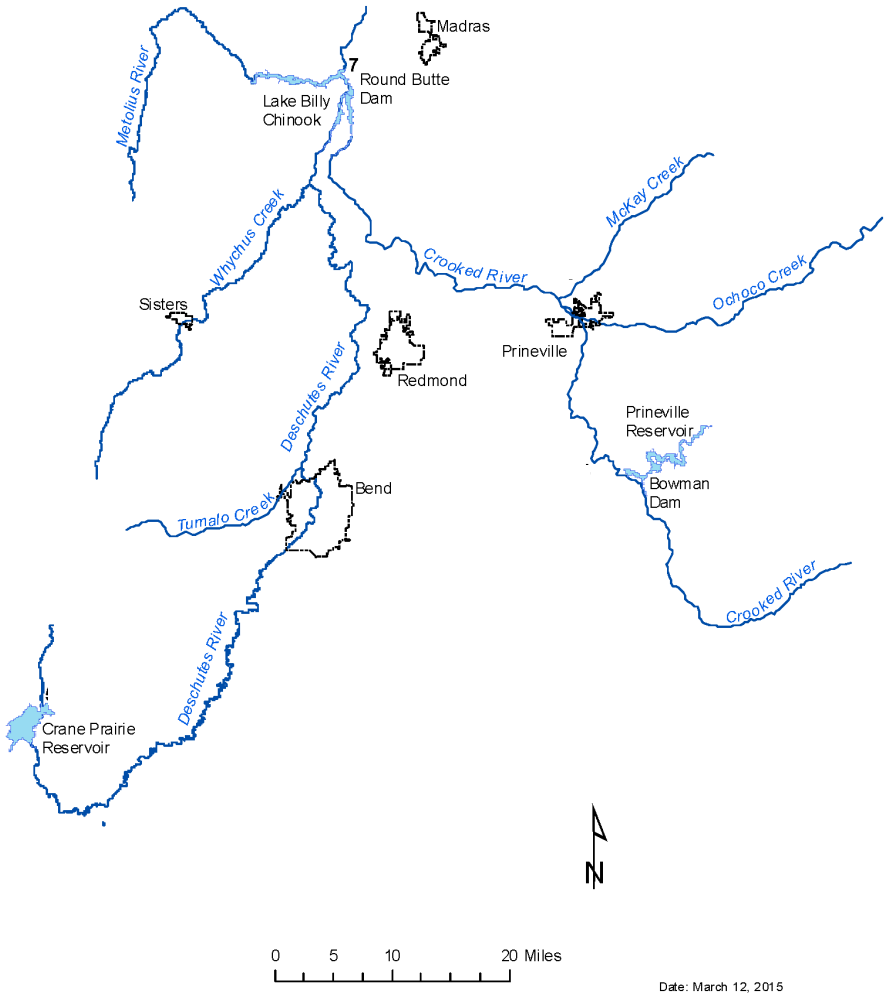
Genetic Determination of Stock of Origin for *Oncorhynchus mykiss* Collected in the Whychus Creek, Upper Deschutes River Basin



Gonzalo Mendez
Portland General Electric

Brice Adams
U.S. Fish and Wildlife Service
Abernathy Fish Technology Center

Deschutes *O. mykiss*

1999:

- 11 distinct population segments listed, including Middle Columbia River Steelhead as threatened.

Deschutes *O. mykiss*

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- 11 distinct population segments listed, including Middle Columbia River Steelhead as threatened.

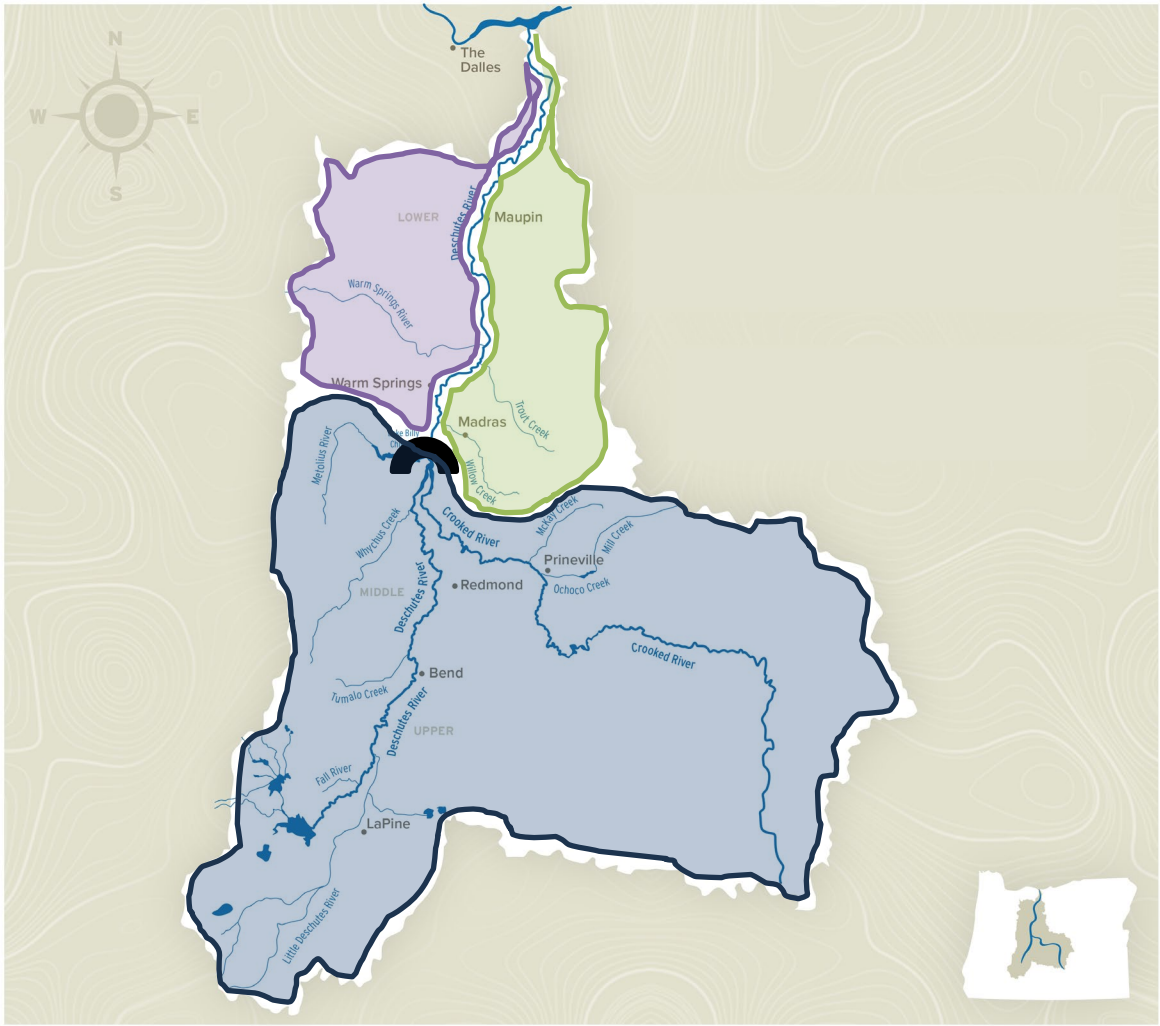
2003:

- Interior Columbia Technical Recovery Team (ICR-TRT) designated populations on Eastside and Westside of Deschutes River below Pelton and Round Butte dams.

2005:

- ICR-TRT identifies historic habitat above dams used by anadromous O. mykiss.

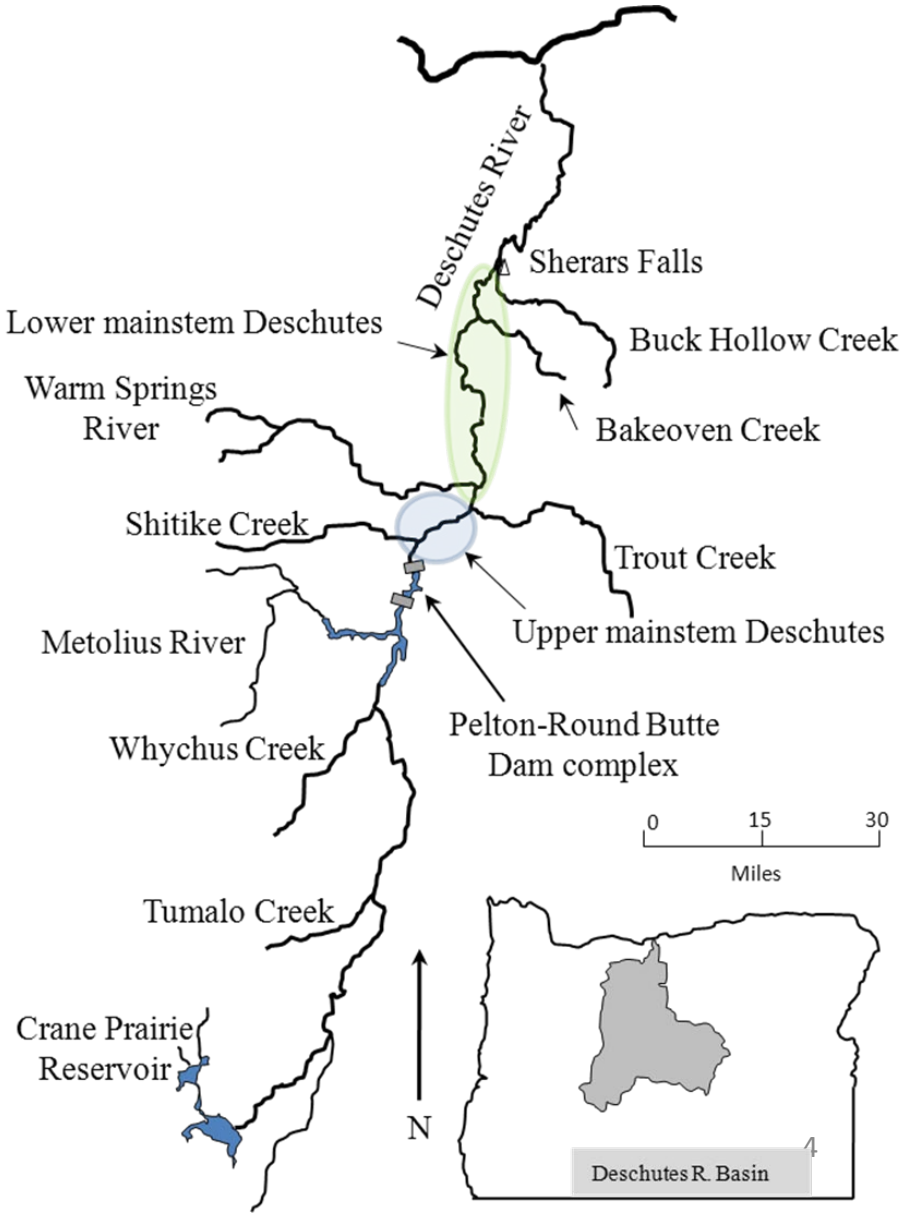
- Begin genetic analysis of Deschutes River O. mykiss.



