

Application of Genetic Baseline: Aiding the Recovery of Steelhead

Scott M. Blankenship

Overview

- Status and trends monitoring – viable salmonid population criteria
- Yakima Steelhead Recovery Plan
- Genetic resources available and their application

ViabLe Salmonid Population Criteria

VSP – What is being monitored

- What are the monitoring needs associated with Recovery Plans for Pacific Northwest ESU and DPS listed under the Endangered Species Act?
- Monitoring Recommendations – (Crawford and Rumsey 2009)
- Address all:
 - Viable salmonid population criteria
 - Listing Factors
 - Threats

VSP – What is being monitored

- VSP Adult Spawner Abundance

- Unbiased sampling design with known precision and accuracy
- Ratio of adipose absent/intact on spawning grounds
- Calculate average coefficient of variation for natural-origin spawner estimates (per population)
- Determine power to detect a significant change in abundance

VSP – What is being monitored

- VSP Adult Spawner Abundance
- VSP Productivity
 - Develop at least 12 brood years of spawner information from cohort analysis
 - Recruits per spawner
 - Estimate juvenile migrants for at least one MPG population within each ESU/DPS
 - Calculate average coefficient of variation
 - Determine power to detect a significant change

VSP – What is being monitored

- VSP Adult Spawner Abundance
- VSP Productivity
- VSP Spatial Distribution
- VSP Species Diversity
 - Short term:
 - Use distribution, spawn time, age structure, fecundity, and sex ratio
 - Long term:
 - Develop a genotypic and phenotypic baseline for each population within each MPG

Priorities and Problems

Problem Cases

- Highest:

Adult Abundance in natural spawning areas

- Methods:

Escapement Sampling (e.g. adjusted weir count)

Probabilistic Sampling – unbiased randomized sites

Index Spawner Survey – (e.g. expanded redd counts)

- What if you have multiple populations above count site?

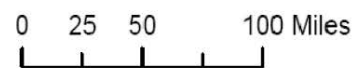
- What if you do not observe redds or recover carcasses poorly?

Yakima Steelhead Recovery Plan

Yakima Steelhead Recovery Plan

Landmarks:

1999 – Middle Columbia River steelhead listed a threatened



Yakima Steelhead Recovery Plan

Landmarks:

1999 – Middle Columbia River steelhead listed a threatened

2006 – Listing revised to cover only anadromous form of *O. mykiss*

2006 – Yakima Subbasin Salmon Recovery Plan adopted

2009 – Yakima Steelhead Recovery Plan (updated, revised)

