

Monitoring of Bull Trout Populations in the Columbia Plateau Province using the EMAP Protocol

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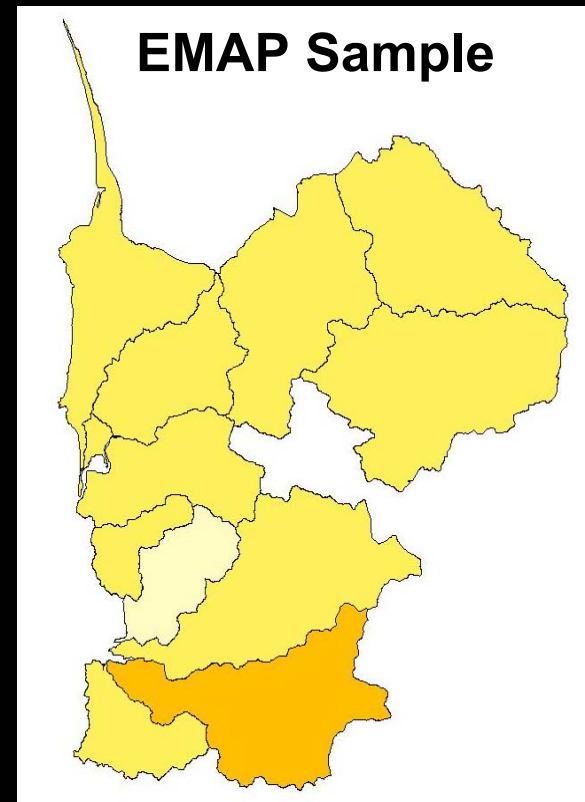
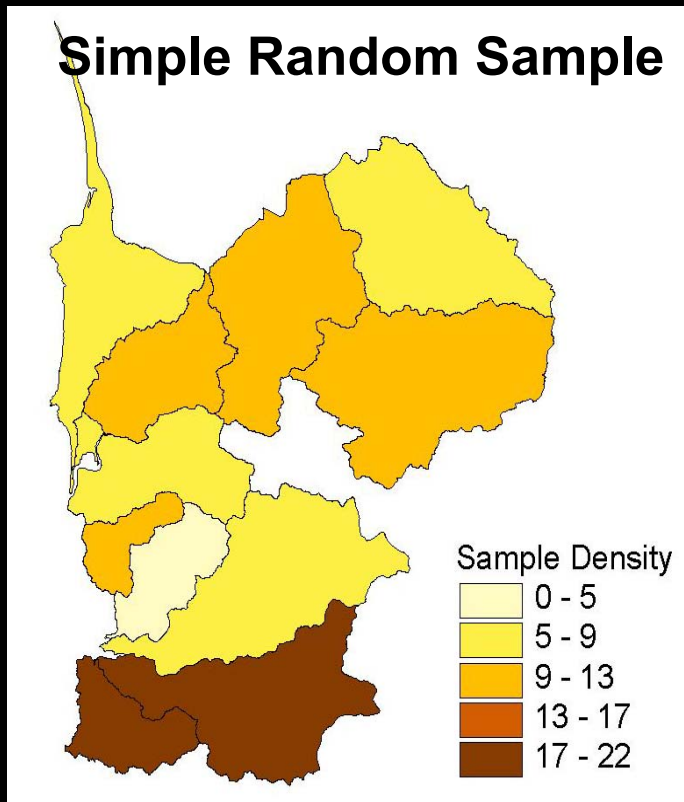
Oregon Department of Fish and Wildlife
Native Trout Program

What is EMAP?

- EPA's Environmental Monitoring and Assessment Program
- Estimate the current **status and trends** of ecological resources with **known confidence**

What is EMAP?

- Probabilistic Surveys
 - Random
 - Spatially Balanced



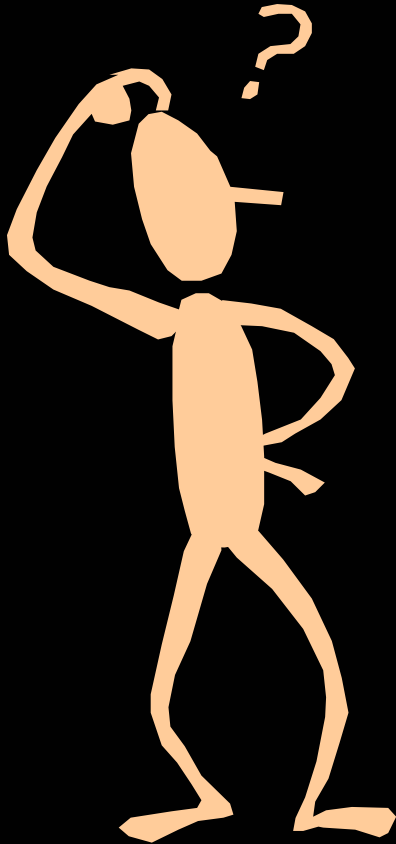
Why EMAP?



- **Statistically rigorous**
- **Status AND trends at multiple scales**
- **Large spatial scales with minimal effort**
- **Integration of multiple aspects of monitoring**
- **Expertise developed with coho**

Why EMAP?