2005 Deschutes *O. mykiss* Collections

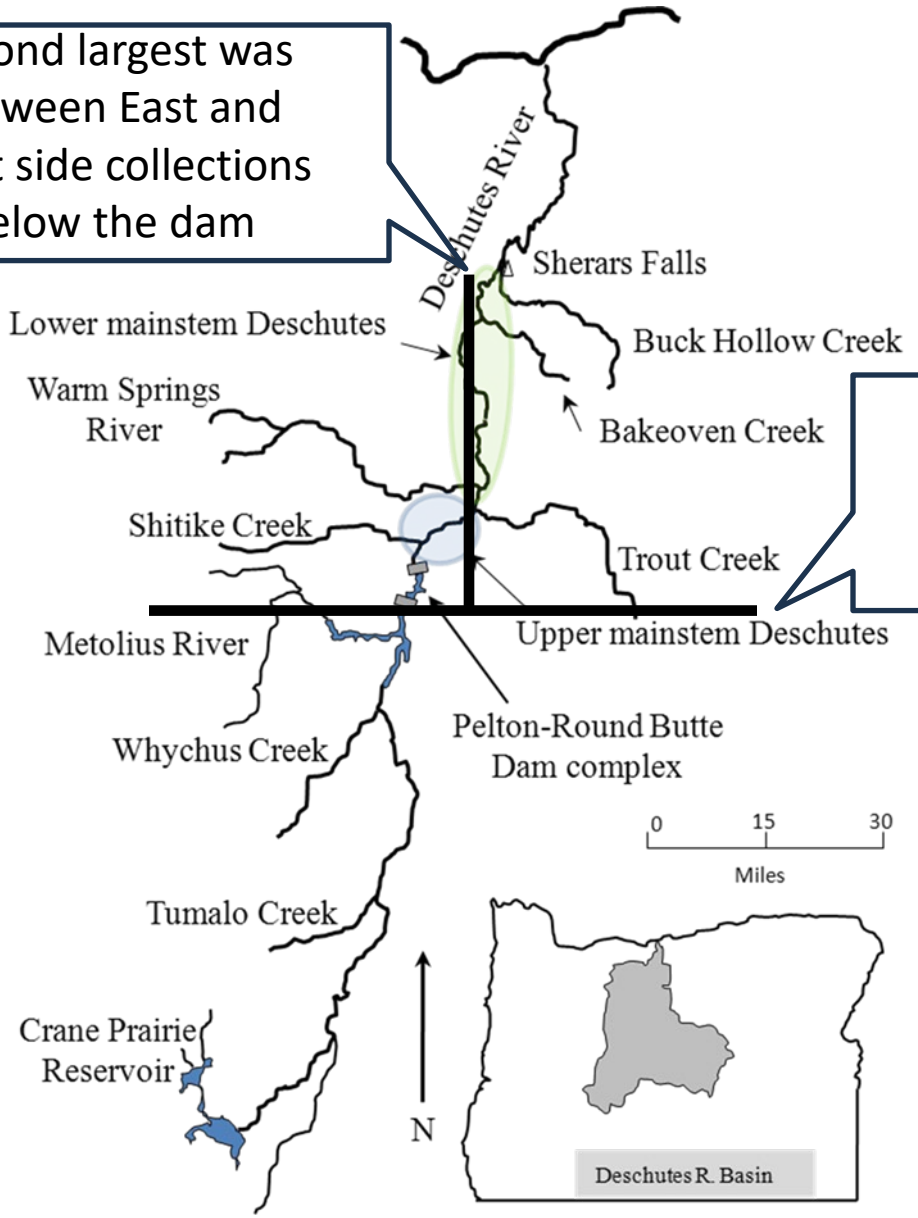
2005:

- 9 collections below dam
  - 3 West side
    - Buck Hollow Creek
    - Bakeoven Creek
    - Trout Creek
  - 3 East side
    - Warm Springs River
    - Warm Springs River strays
    - Shitike Creek
  - 2 mainstem Deschutes River collections
  - Round Butte Hatchery
- 4 collections above dam
  - Crane Prairie Reservoir
  - Oak Springs Hatchery
  - Tumalo Creek
  - Whychus Creek



2005 Deschutes *O. mykiss* Results

Second largest was between East and West side collections below the dam

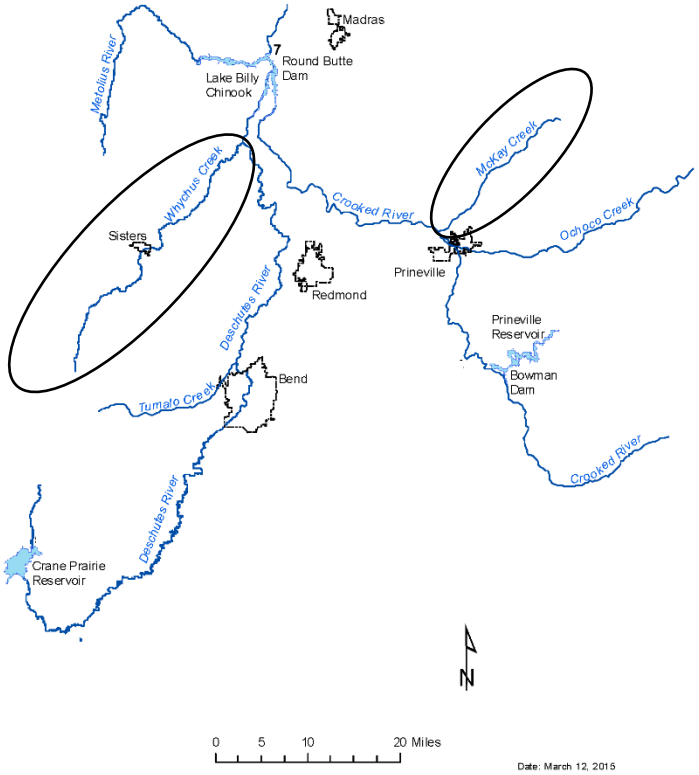


Biggest difference was between collections above and below dam

2013 Study Area

2013 Objectives:

- Examine introgression between Round Butte Hatchery origin steelhead and *O. mykiss* collected from Whychus and McKay creeks.
- Determine the genetic relationship between *O. mykiss* collected from Whychus and McKay creeks prior to re-establishing fish passage and other *O. mykiss* collections from the upper Deschutes Basin (upper Crooked River and Tumalo Creek).