2009 – YSRP incorporated into Middle Columbia Steelhead
Recovery Plan

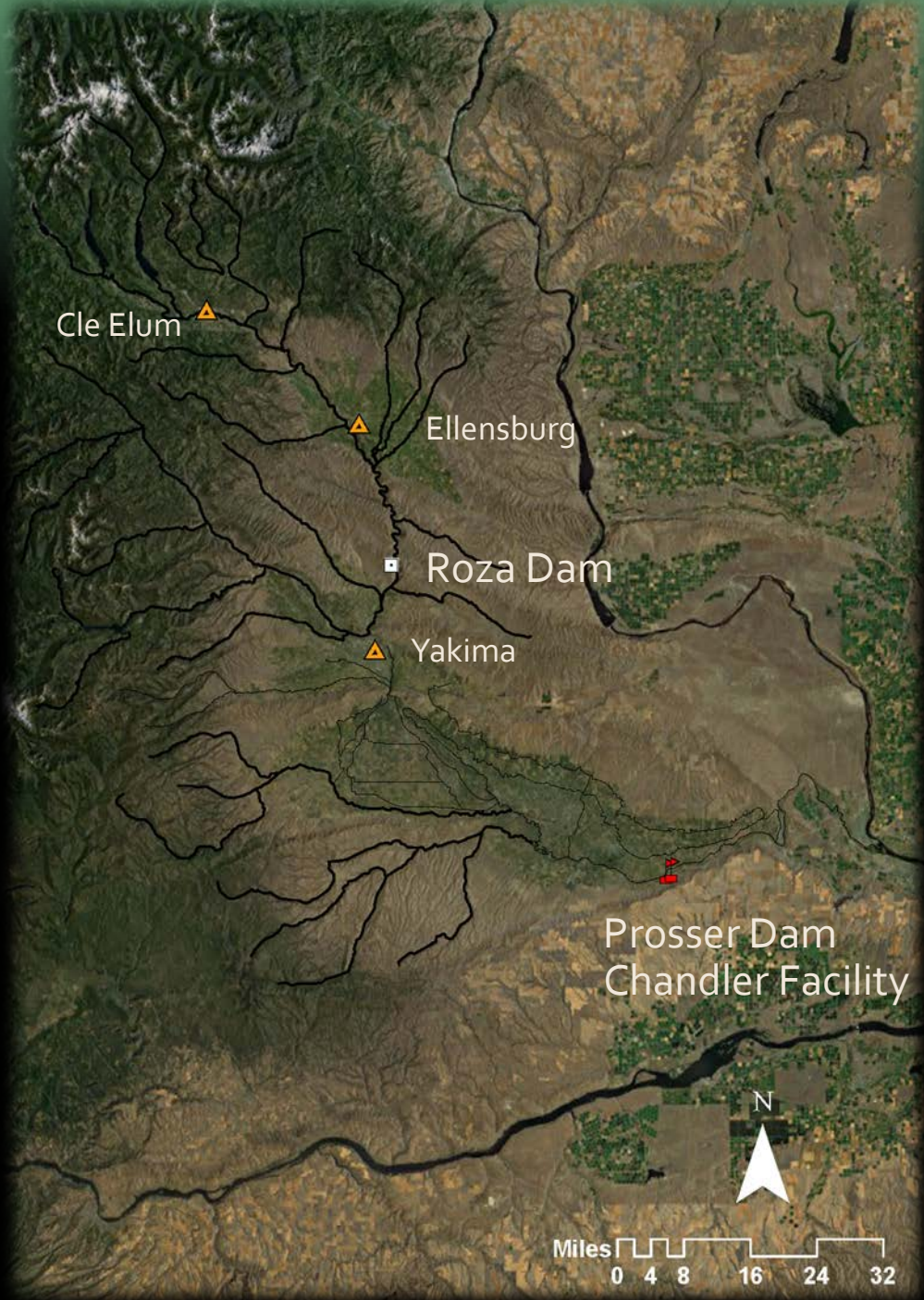
Yakima Steelhead Recovery Plan

Abundance and Productivity:

Ladder counts at Prosser Dam

Counts at Roza Dam

Yakima Basin Map



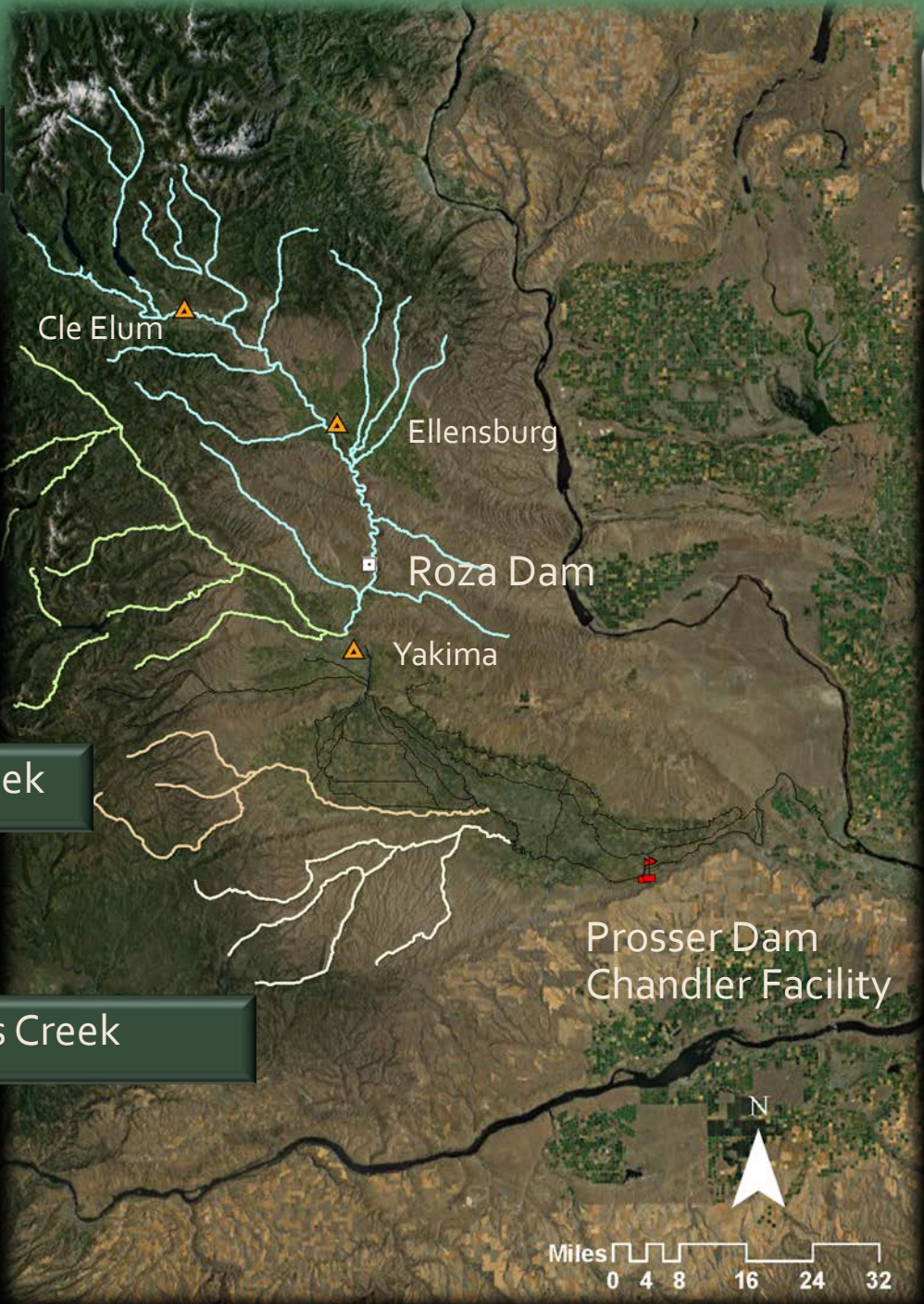
Yakima Basin Map

Upper Yakima River

Naches River

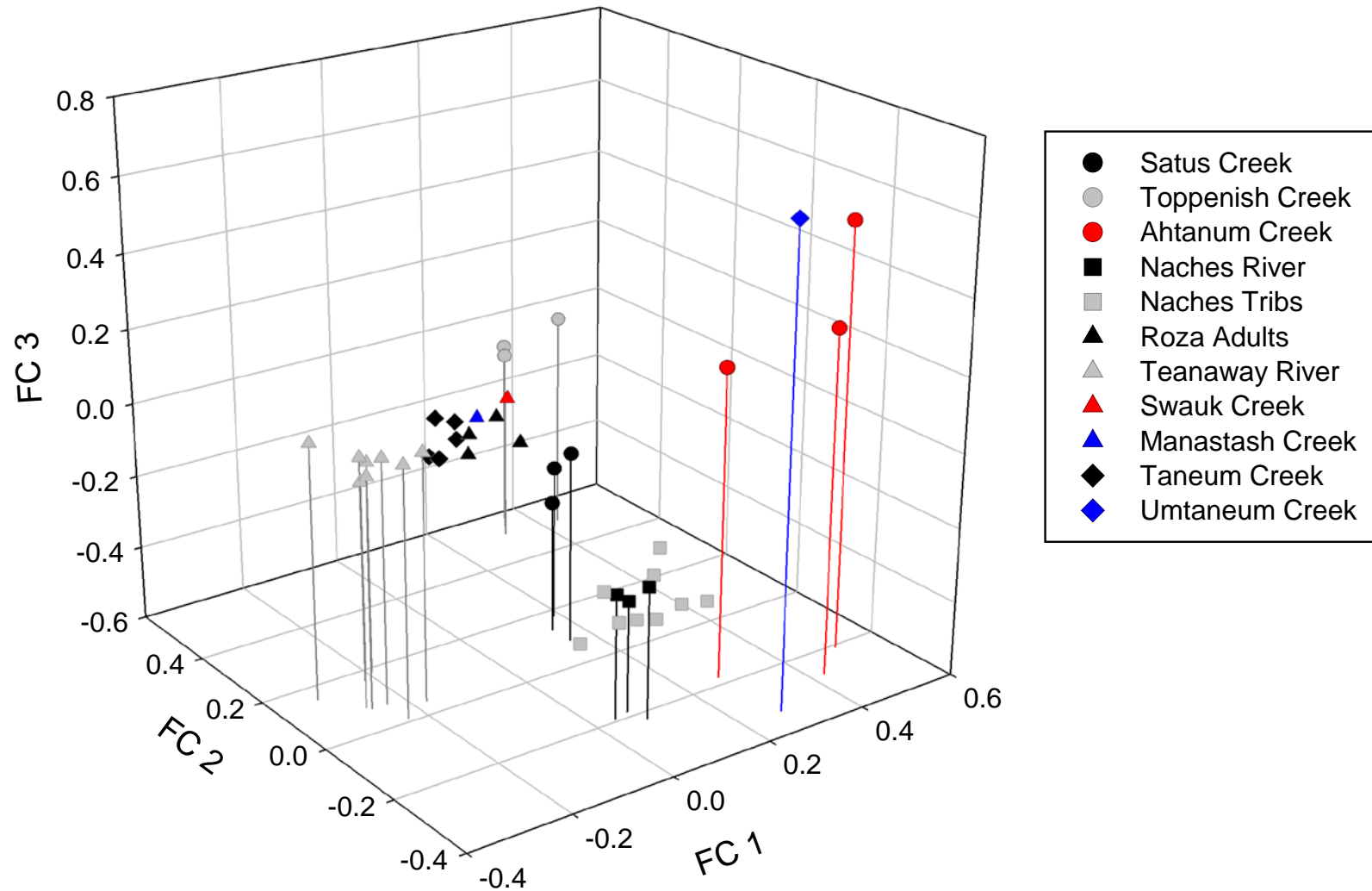
Toppenish Creek

Satus Creek



Yakima Steelhead Genetic Resources

Yakima Baseline - FCA



Reference Collections

Initial Baseline