Coho Questions



- **Status**

How many adult coho are in a region?

What is the density of deep pools?

- **Trends**

Is the number of adult coho changing over time?

Is the number of juveniles changing?

- **Associations**

Is the number of juveniles related to the number of adults?

Is the number of juveniles related to habitat condition?

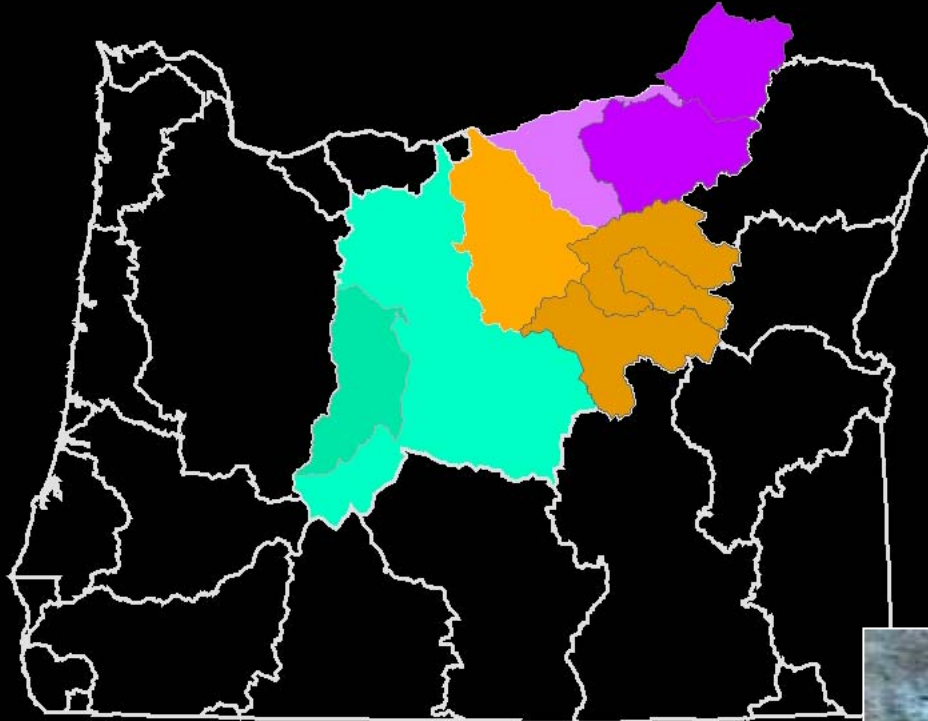
Why EMAP?

Estimates of Precision for Coho

Average Relative Precision

Geographic Unit	1990-97	1998-2001	
	Random 200 Sites	Random 400 Sites	EMAP 400 Sites
ESU	± 28%	± 21%	± 16%
Monitoring Area	± 54%	± 37%	± 22%
Major Basin	± 63%	± 52%	± 35%