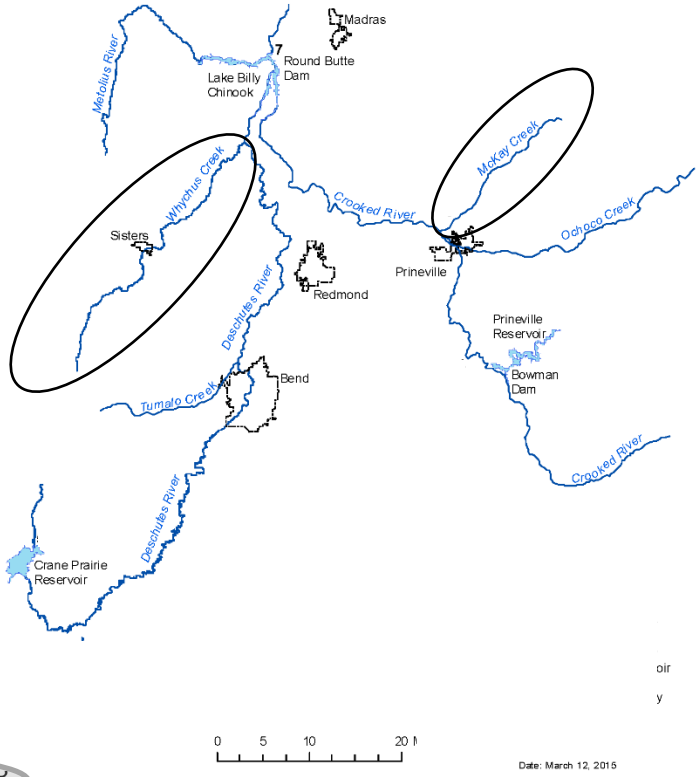
Whychus Creek

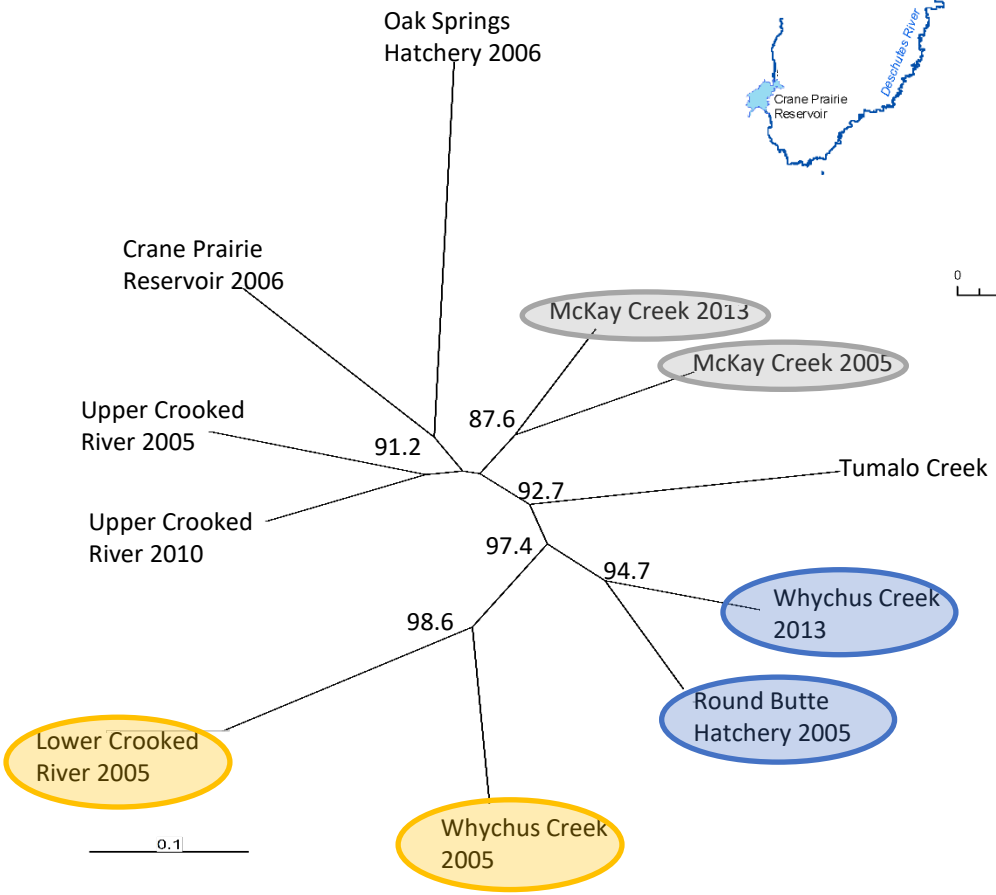
McKay Creek

2013 Results

2013 Results:

- 2013 McKay Creek collection still look previous collections
- 2013 Whychus Creek collection looks like RBH collection