Satus Creek

Toppenish Creek

Ahtanum Creek

Naches River

upper Yakima River

Teanaway River

Taneum River

Skamania Hatchery

Additions

Cowiche Creek

Oat Creek

Little Rattlesnake Creek

N.F. Little Naches River

Nile Creek

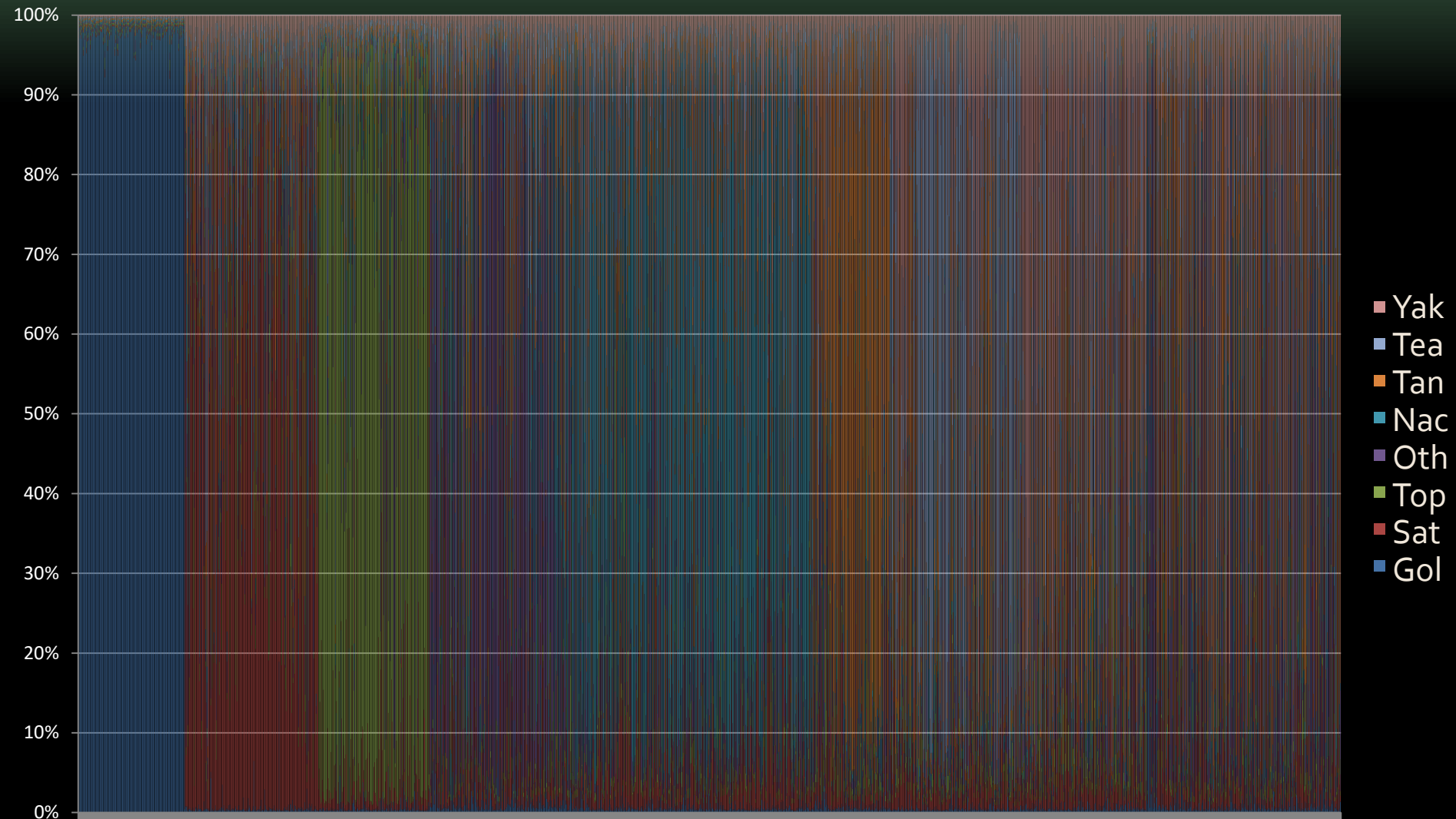
Pile Up Creek

West Quartz Creek

Umtanum River

Goldendale Hatchery

Yakima Steelhead - STRUCTURE



Individual steelhead from baseline

Reference Collections

Baseline

Goldendale Hatchery
Satus Creek
Toppenish Creek
Little Rattlesnake Creek
Naches River
N.F. Little Naches River
Nile Creek
Pile Up Creek
West Quartz Creek
Taneum River (residents)
Taneum River
Teaway River (resident)
Teaway River
upper Yakima River

