

Yakima River Steelhead Radio Telemetry

Chris Frederiksen YN



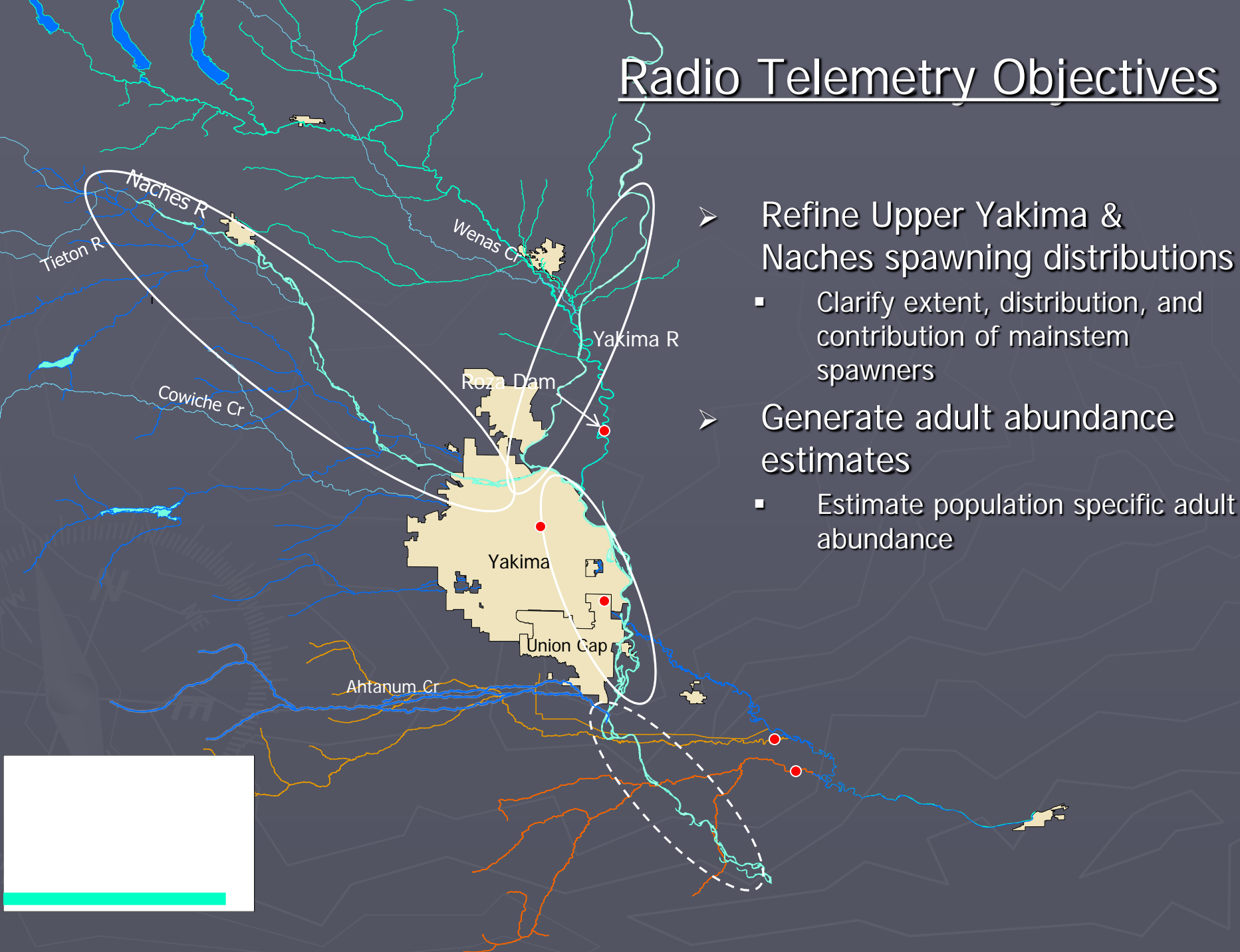
Photo: Zack Mays

Project Acknowledgements:

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Radio Telemetry Objectives



- Refine Upper Yakima & Naches spawning distributions
 - Clarify extent, distribution, and contribution of mainstem spawners
- Generate adult abundance estimates
 - Estimate population specific adult abundance

Run size and distribution (2011-12)

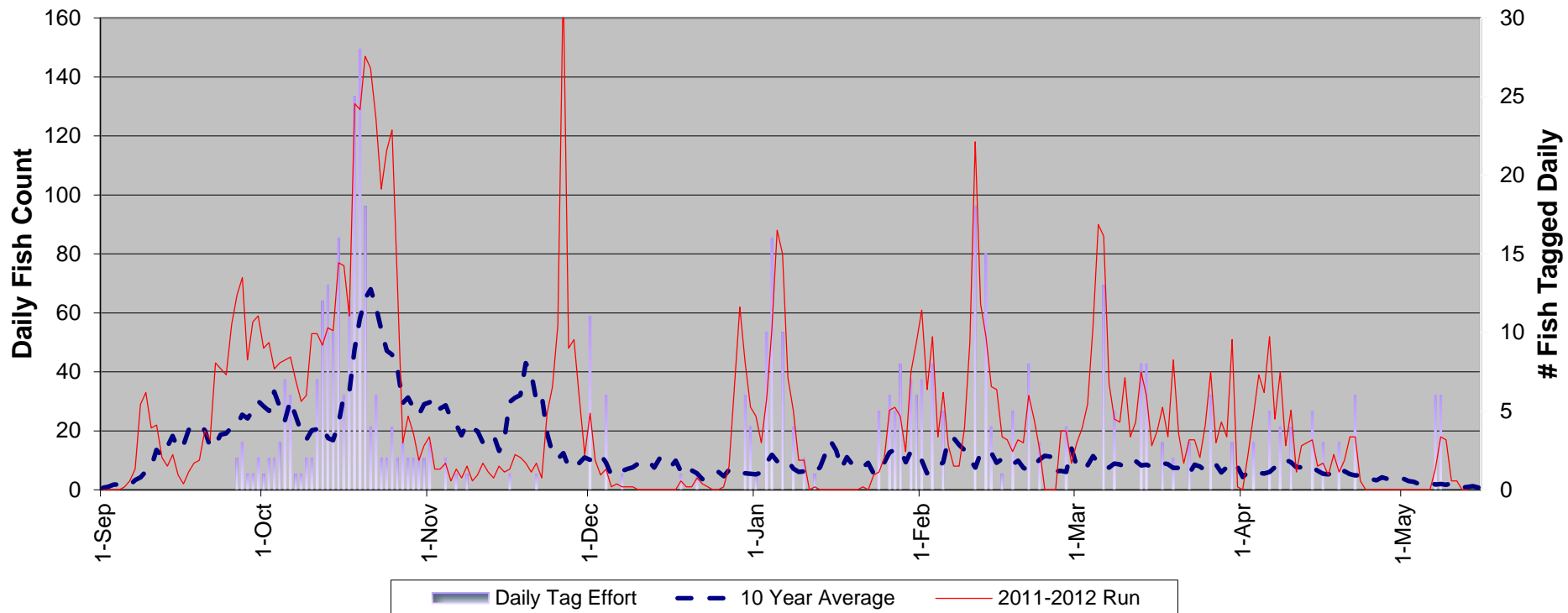
Prosser Statistics (rkm 75.6)

- 6359 total steelhead
 - 6208 wild (97.6%)
 - 151 hatchery (2.4%)
 - ▶ 66.5% F
 - ▶ 33.5% M

Tagging Statistics (715 Sampled)

- 507 radio tagged
 - 493 wild (97.2%)
 - 14 hatchery (2.8%)
 - ▶ 65.8% F
 - ▶ 34.2% M

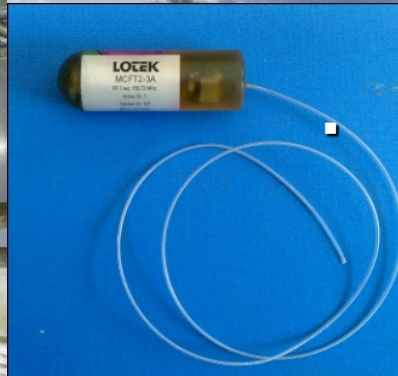
Yakima Steelhead Run-Timing at Prosser Dam: Recent 10-Year Average vs 2011-12 Run



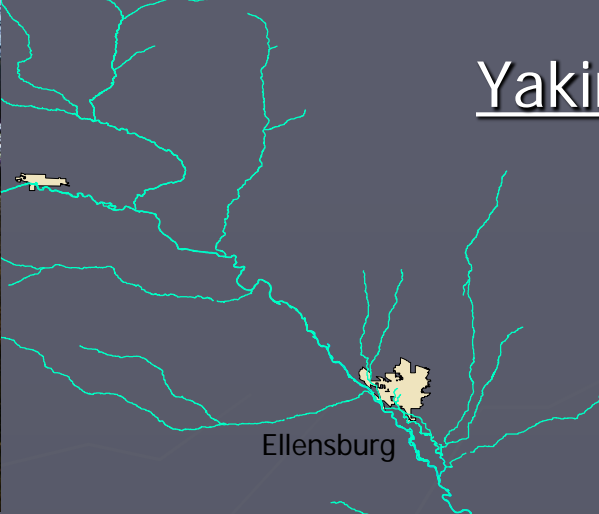


➤ Bio sampling & tagging:

- Steelhead trapped at Prosser Dam (rkm 75.6)
 - Right Bank Denil Trap
- Transferred to anesthetic tank for sedation
 - Anesthetized prior to bio-sampling
 - ▶ Length, weight, sex, scales, DNA
 - ▶ Inspected for external marks, tags, injuries
 - Radio Tagging
 - ▶ Lotek Motion sensor Gastric tags
 - ▶ MXFT2-3A-M (16x46mm, 16g)
 - ▶ Placed in stomach through mouth
 - ▶ Esophageal implant tube
 - ▶ Recovery
 - ▶ Placed in adjacent recovery tank
 - ▶ ~20 minutes