Bull Trout in the Columbia Plateau

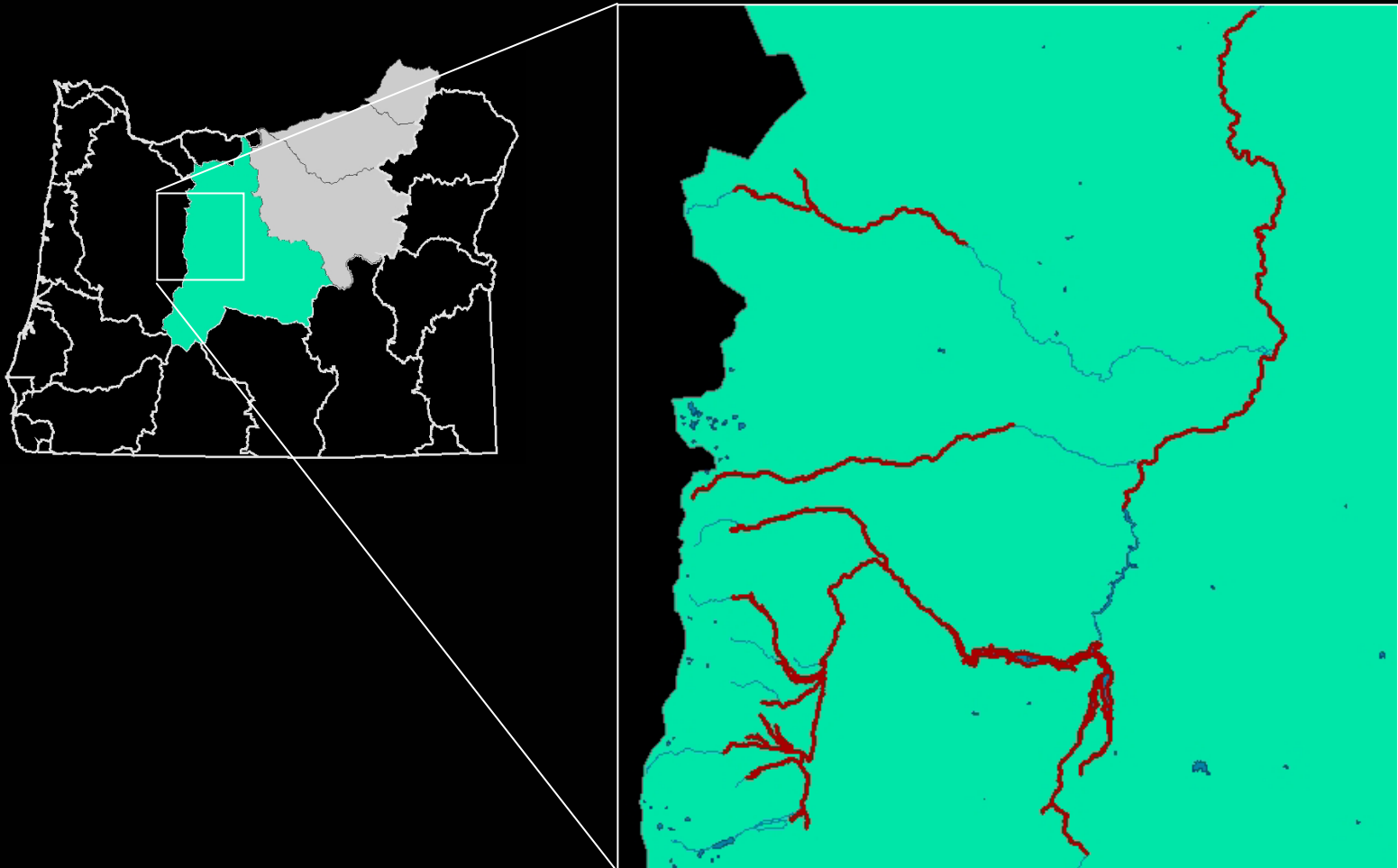


- Estimate of Redds
- Target Precision
 - province $\pm 25\%$
 - subbasin $\pm 40\%$



Target Population

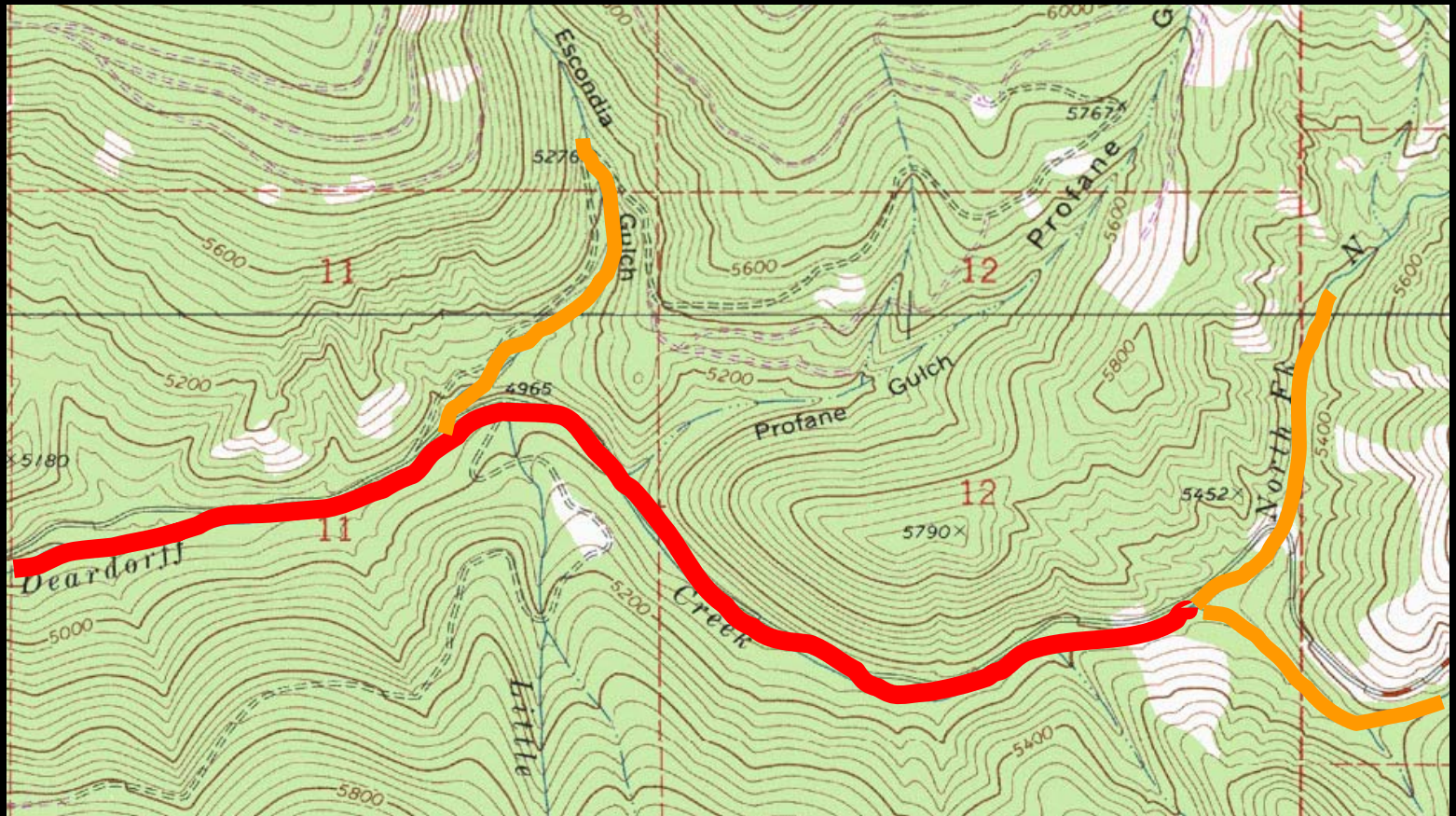
All potential bull trout spawning reaches in Columbia Plateau Province