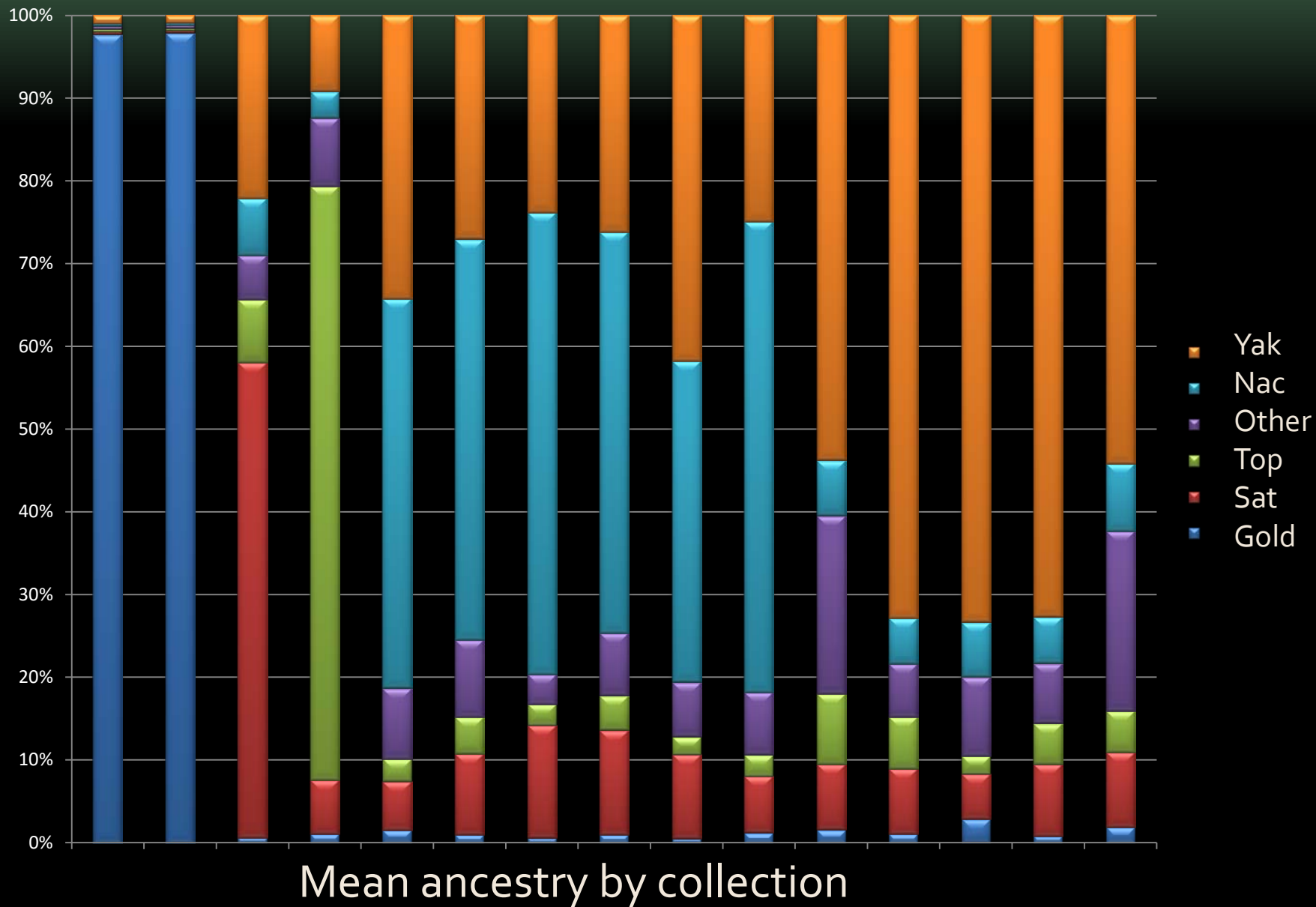
Reporting Group

Goldendale
Satus
Toppenish

Naches

upper Yakima

Yakima Steelhead - STRUCTURE



Power of reference baseline

	Realistic Fishery Simulations					
Reporting Group	GoldendaleH	SatusCr	ToppenishCr	NachesR	TaneumR	TeanawayR
Goldendale	1.000	0.000	0.000	0.000	0.000	0.000
Satus	0.000	0.979	0.005	0.004	0.000	0.003
Toppenish	0.000	0.002	0.990	0.000	0.000	0.001
Naches	0.000	0.006	0.001	0.982	0.007	0.003
Upper Yakima	0.000	0.013	0.004	0.014	0.993	0.994

Conclusions

- VSP criteria integral to monitoring and recovery planning
- Genetic techniques offer alternative strategies for meeting monitoring requirements
- Yakima Steelhead Recovery Plan adopted genetic-based metrics for estimating abundance and productivity
- Genetic infrastructure in place

Future steps

★ Representative sampling of adults at Prosser Dam

- Partition juveniles migrants by region (traps, Chandler facility)

- Spatial Distribution

Radio tracking and new tagging technologies

What is the role of mainstem spawning to recovery scenarios?