Yakima River Telemetry Study: Detection Methods



Ellensburg



Fixed Site Receivers:

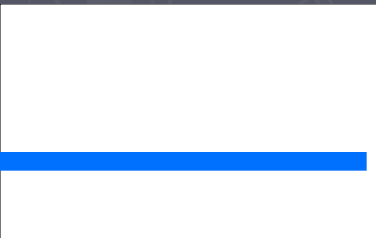
- Placed for monitoring:
 - Macro-reach movement and holding patterns
 - Tributary and population escapement
 - Mainstem Migration & spawning activity



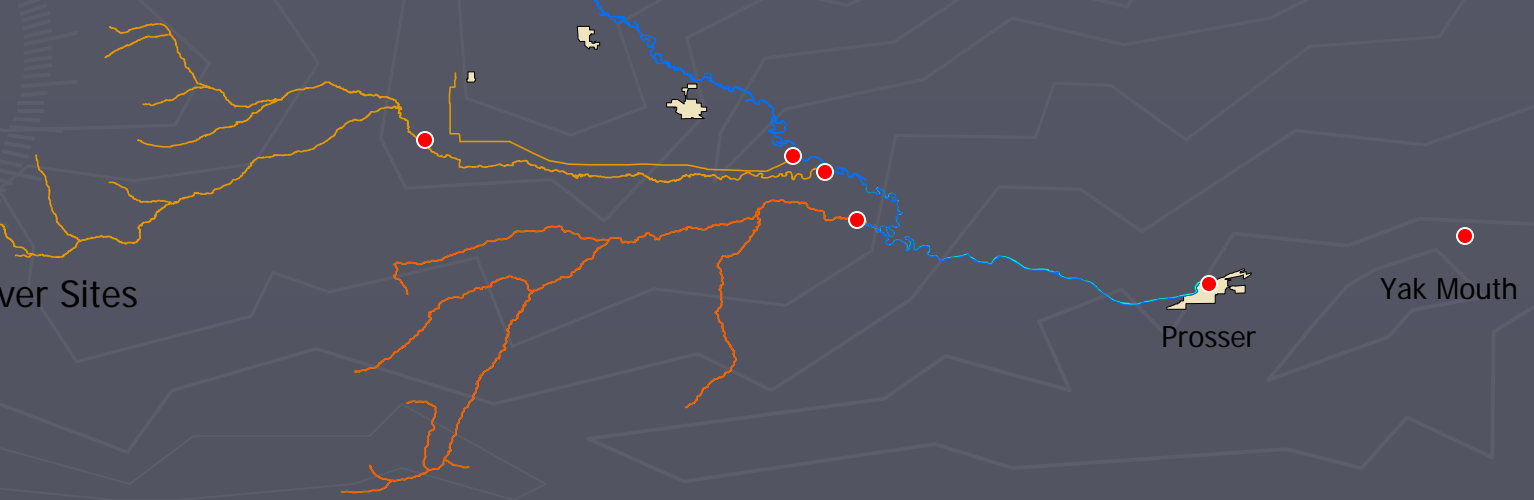
Equipment prioritized for addressing primary objectives!



Yakima



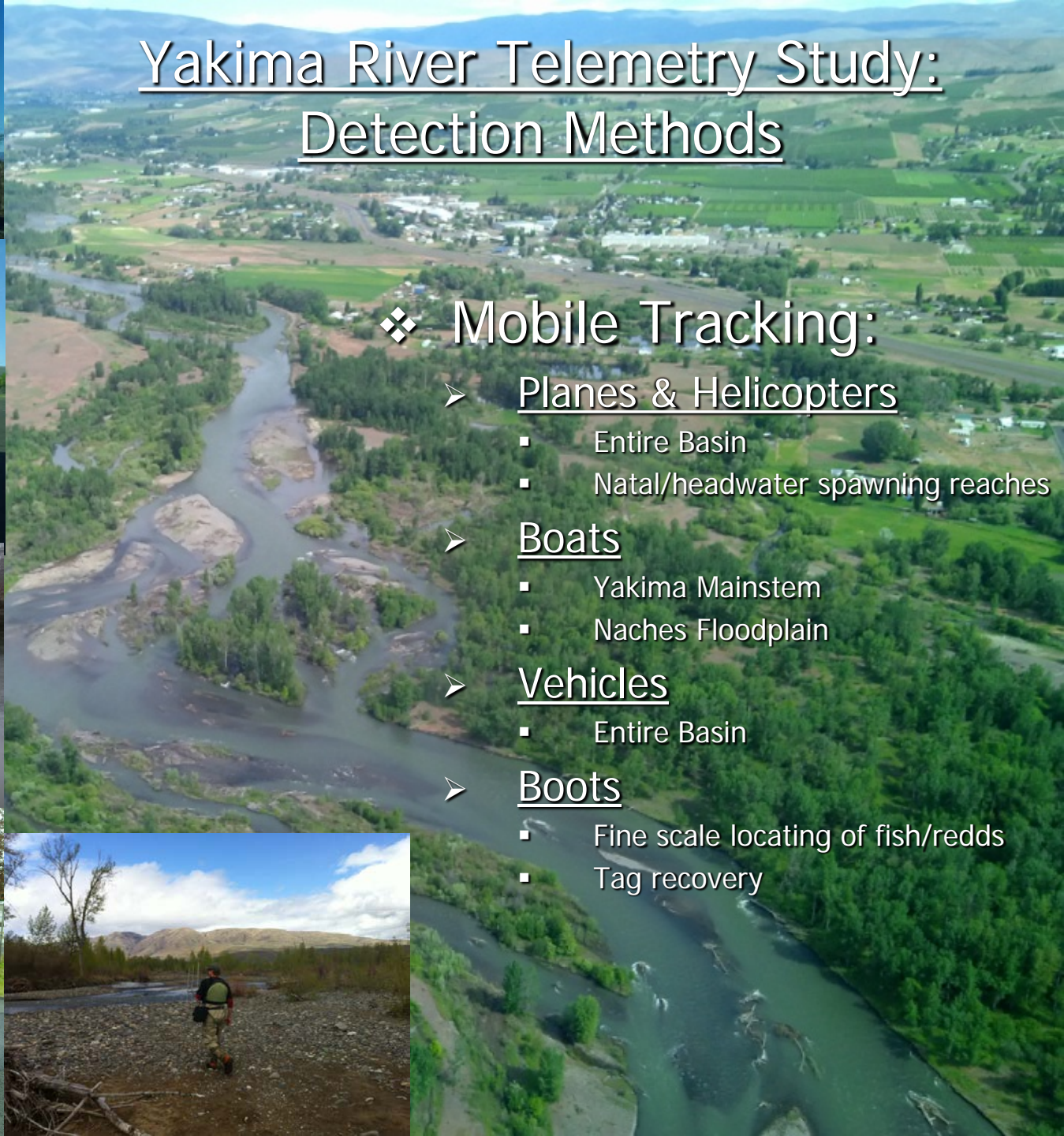
Telemetry Receiver Sites



Prosser

Yak Mouth

Yakima River Telemetry Study: Detection Methods



❖ Mobile Tracking:

➤ Planes & Helicopters

- Entire Basin
- Natal/headwater spawning reaches

➤ Boats

- Yakima Mainstem
- Naches Floodplain

➤ Vehicles

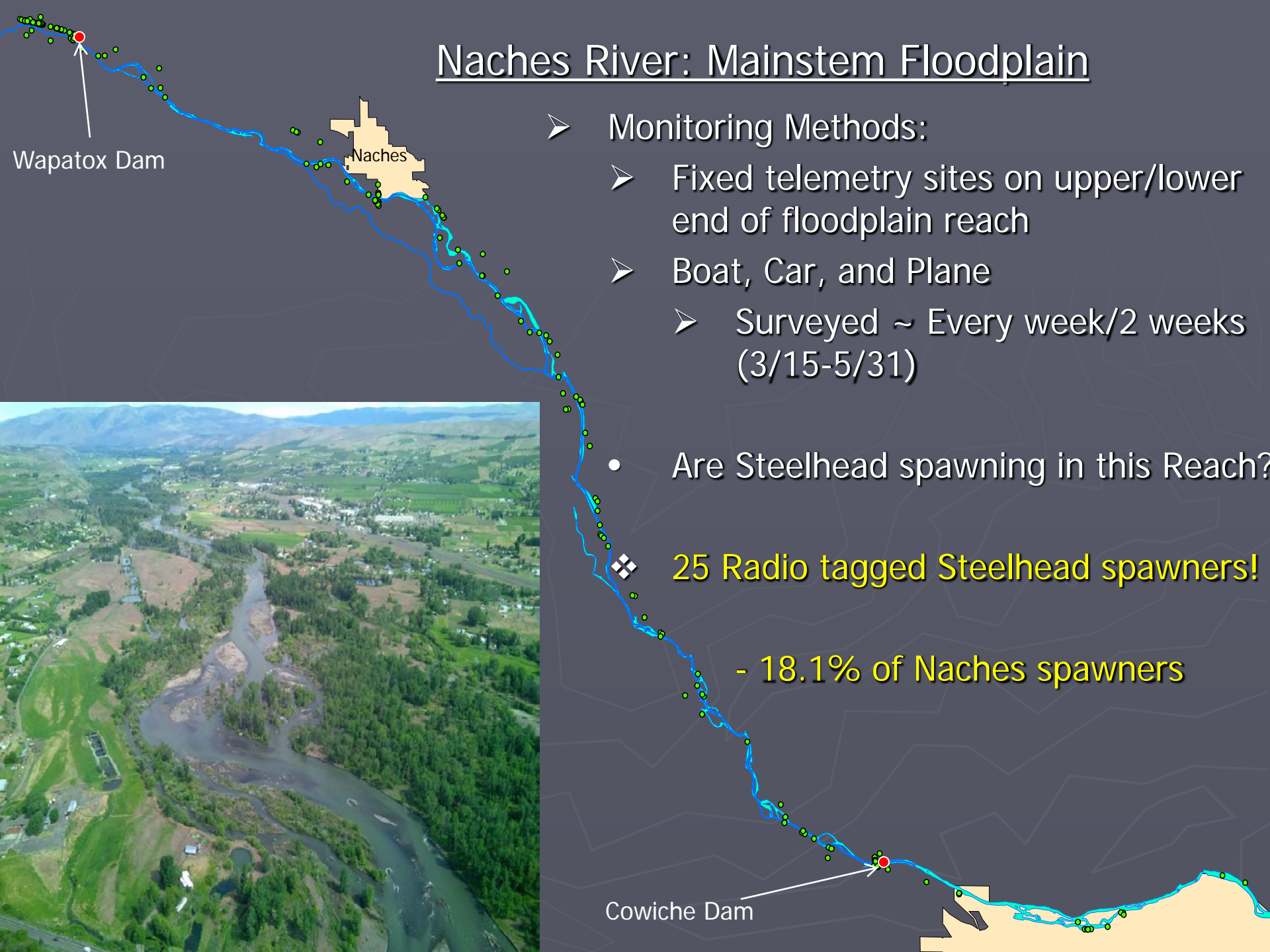
- Entire Basin

➤ Boots

- Fine scale locating of fish/redds
- Tag recovery



Naches River: Mainstem Floodplain



➤ Monitoring Methods:

- Fixed telemetry sites on upper/lower end of floodplain reach
- Boat, Car, and Plane
- Surveyed ~ Every week/2 weeks (3/15-5/31)

• Are Steelhead spawning in this Reach?