Target Population

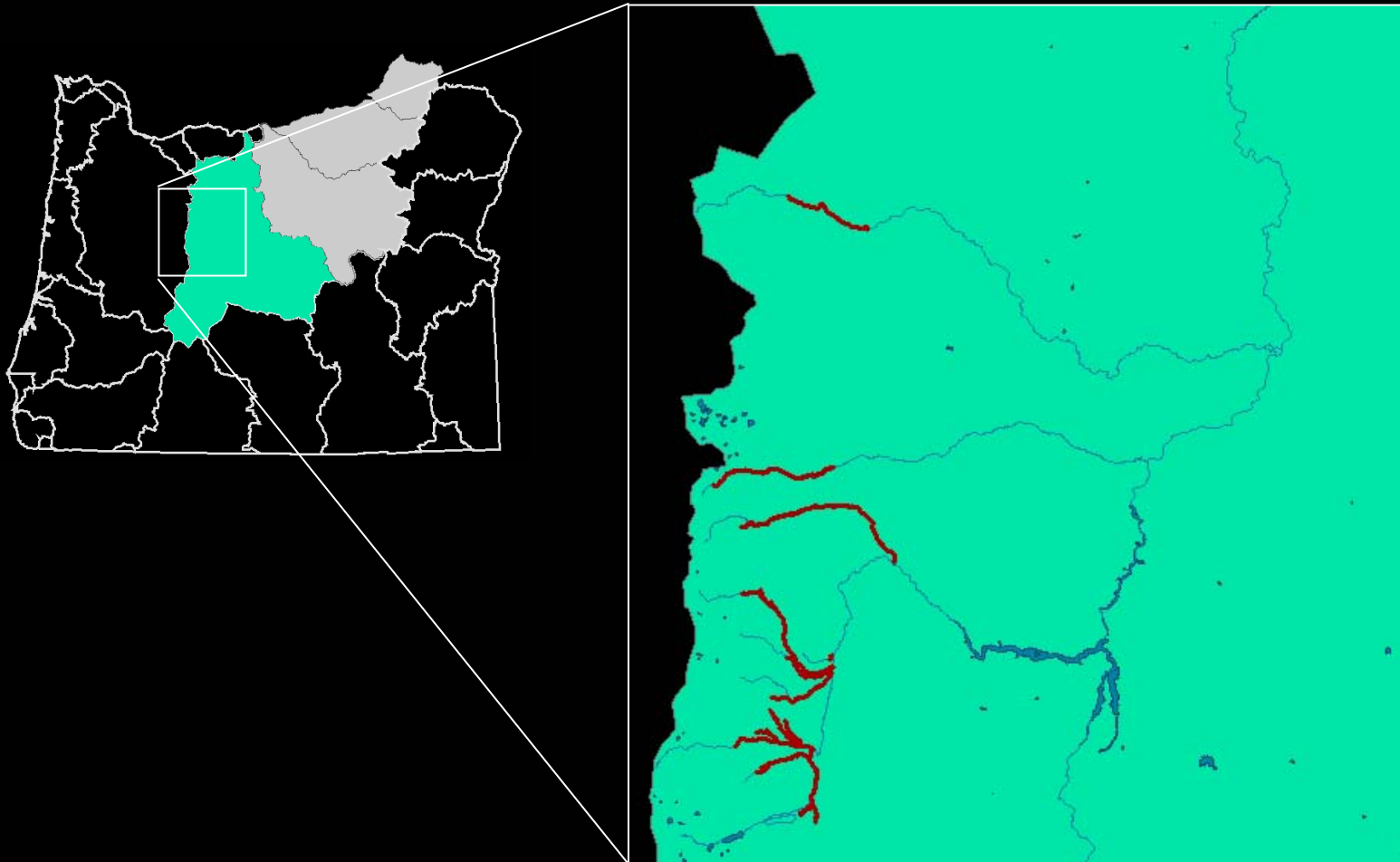
spanning
distribution

presence

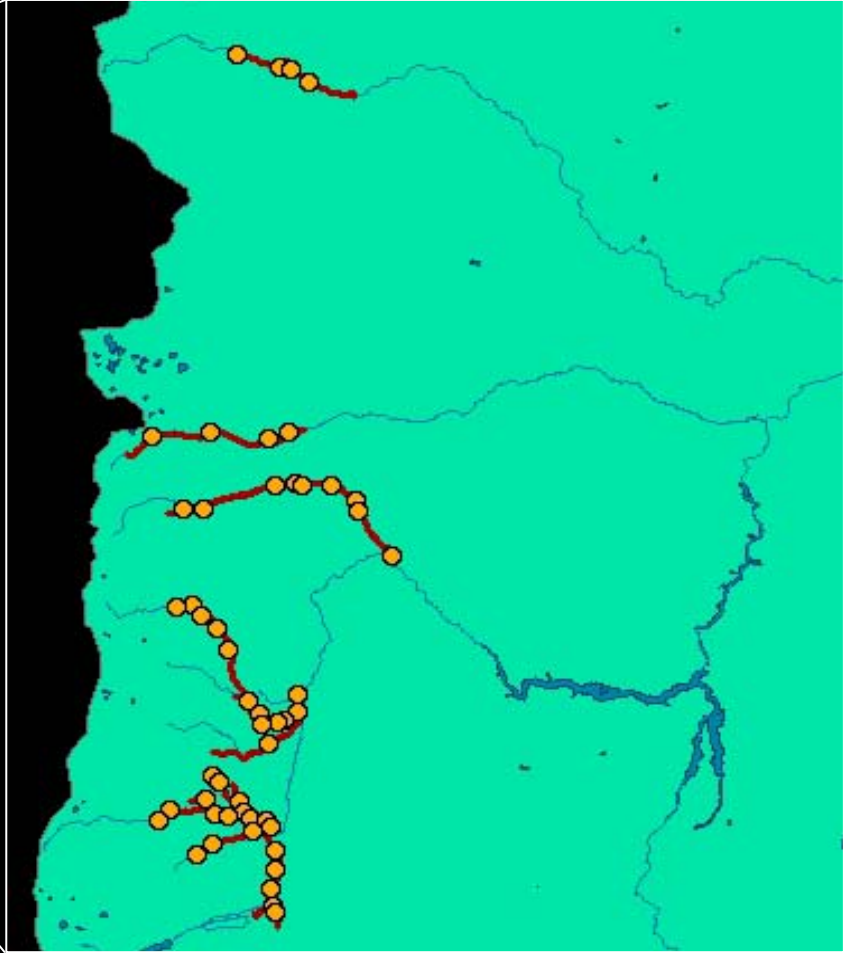
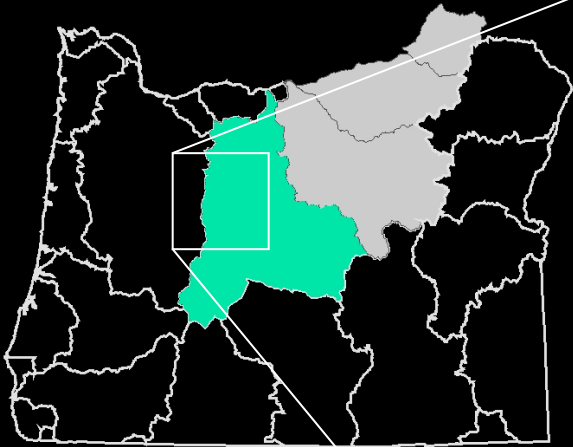


Sample Frame

All wadeable streams within the target population



Sample Sites



- 50 new sites each year

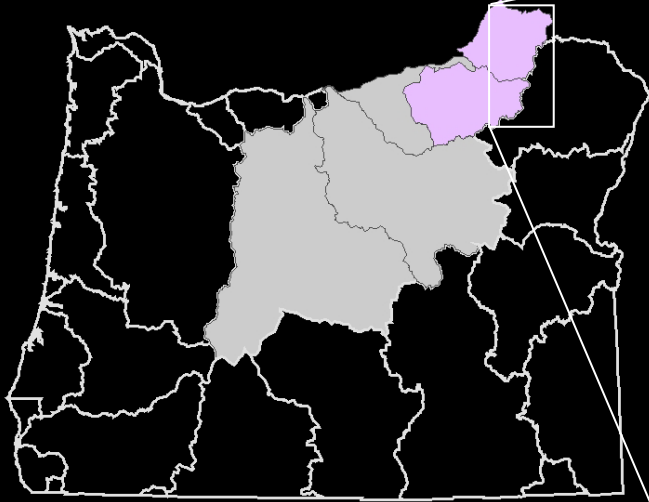
Response Design

- 1.6 km surveys
- Zero counts
- Late August – Early November
- 3 - 4 repeat surveys
- Marked redds

