bonneville influence to powerhouse	1.1 – 2.2	2	2	0.7
WS3	Powerhouse to steelhead falls	2.2 – 2.6	6	3	1.1
WS4	Steelhead falls to mouth of Mill Creek	2.6 – 4.2	5	4	1.2
WS5	Mouth of Mill Creek to mouth of Buck Creek	4.2 – 5.2	3	5**	0.7
WS6	Mouth of Buck Creek to end of Study area (Lidar data set)	5.2 – 5.7	4	5**	0.7

* Data is preliminary, **Approximately equal

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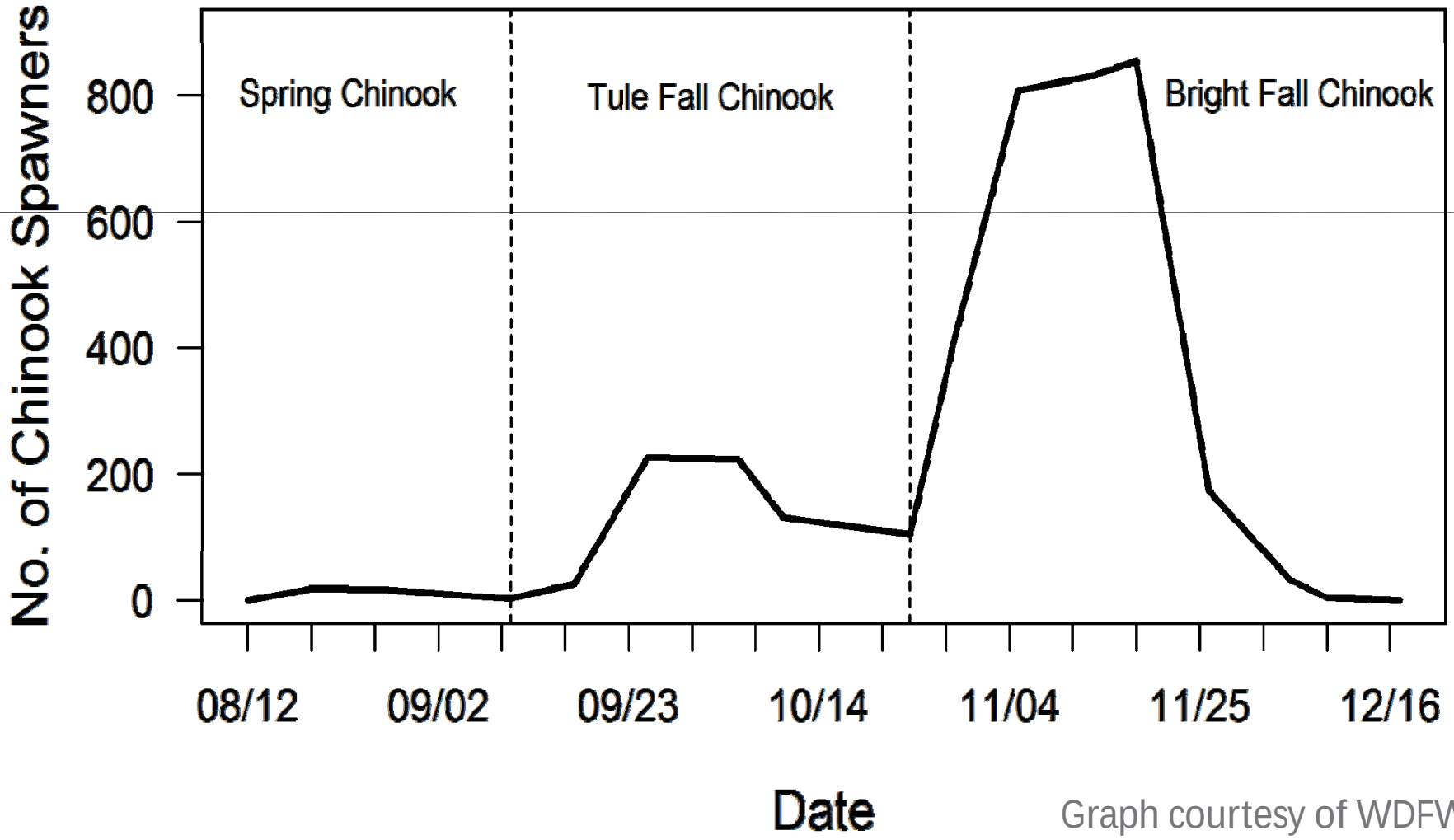
Temporal Distribution Based on Chinook Live Counts



Graph courtesy of WDFW

Potential threats to salmon habitat

- **Development/land use**
  - **New construction, roads, homes**
  - **Altered/diminished riparian areas**
  - **Clear cuts, grazing**
- **Increased recreation**
  - **Potential for harassment**
  - **Gravel bed, spawning site disturbances**
- **Invasive Species**
  - **Alter ecosystem processes**