❖ **25 Radio tagged Steelhead spawners!**

- 18.1% of Naches spawners

Cowiche Dam

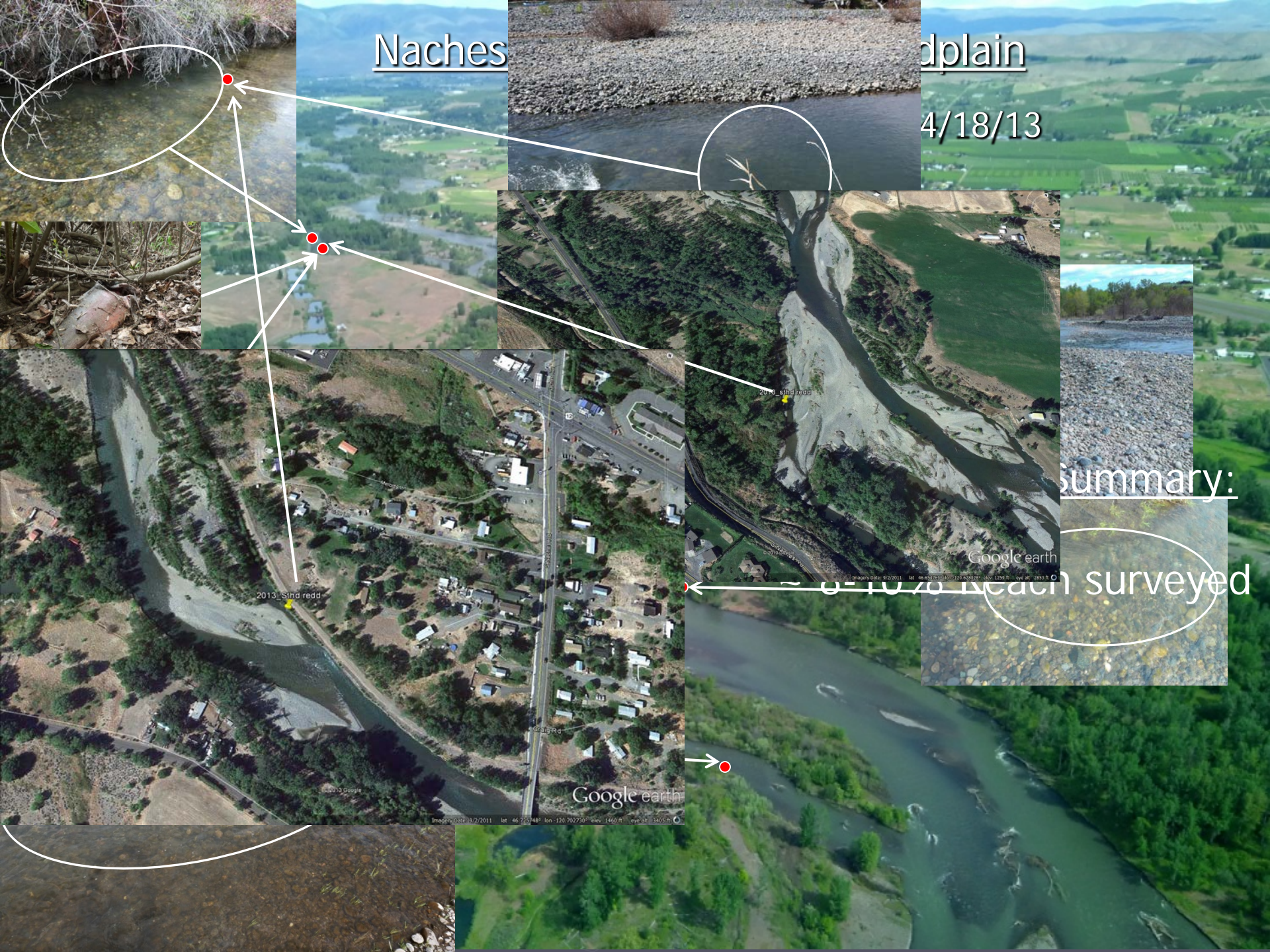
Wapatox Dam

Naches

Naches

Plain

4/18/13



Summary:

0-1070 reach surveyed

2013_1st redd

2013_1st redd

Google earth

Google earth

Imagery Date: 9/2/2011 lat 46.715448 lon -120.702750 elev 1460 ft eye alt 1345 ft

Imagery Date: 9/2/2011 lat 46.653955 lon -120.619281 elev 1758 ft eye alt 2853 ft

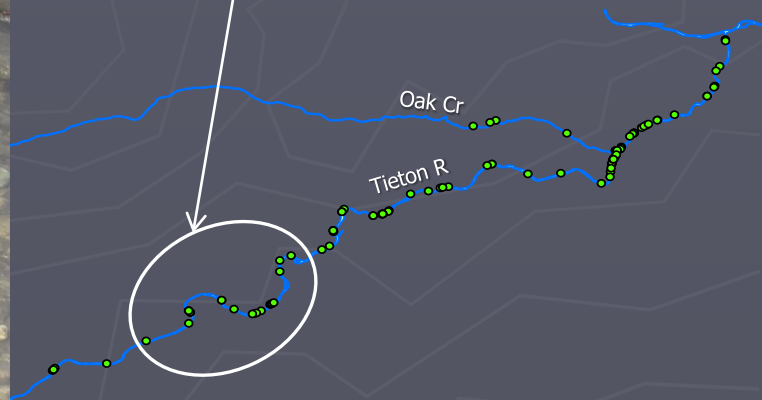
Tieton River

2013 Observations:

- 2nd credit to Wild 4/26 ➤ 3 A
- Lower end of Side channel ➤ 15 Ver (Mi)



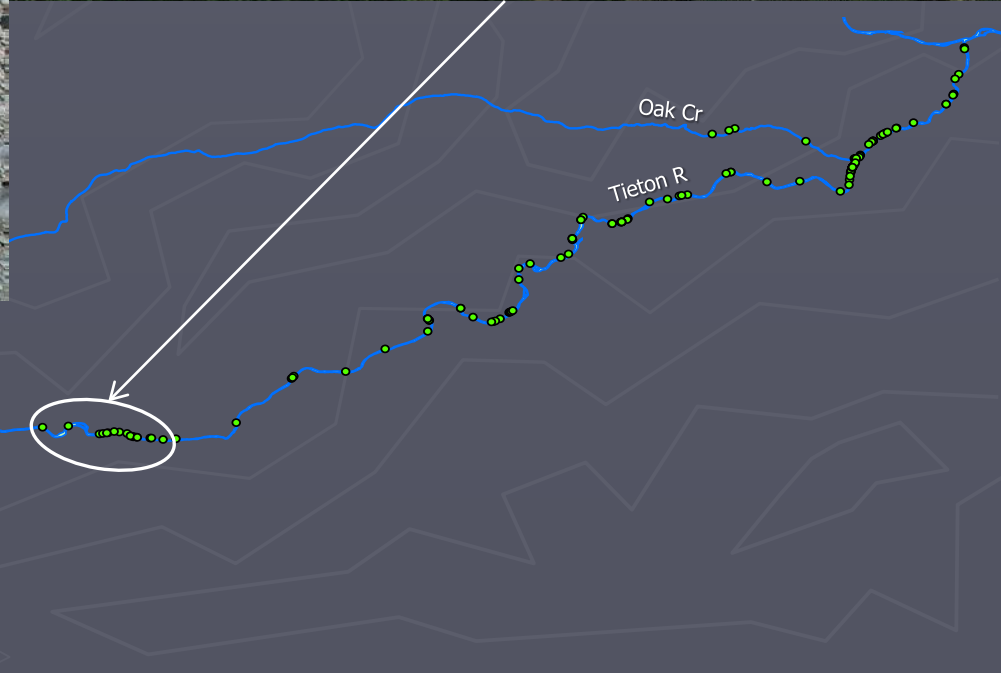
uggests yes!