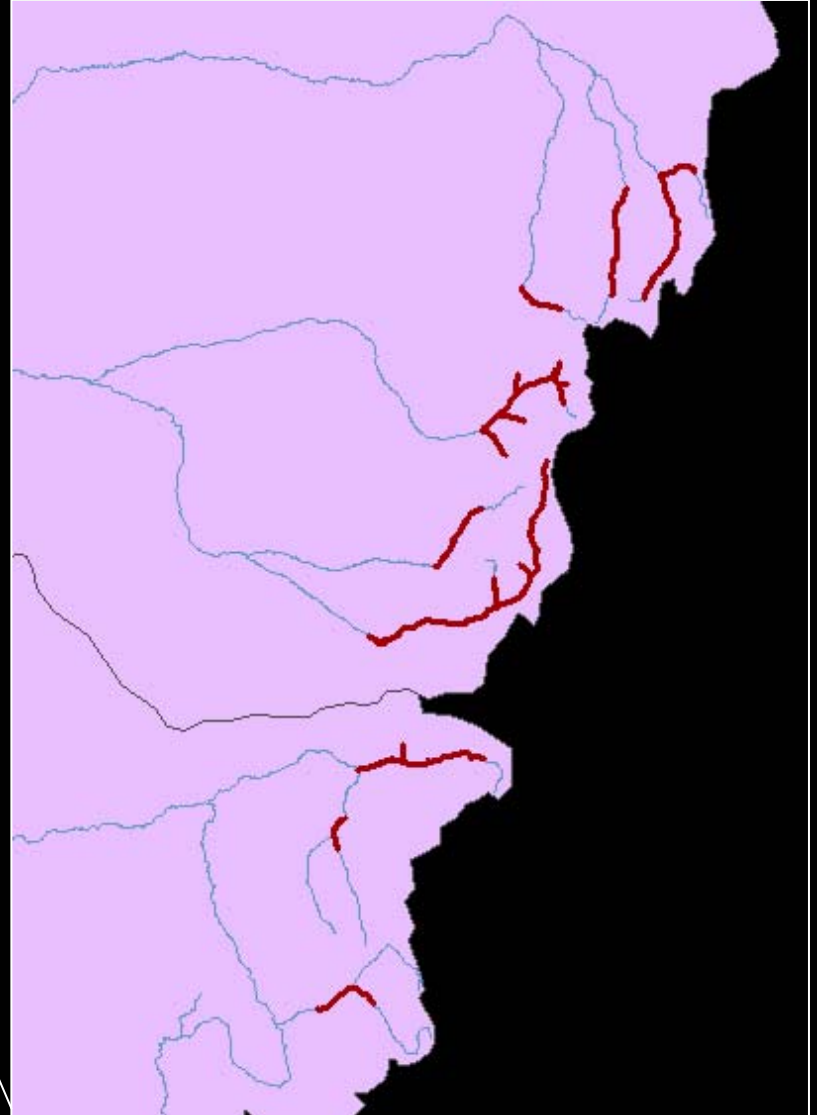


Census vs. EMAP

Umatilla/ Walla Walla Subbasin

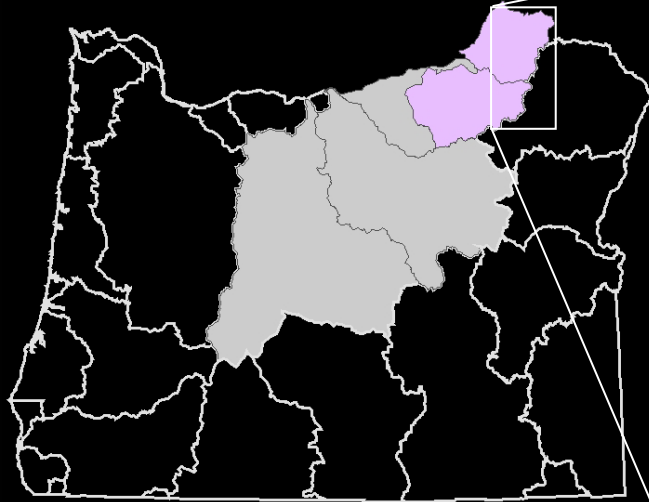


- **Surveyed sample frame**

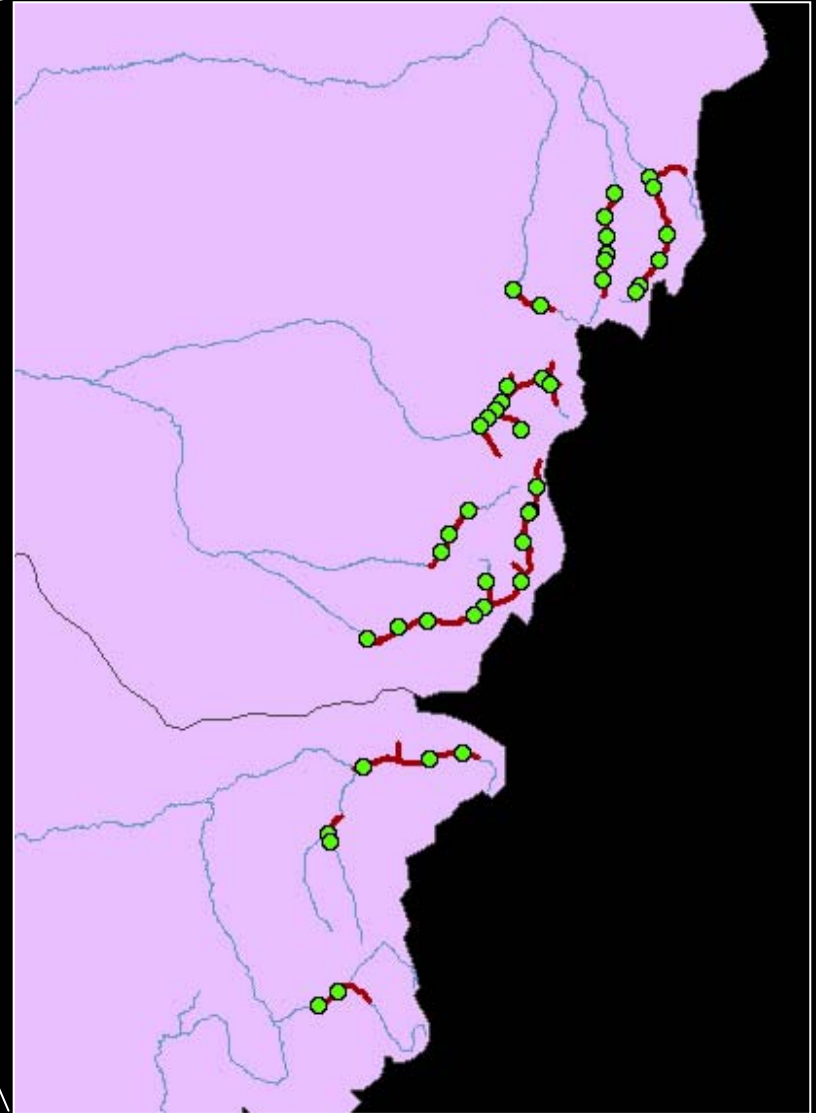


Census vs. EMAP