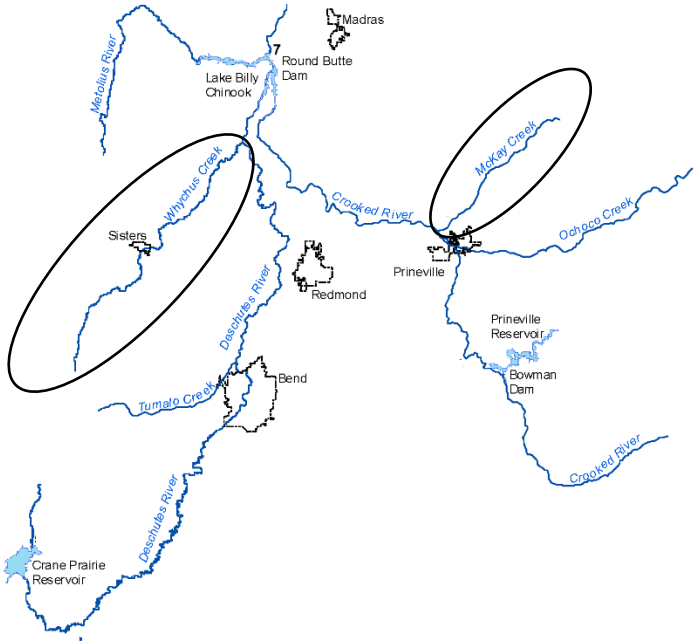


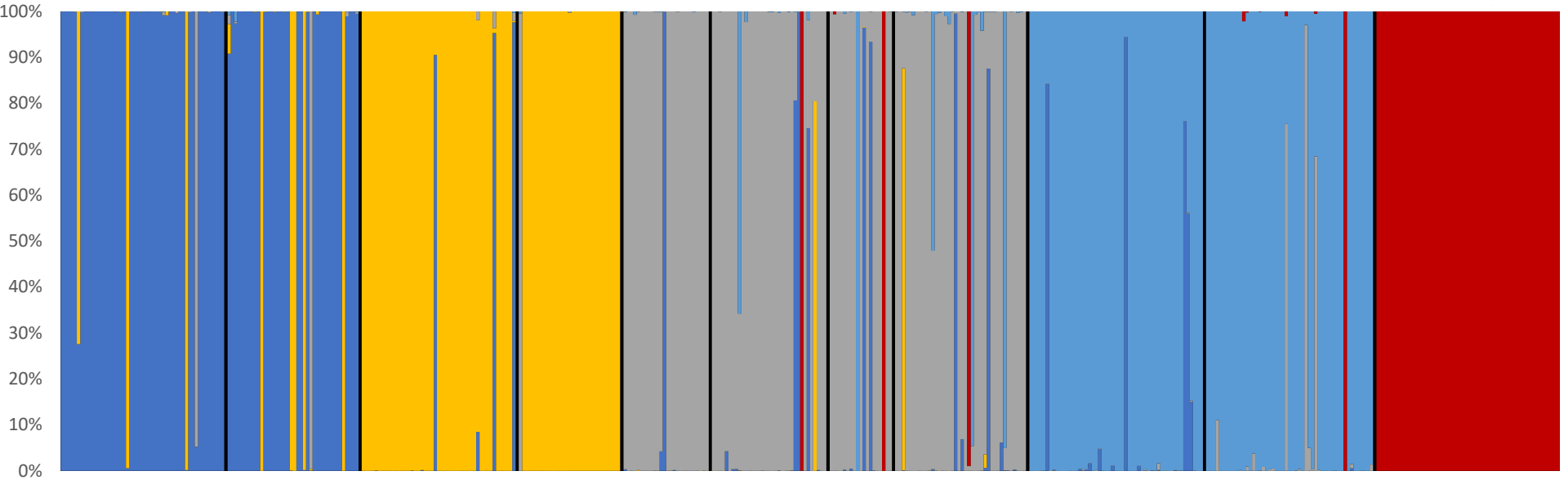


2013 Results

2013 Results:

- 2013 McKay Creek collection still look previous collections
- 2013 Whychus Creek collection looks like RBH collection
- Little to no introgression with hatchery fish.

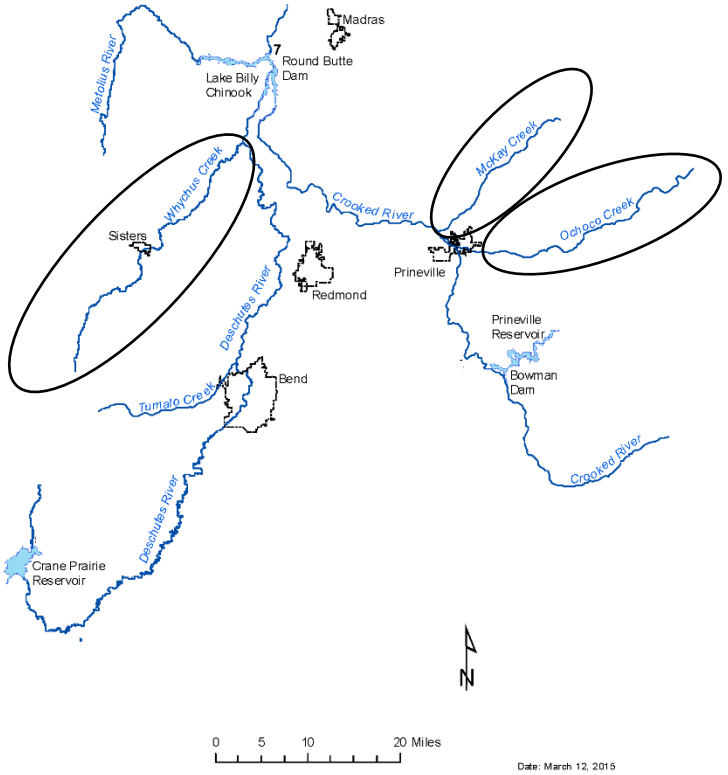




2016 Study Area

2016 Objectives:

- Examine introgression between Round Butte Hatchery origin steelhead and *O. mykiss* collected from Whychus, McKay, and Ochoco creeks.
- Determine the genetic relationship between *O. mykiss* collected from Whychus, McKay, and Ochoco creeks and other *O. mykiss* collections from the upper Deschutes Basin (upper Crooked River and Tumalo Creek).