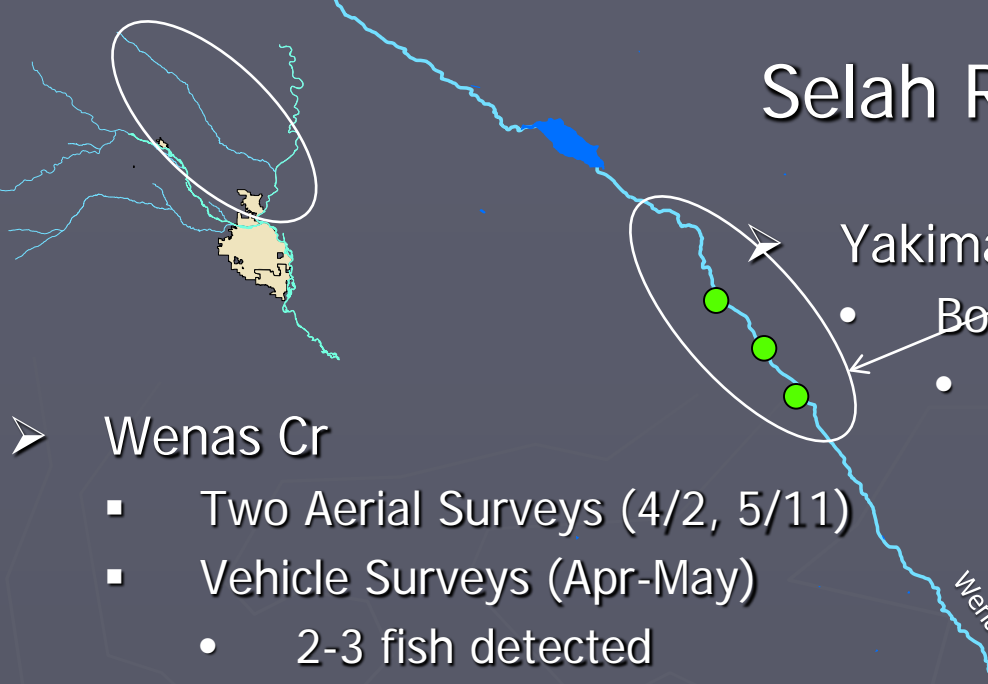


Tieton River

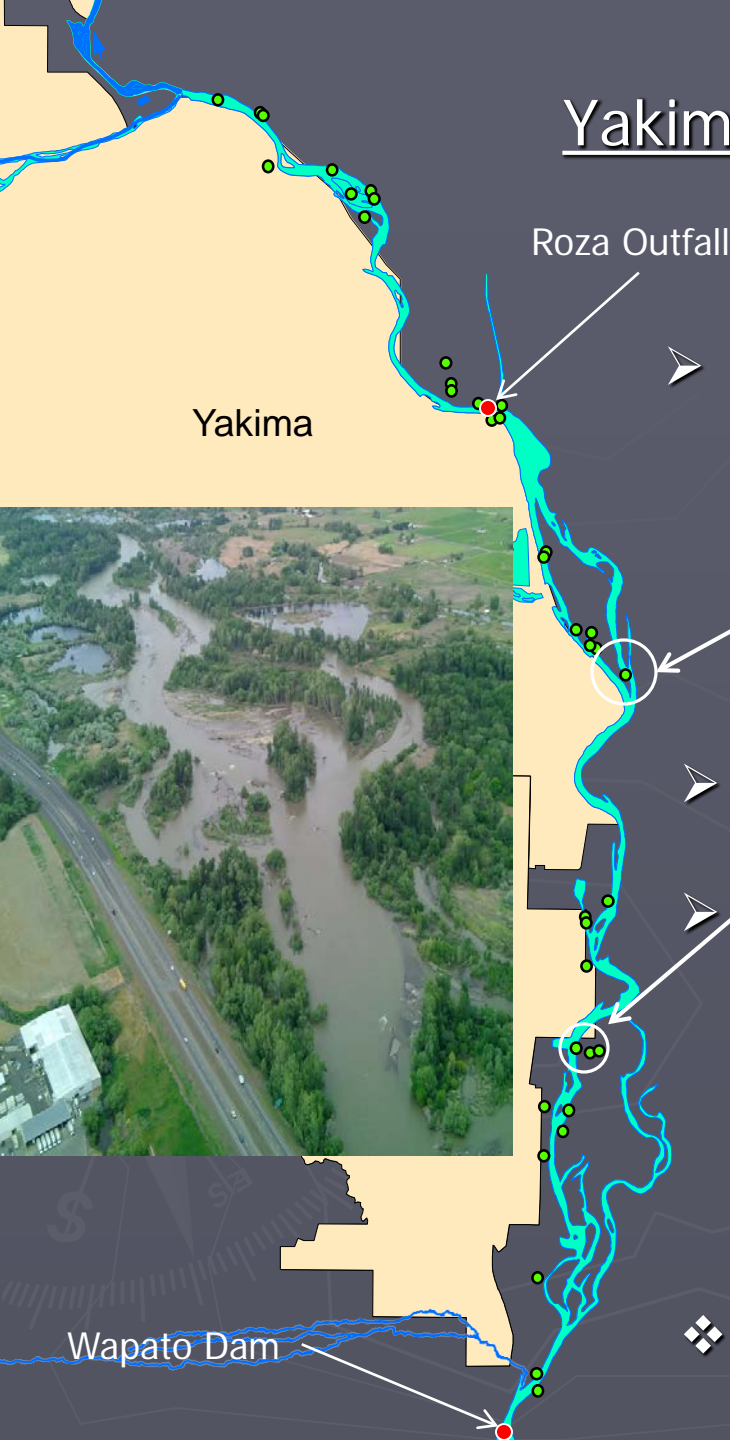
2013 Observations:

- 3rd redd found ~05/03
- Mid part of side channel
- Recovered 2 Rtags





Yakima River: Gap to Gap Mainstem



- Surveyed ~ once a week (3/15-5/31)
- Boat, Car, and Plane

Steelhead #5327: Wild Male

- Multiple Detections at Roza outfall and rKM 185.8 (03/16-04/14)
- Inactive Detection on 05/11
- Detected at Wapato F 04/04 & 04/13
- Detected at Rkm Window: 04/08 – 04/30
- Estimated spawn window: 04/04 – 04/13
- Entrained as post-spawn Kelt on 04/19



Total of 3-4 Radio-tagged Steelhead Spawned in the Gap to Gap Reach



Google earth

Imagery Date: 9/2/2011 lat: 46.556723° lon: 120.465935° elev: 969 ft eye alt: 5622 ft

Wapato Dam

Roza Outfall

Yakima

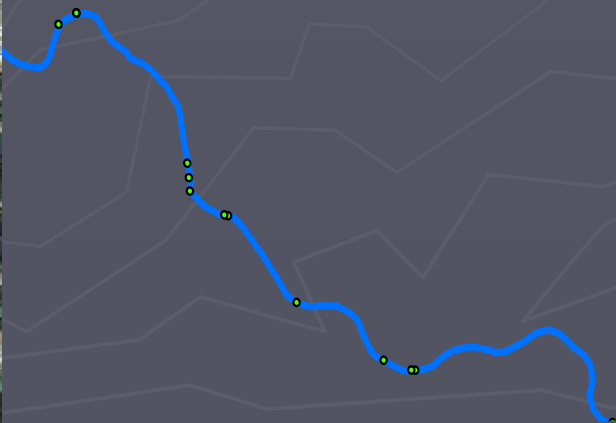
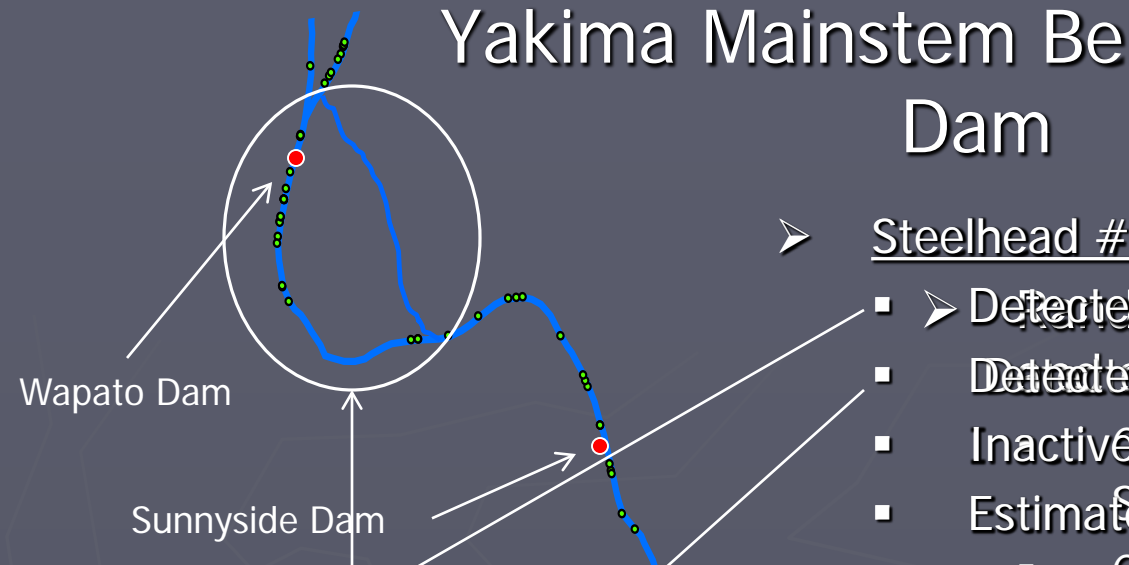
Yakima Mainstem Below Wapato Dam