Umatilla/ Walla Walla Subbasin



- Surveyed all sample sites



Census vs. EMAP

Umatilla/ Walla Walla Subbasin

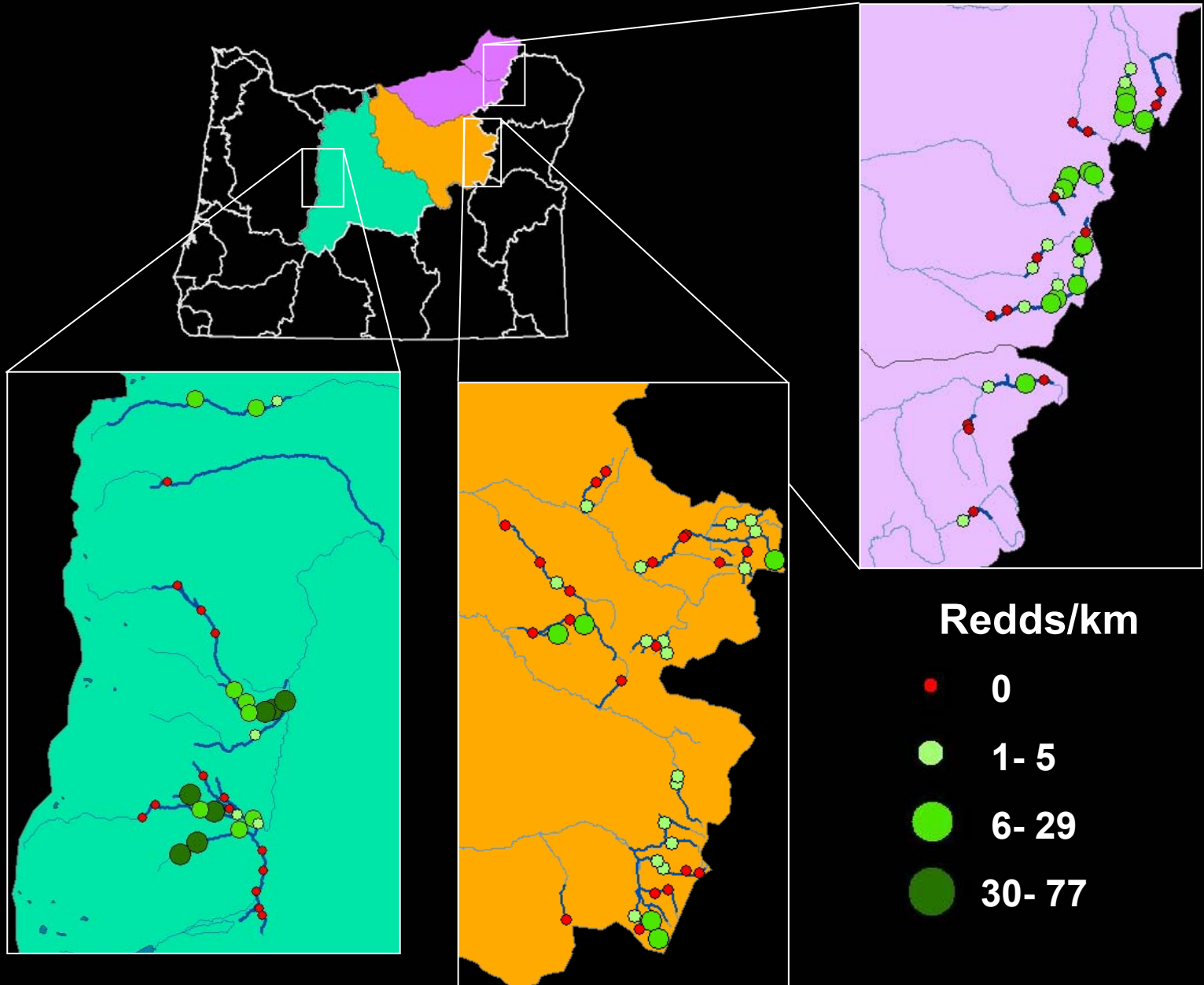
	Census	EMAP
No. of Redds	730	716
Km Surveyed	115	59