Ochoco Creek

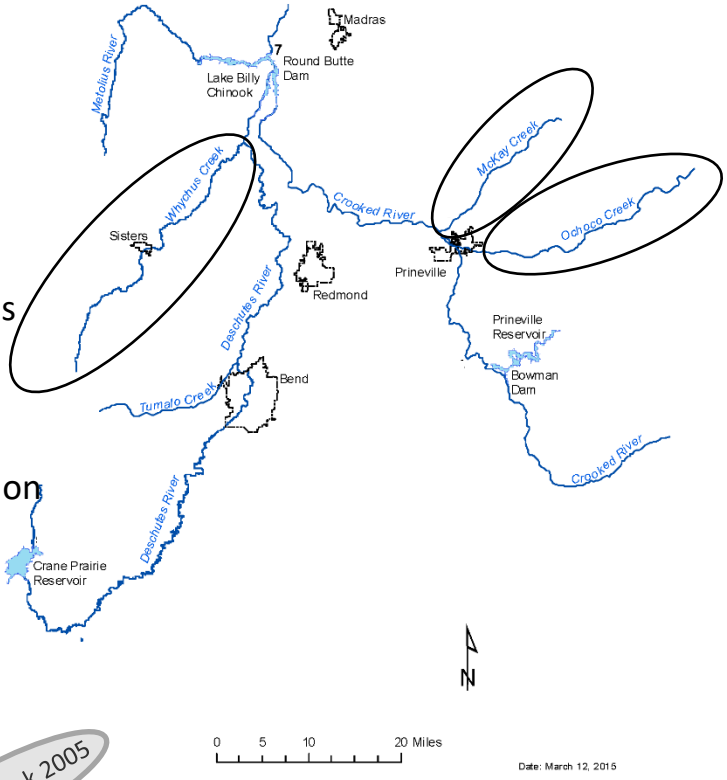
Whychus Creek

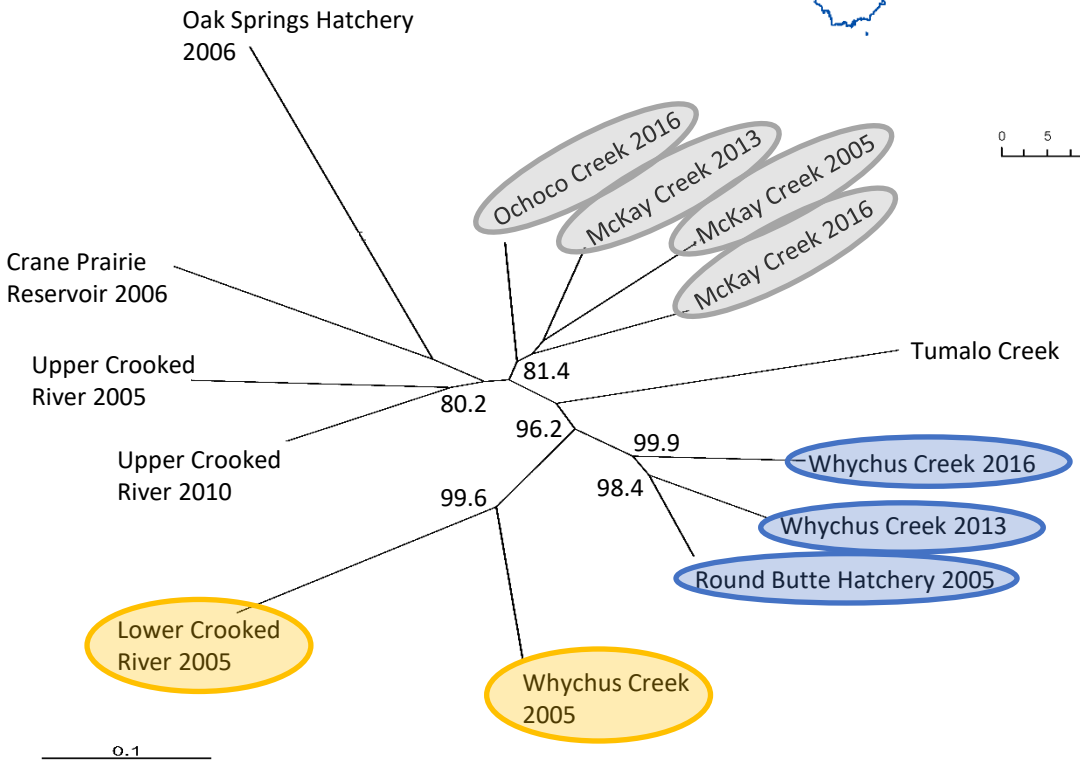
McKay Creek

2016 Results

2016 Results:

- 2016 McKay Creek collection look like 2005 and 2013 collections
- 2016 Ococho look like McKay Creek collections
- 2016 Whychus Creek collection looks like 2013 and RBH collection