Dam

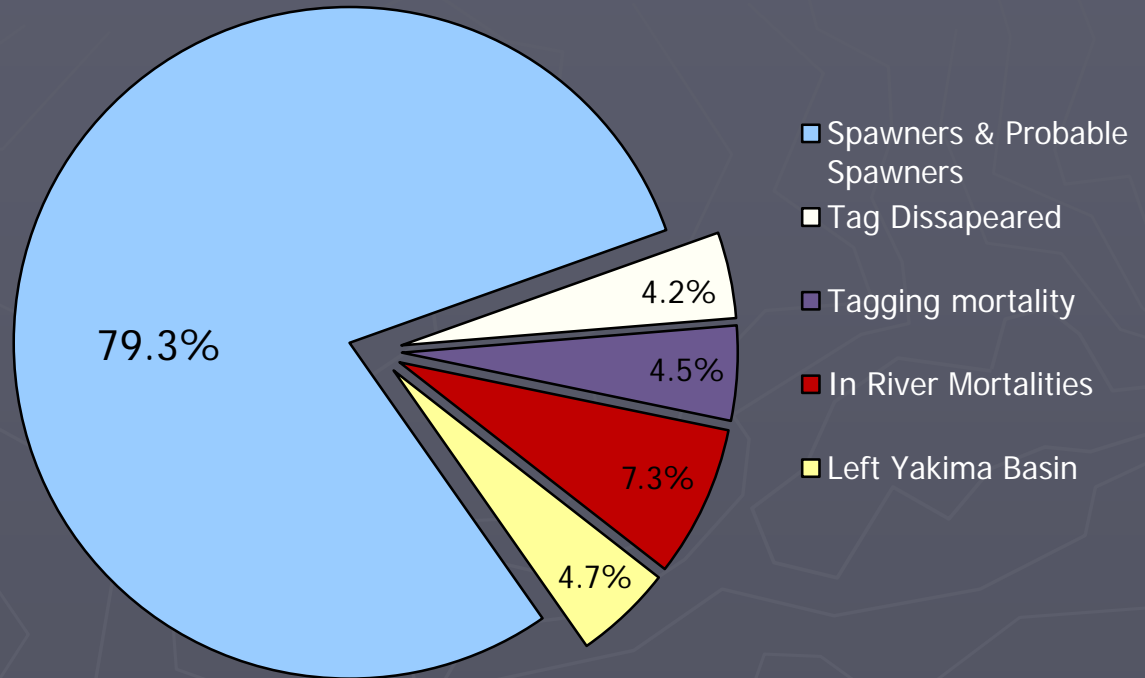
Steelhead #5495: Wild Female

- ➤ Detected at Wapato Dam (05/03/09)
- Detected at Marion Drain 304719 & 05/10
- Inactive detection 05/16 @ Arkma 2856
- Estimated spawn Window: ~04/22 – 05/09
- Car, Plane & Boat (Sunnyside Dam to Zillah)

❖ Total of 5-7 Radio-tagged Steelhead likely Spawned below Wapato and Sunnyside Dams



Fate of Radio Tagged Steelhead (N=507)



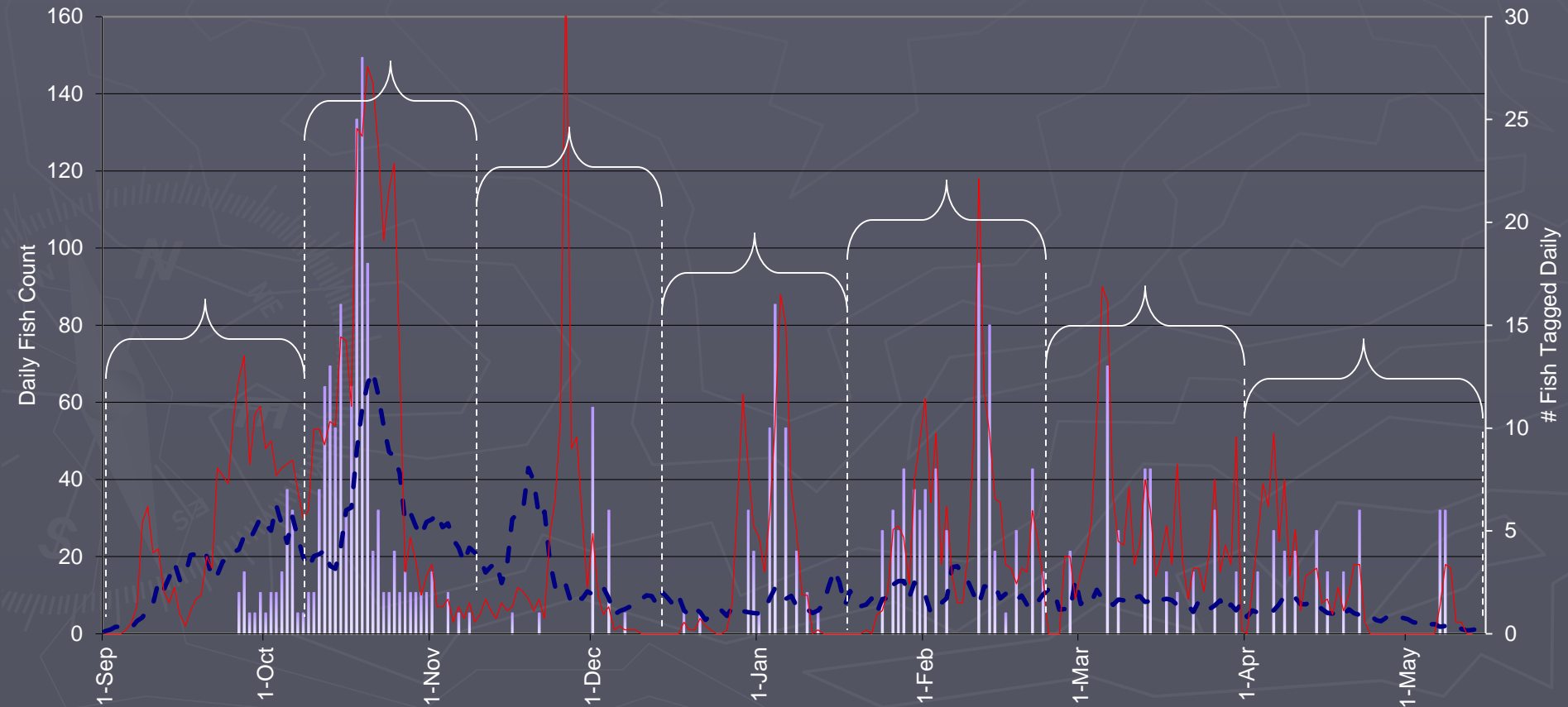
Partitioning of Run-Timing & Sampling at Prosser Dam

-Improved Method for Population Expansion Estimates

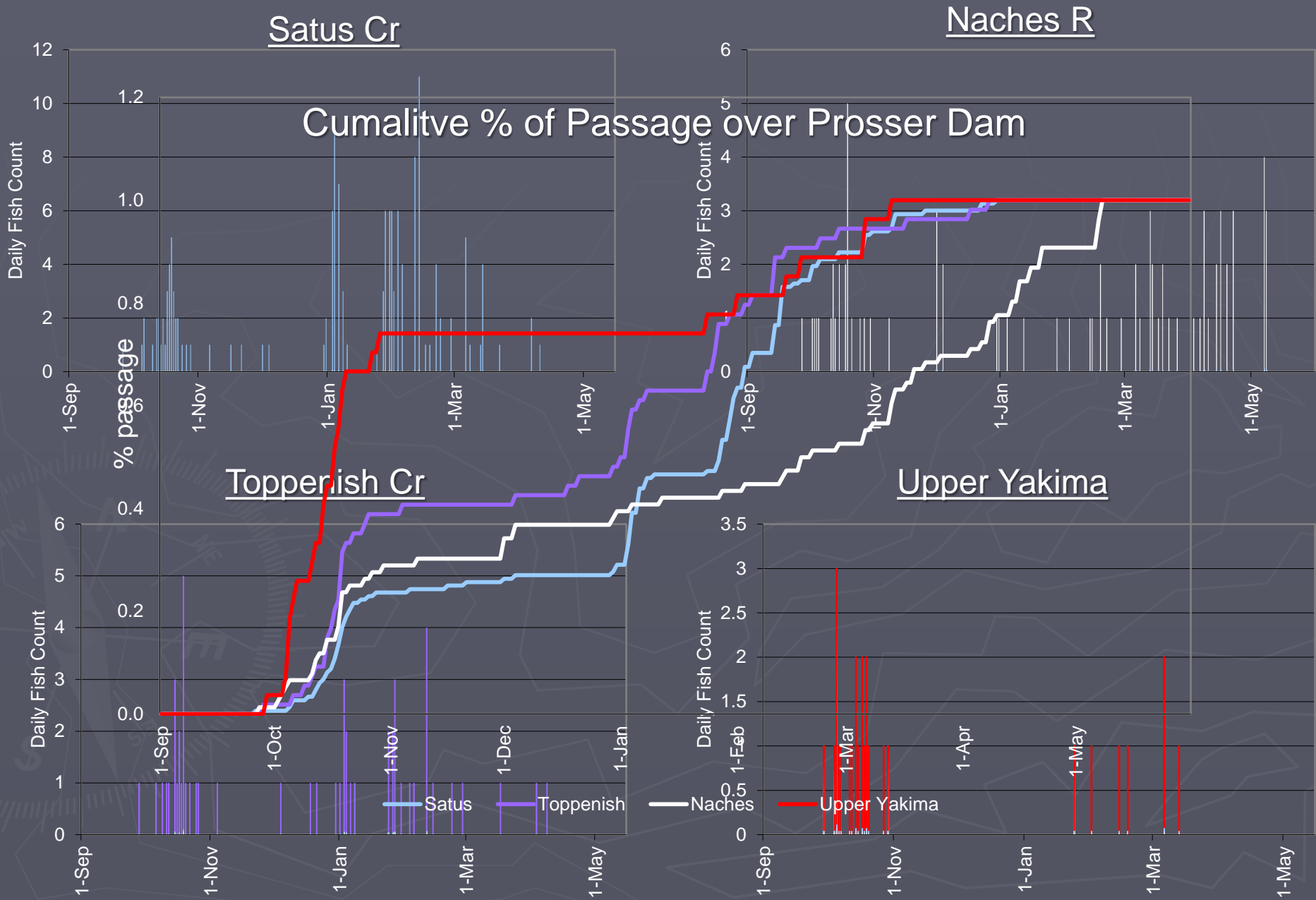
-Differential run-timing between populations