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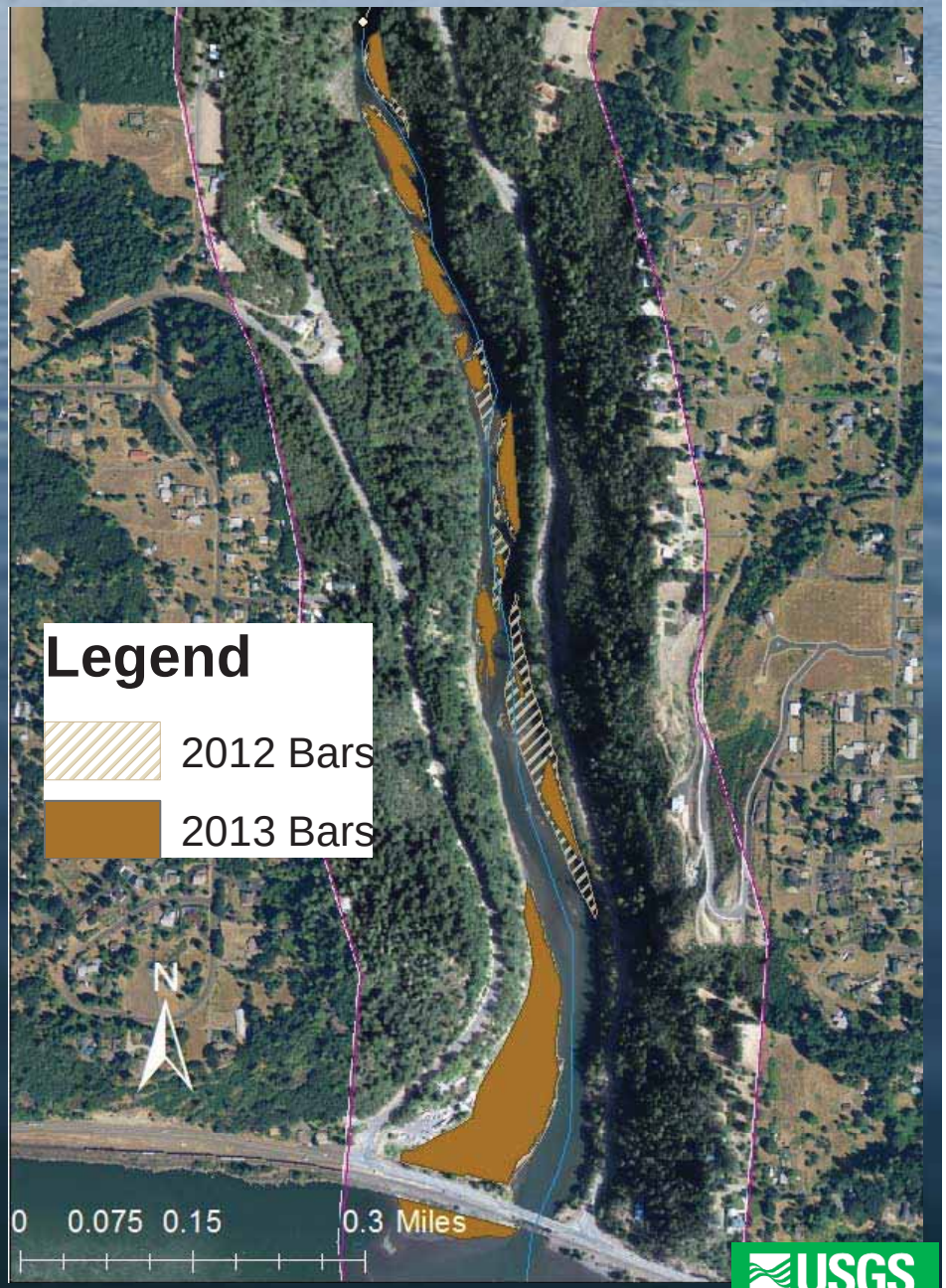
Data gaps

- Substrate and bathymetry for entire study area
- Hydrodynamic model extended
- Update habitat types (riffles, runs, pools) within reaches
- Extent of Bonneville pool influence
- Continued redd monitoring (coho and steelhead)
- River in flux
  - Gravel bars, LWD, pool formation
  - Riparian establishment, sediment

Gravel bar change 2012 to 2013



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Summary

- Study area meets suitable habitat criteria for all salmonid life history stages
- Lower reaches have highest observed redd densities (RM 2.2 to mouth)
- Redd densities higher in reaches with lower slopes/gradients
- Re-vegetation projects will likely enhance habitat
  - Sediment stabilization, cover, and insect/leaf litter inputs
- LWD recruitment would enhance pool development and cover

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Next steps

- Incorporate 2013 redd data into GIS
- Review and finalize habitat classification scheme based on life history stages and species
- Final fish habitat assessment report

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Thank you

- WDFW – Jeremy Wilson and crew
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- Washington State - Salmon Recovery Funding Board
- Andy Maser and Steve Stampfli

WHITE SALMON RIVER WATERSHED

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