2016 Results

2016 Results:

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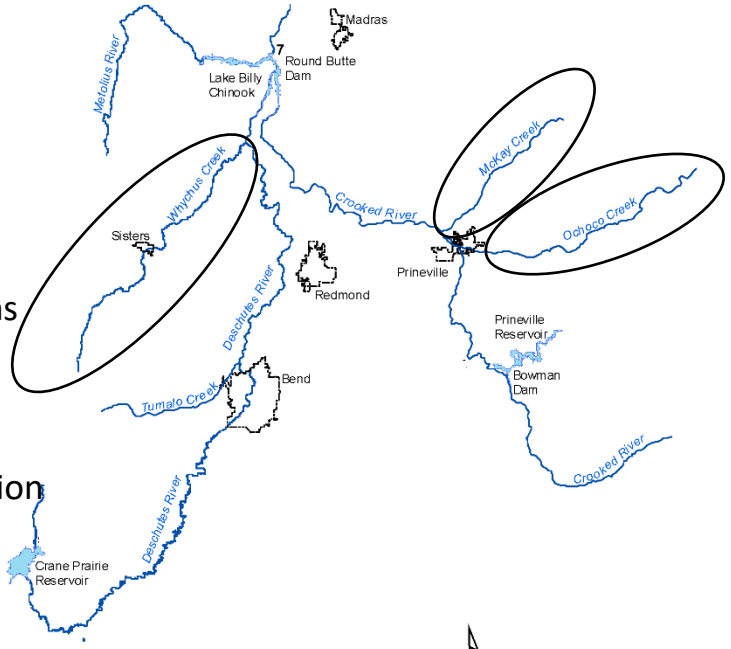
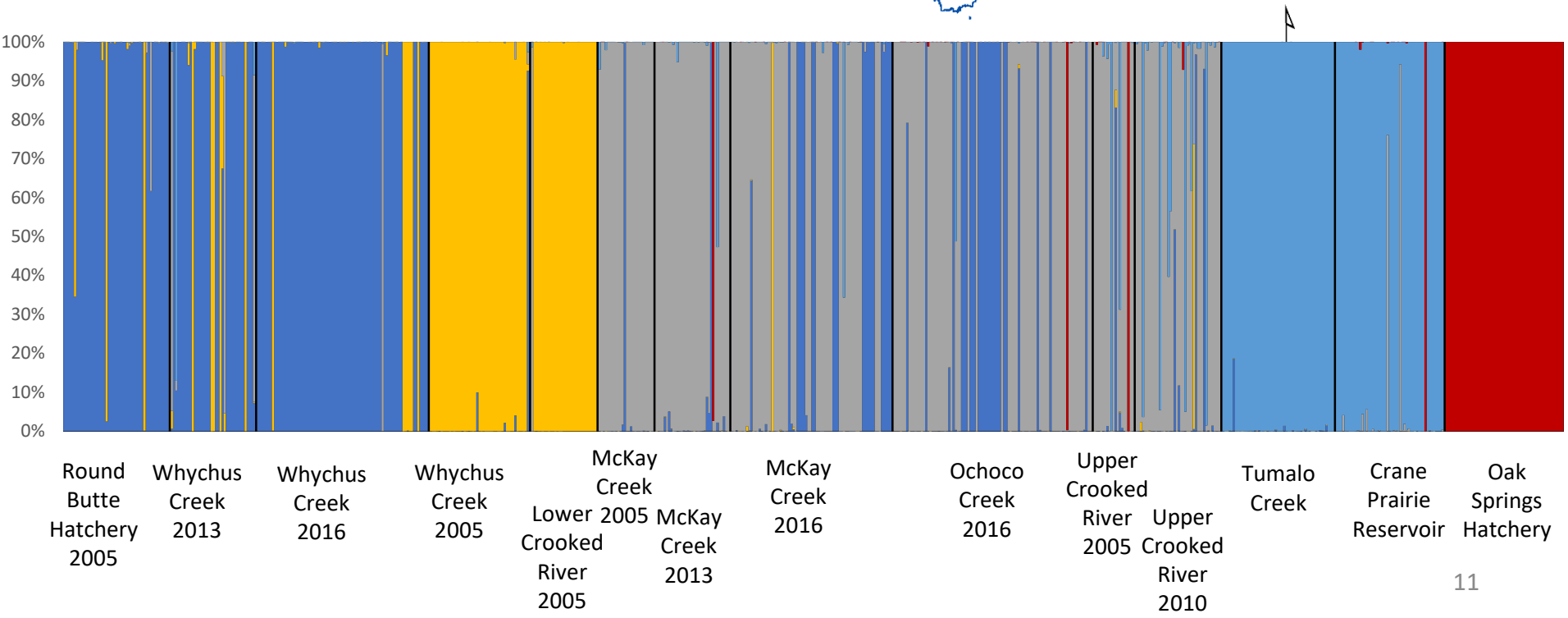
- 2016 Ococho look like McKay Creek collections
- 2016 Whychus Creek collection looks like 2013 and RBH collection
- Little to no introgression with hatchery fish.