-Under/Over sampling effort for stratified periods

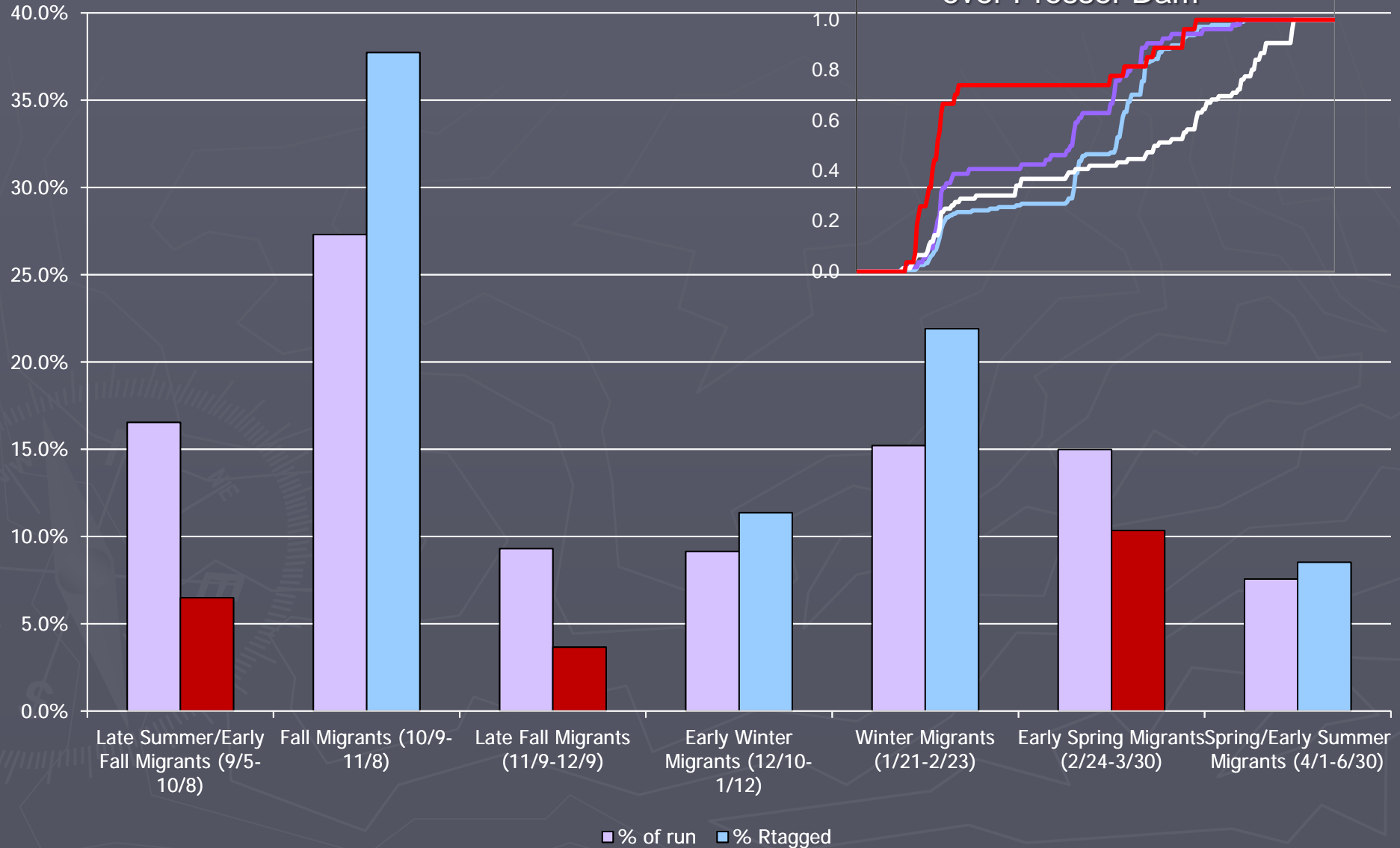
Yakima Steelhead Run-Timing at Prosser Dam & Tagging effort



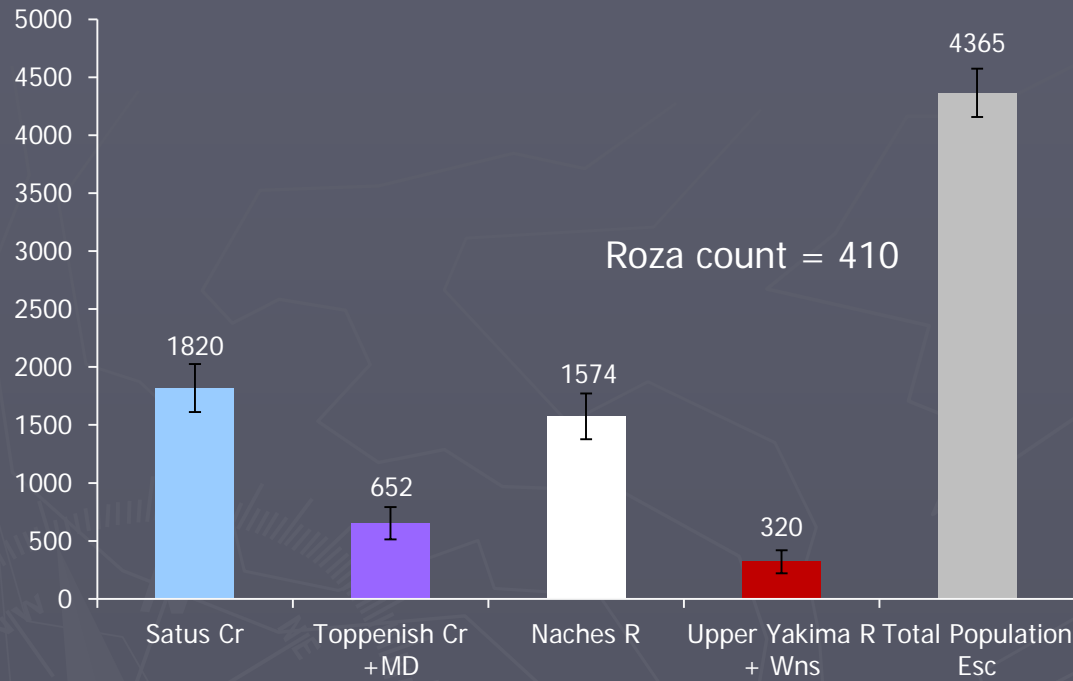
Population Run-timing: Prosser Dam



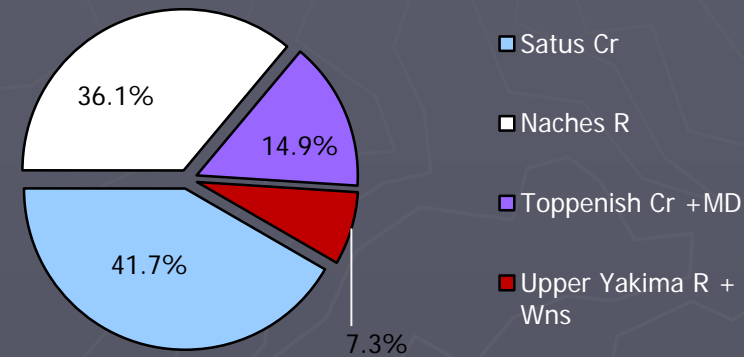
Cumulative Passage: Prosser Dam



Population Estimates: Base Escapement

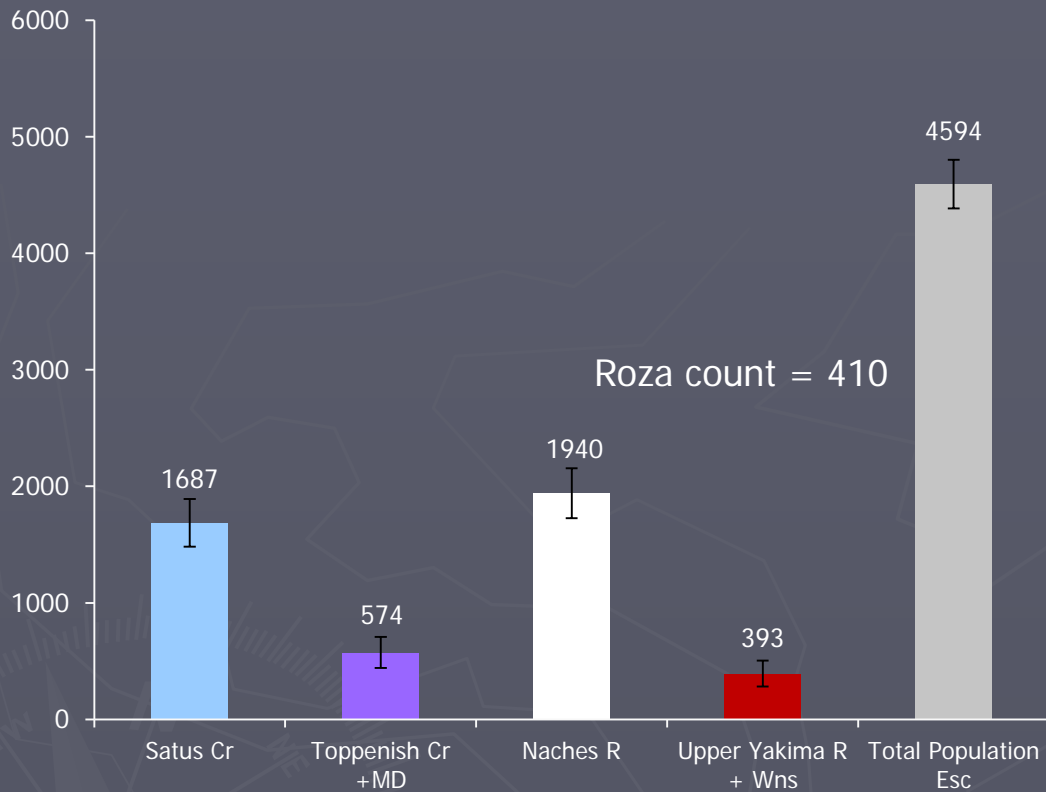


% of Total Spawners by Population

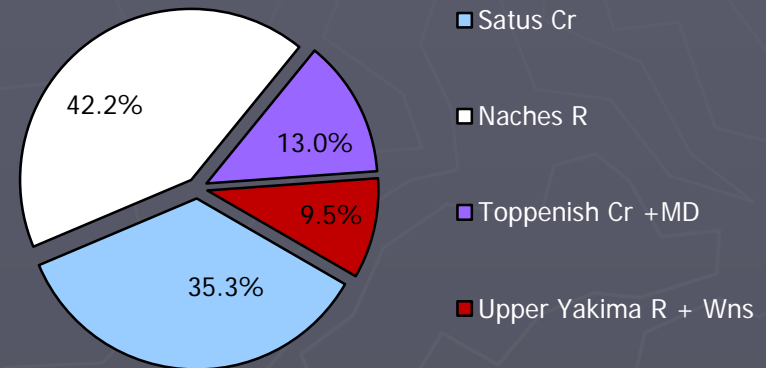


Population	Abundance	CI ($\alpha = .10$)
Satus Cr	1820	+/- 207
Toppenish Cr +MD	652	+/- 139
Naches R	1574	+/- 197
Upper Yakima R + Wns	320	+/- 100
Total Population Esc	4365	+/- 209