Redd Estimate

Columbia Plateau Province

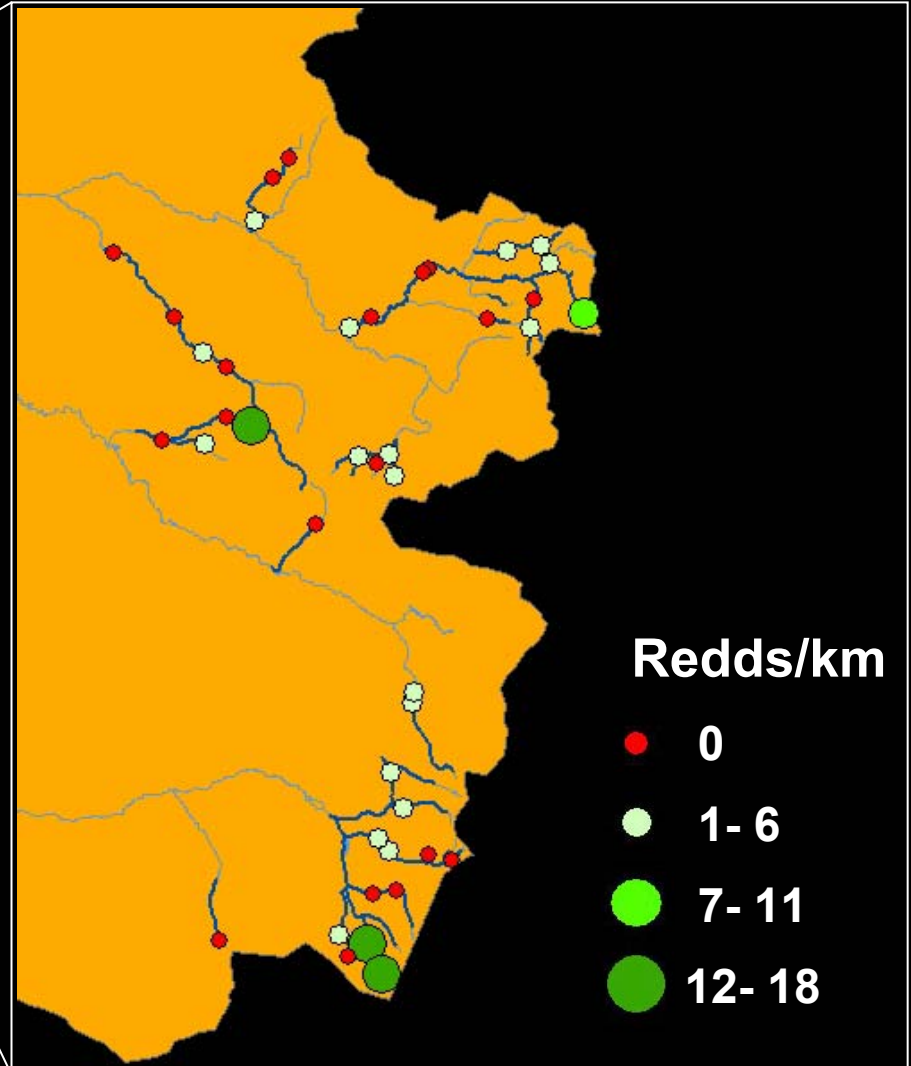
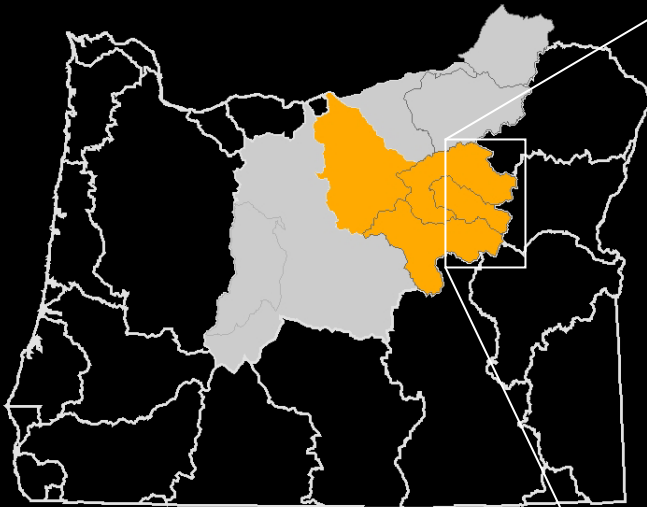
	n	Redds	95%CI
Province	116	2930	± 15%
John Day	42	541	± 33%
Walla Walla	40	716	± 16%
Deschutes	34	1704	± 22%

Site Occupancy



Site Occupancy

John Day subbasin



- Spawning domain less accurate
- Sympatric fall spawning salmonids

Considerations for Evaluation

- **What is an acceptable level of precision for bull trout monitoring?**
- **Are redd surveys the best method to monitor reproductive adults?**
- **How do redd numbers relate to reproductive adults ?**

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