- Diversity

Understanding the balance between life history forms

Non-native hatchery fish

Acknowledgements

WDFW MGL

Norm Switzler

Maureen Small

Jennifer von Bargaen

Sarah Bell

Steelhead information

Yakama Nation

CRITFC

Funding

Bonneville Power Administration



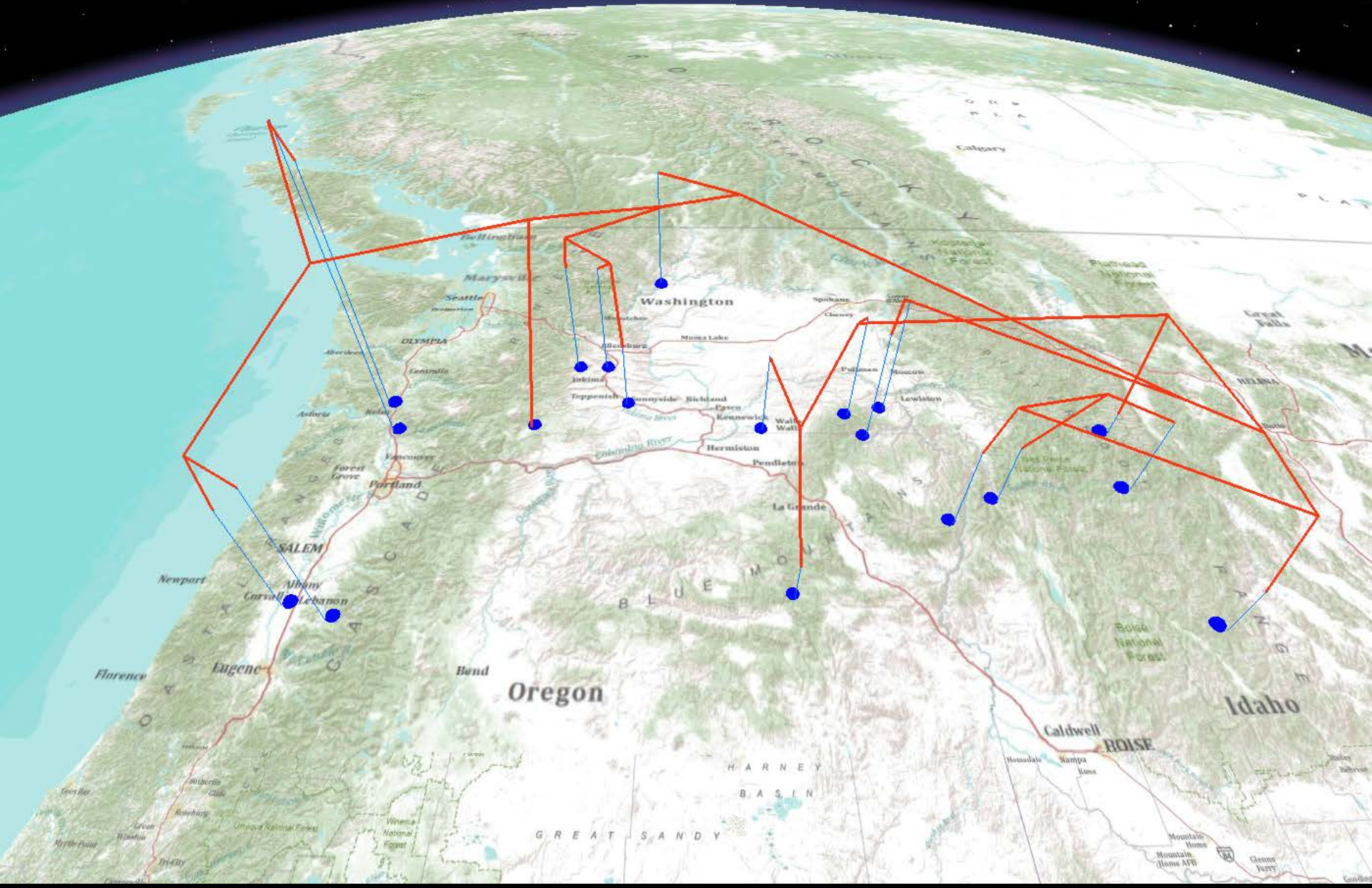
NOAA



Washington State Fund



Questions?



Prosser Dam Mixed Adults

Population	Location	Stage	Location (rkm)	Year	WDFW Code	SPAN
Yakima MPG	Prosser-Mixed Adults	Adult	Prosser	2007	07AJ	165
Yakima MPG	Prosser-Mixed Adults	Adult	Prosser	2008	08LM	228

Prosser Dam Mixed Adults

2007

Satus	0.07	(0.01, 0.12)
Toppenish	0.20	(0.12, 0.26)
Ahtanum	0.11	(0.03, 0.16)
Naches	0.28	(0.19, 0.34)
Upper Yakima	0.26	(0.16, 0.35)
Teanaway	0.09	(0.04, 0.20)
Skamania	0.00	(0.00, 0.00)

lower	0.38
Naches	0.28
Upper Yakima	0.34

Prosser Dam Mixed Adults

2008

Satus	0.10	(0.03, 0.14)
Toppenish	0.29	(0.21, 0.34)
Ahtanum	0.07	(0.03, 0.13)
Naches	0.29	(0.21, 0.37)
Upper Yakima	0.17	(0.09, 0.23)
Teanaway	0.06	(0.03, 0.18)
Taneum	0.01	(0.00, 0.03)
Skamania	0.00	(0.00, 0.00)

lower	0.46
Naches	0.29
Upper Yakima	0.24