Population Estimates: Base Escapement




% of Total Spawners by Population



Population	Abundance	CI ($\alpha = .10$)
Satus Cr	1687	+/- 205
Toppenish Cr +MD	574	+/- 133
Naches R	1940	+/- 214
Upper Yakima R + Wns	393	+/- 112
Total Population Esc	4594	+/- 208

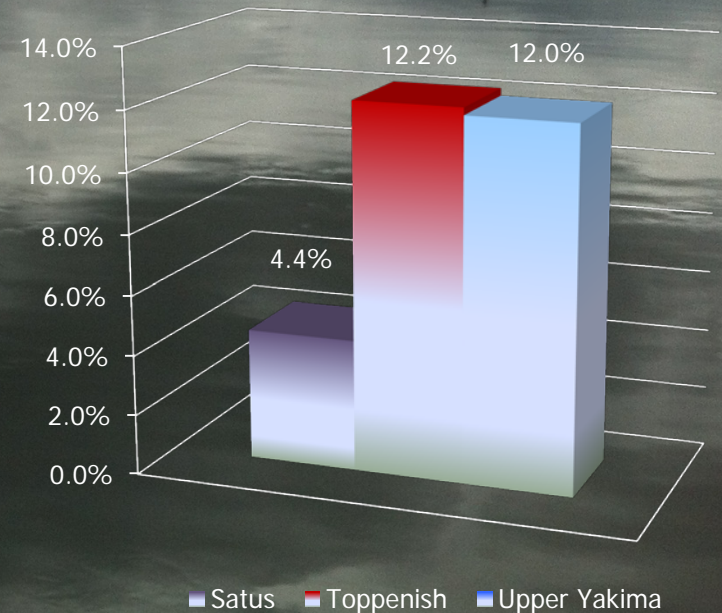
Radio Tag Regurgitation Estimates

- Simultaneous detections of PIT/RT tags
- Sites equipped with Instream PIT-arrays & RT Receivers
- Verified with Inactive tag detections and Tag recoveries
- Important part of study!

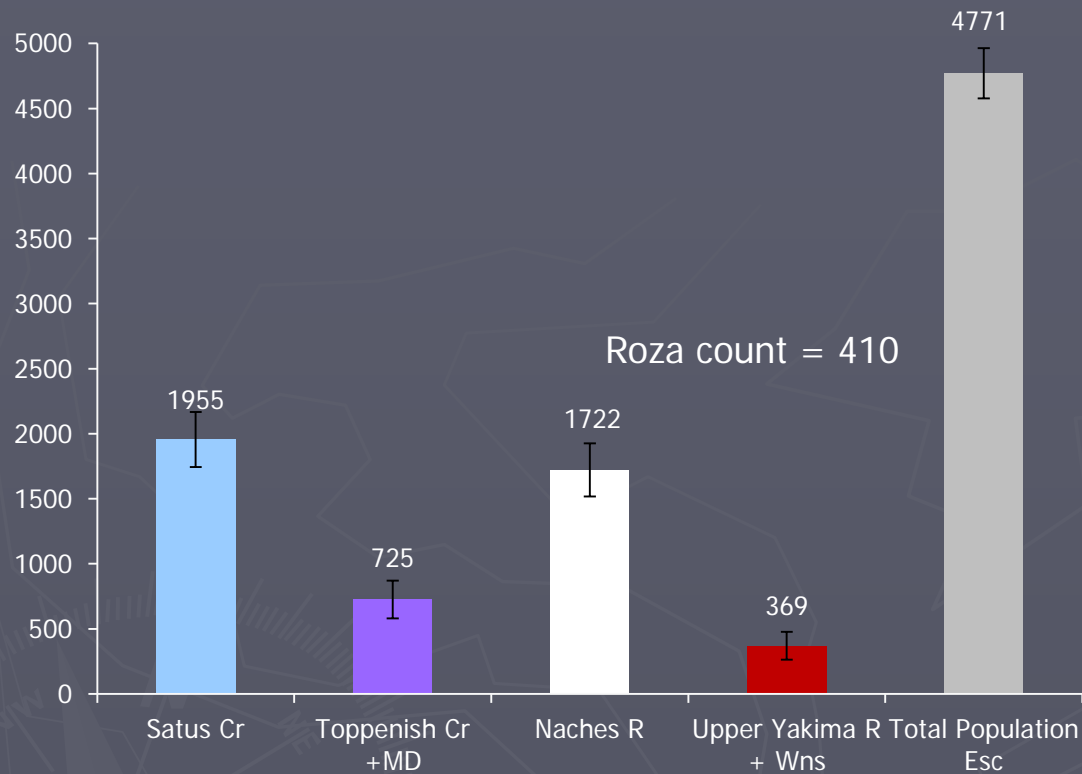


Tag Regurgitation				
	# Tags detected			Regurgitation
	RT	Total observed	Difference	%
Satus	152	159	7	4.4%
Toppenish	43	49	6	12.2%
Upper Yakima	22	25	3	12.0%

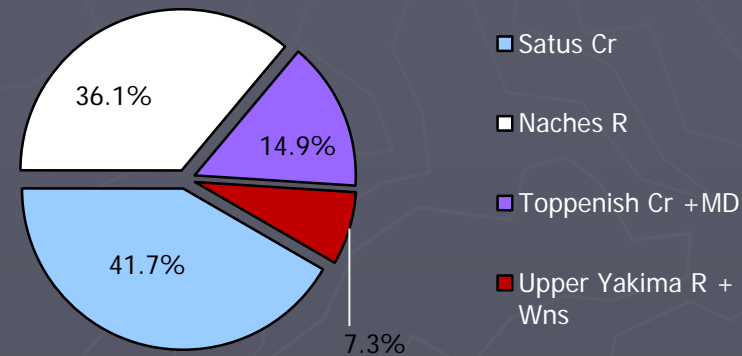
* Used 12% Tag regurgitation for Naches population



Population Estimates: Expanded w/TR

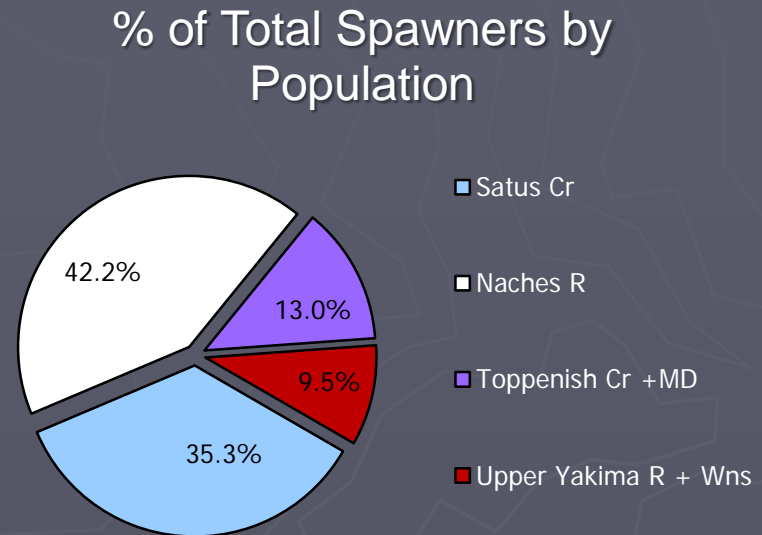
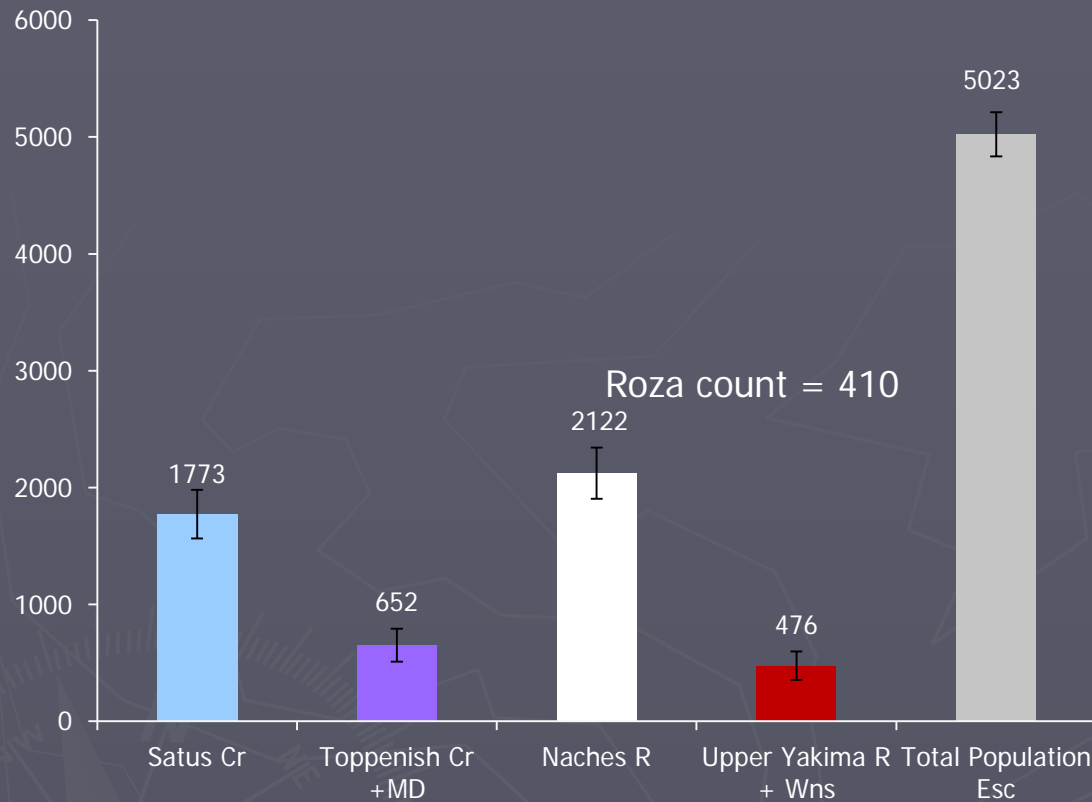


% of Total Spawners by Population



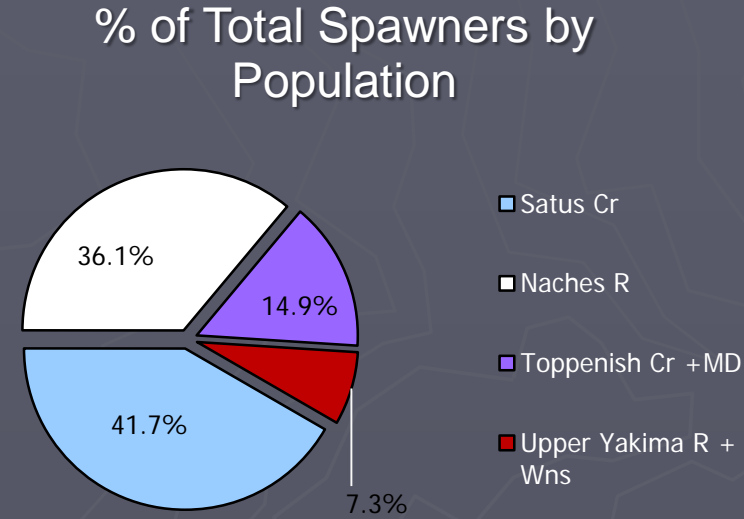
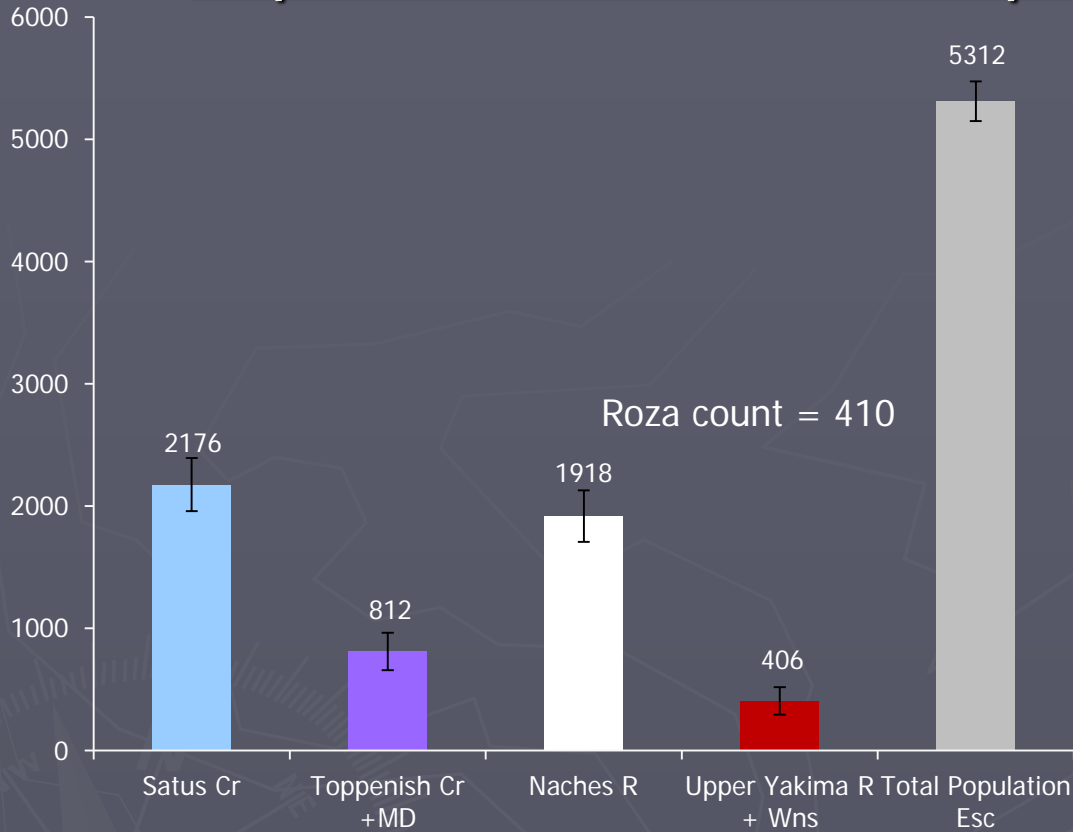
Population	Abundance	CI ($\alpha = .10$)
Satus Cr	1955	+/- 211
Toppenish Cr +MD	725	+/- 146
Naches R	1722	+/- 204
Upper Yakima R + Wns	369	+/- 107
Total Population Esc	4771	+/- 193

Population Estimates: Expanded w/TR



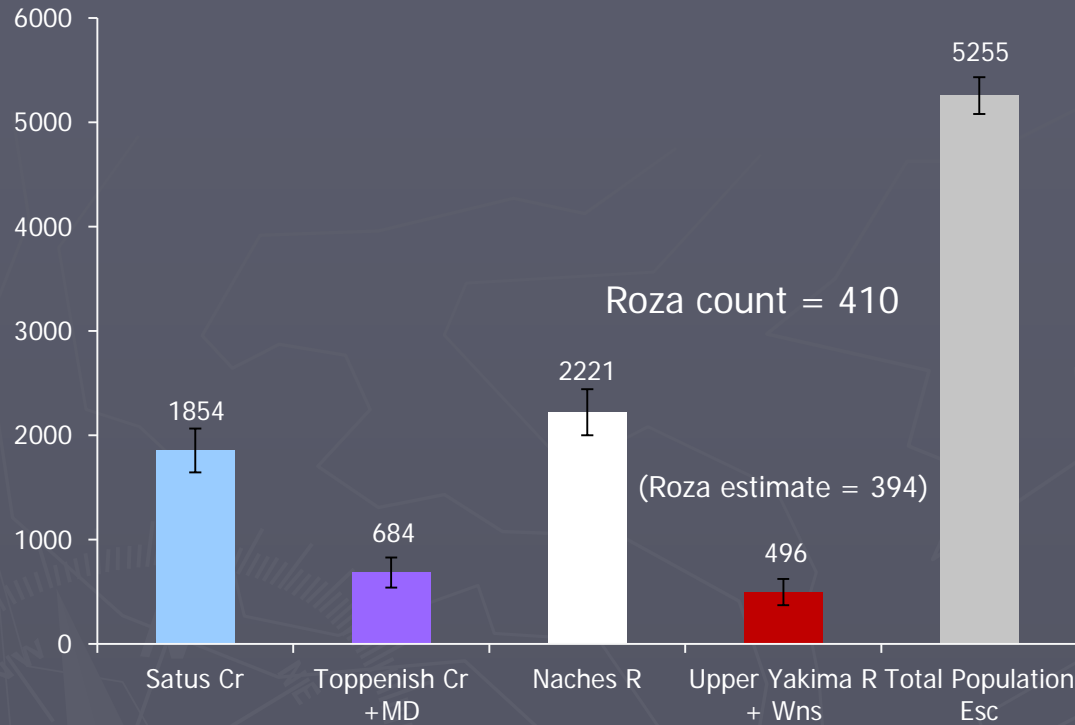
Population	Abundance	CI ($\alpha = .10$)
Satus Cr	1773	+/- 208
Toppenish Cr +MD	652	+/- 141
Naches R	2122	+/- 219
Upper Yakima R + Wns	476	+/- 122
Total Population Esc	5023	+/- 189

Population Estimates: Expanded w/ TR +TM

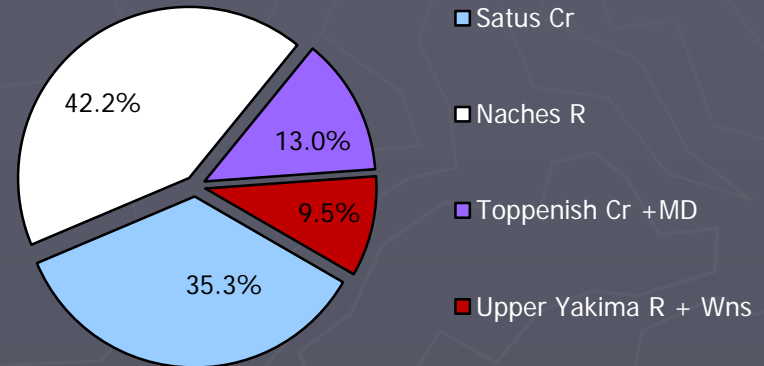


Population	Abundance	CI ($\alpha = .10$)
Satus Cr	2176	+/- 217
Toppenish Cr +MD	812	+/- 153
Naches R	1918	+/- 210
Upper Yakima R + Wns	406	+/- 112
Total Population Esc	5312	+/- 162

Population Estimates: Expanded w/ TR +TM



% of Total Spawners by Population



Population	Abundance	CI ($\alpha = .10$)
Satus Cr	1854	+/- 211
Toppenish Cr +MD	684	+/- 144
Naches R	2221	+/- 221
Upper Yakima R + Wns	496	+/- 125
Total Population Esc	5255	+/- 176

That's all Folks!