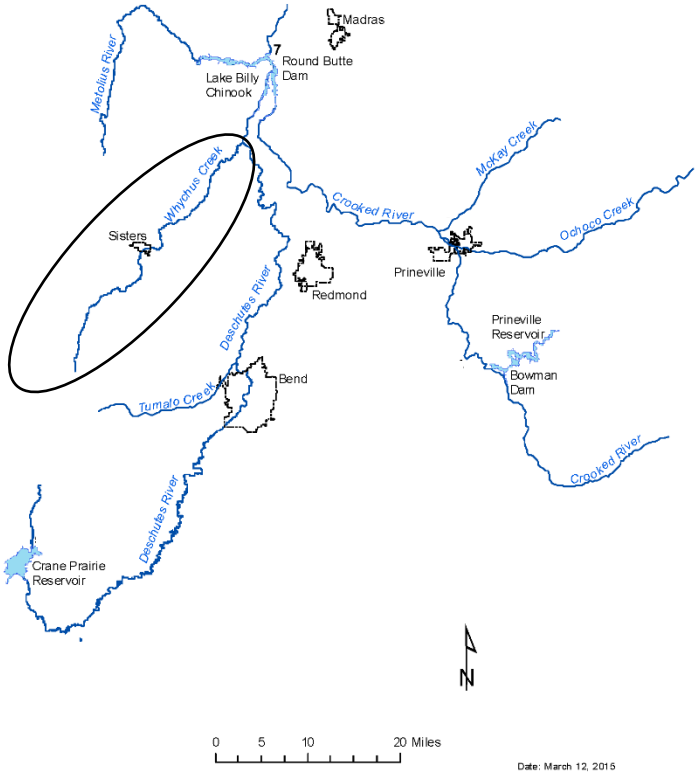




2023 Study Area

2023 Objectives:

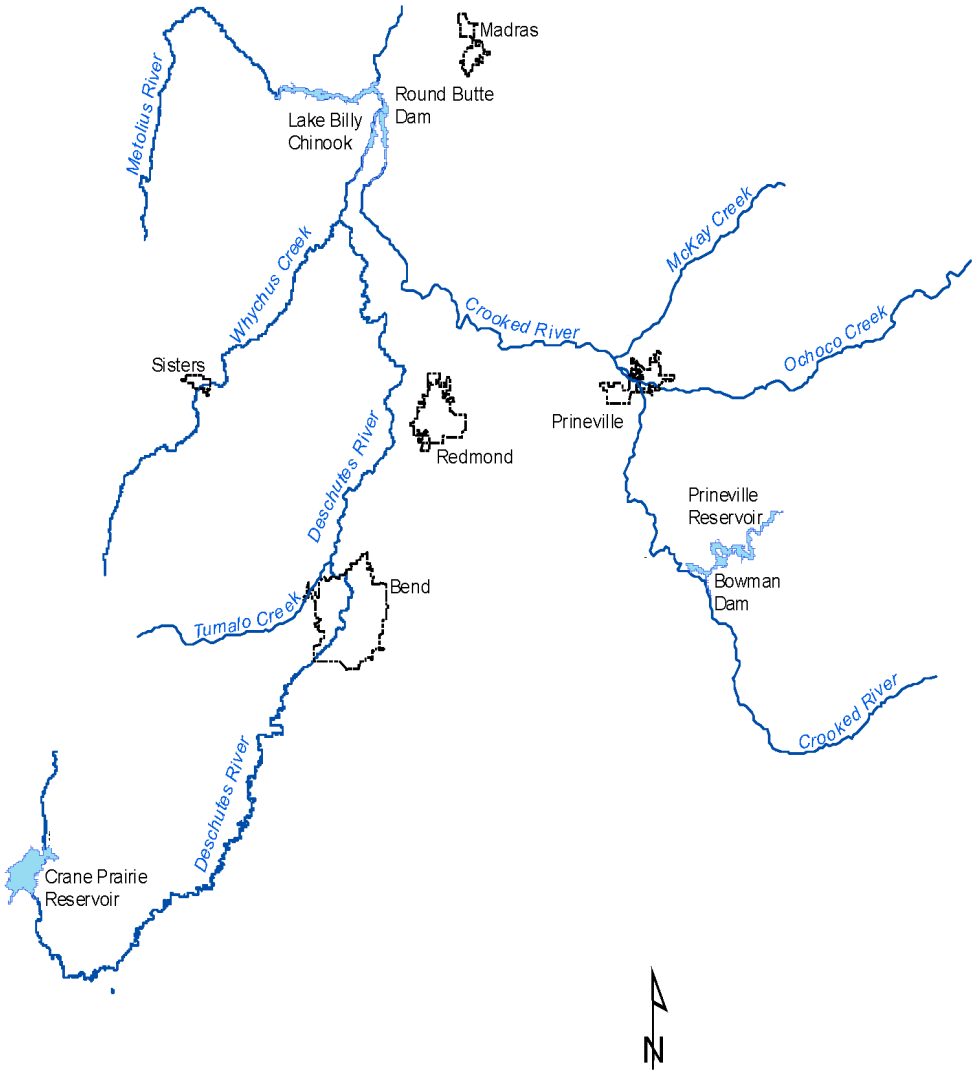
- Update previously genotyped individuals as well as newly collected O. mykiss from Whychus Creek with new genetic markers.
- Determine the genetic relationship between *O. mykiss* collected from Whychus and other *O. mykiss* collections from the upper Deschutes Basin (upper Crooked River and Tumalo Creek).
- Examine introgression between Round Butte Hatchery origin steelhead and *O. mykiss* collected from Whychus Creek.



Whychus Creek

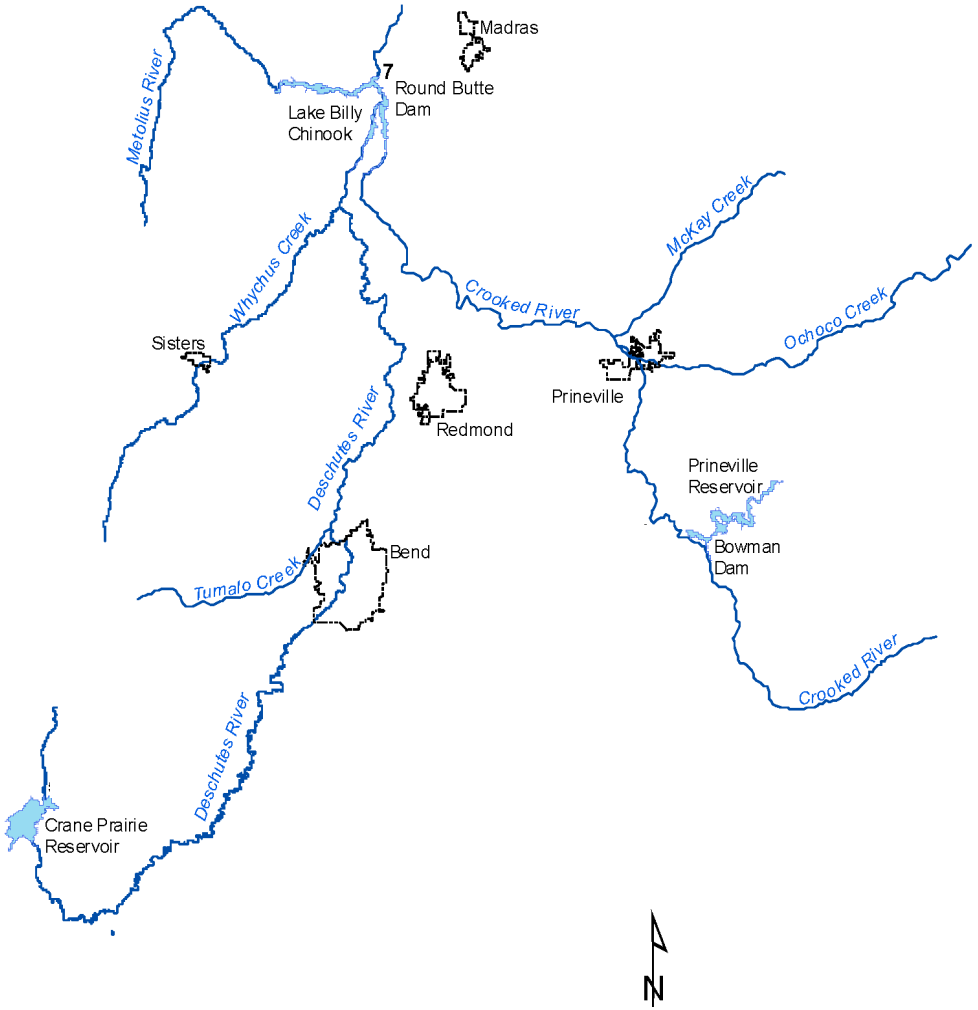
Genetic Baseline

Population	n
Round Butte Hatchery 2005	41
Lower Crooked River 2005	26
McKay Creek 2005	26
Ochoco Creek 2005	19
Upper Crooked River 2005	18
Upper Crooked River 2010	28
Whychus Creek 2005	36
Tumalo Creek below falls 2006	52
Bridge Creek	12
Tumalo Creek above falls 2007	26
Tumalo Creek above falls 2018	5

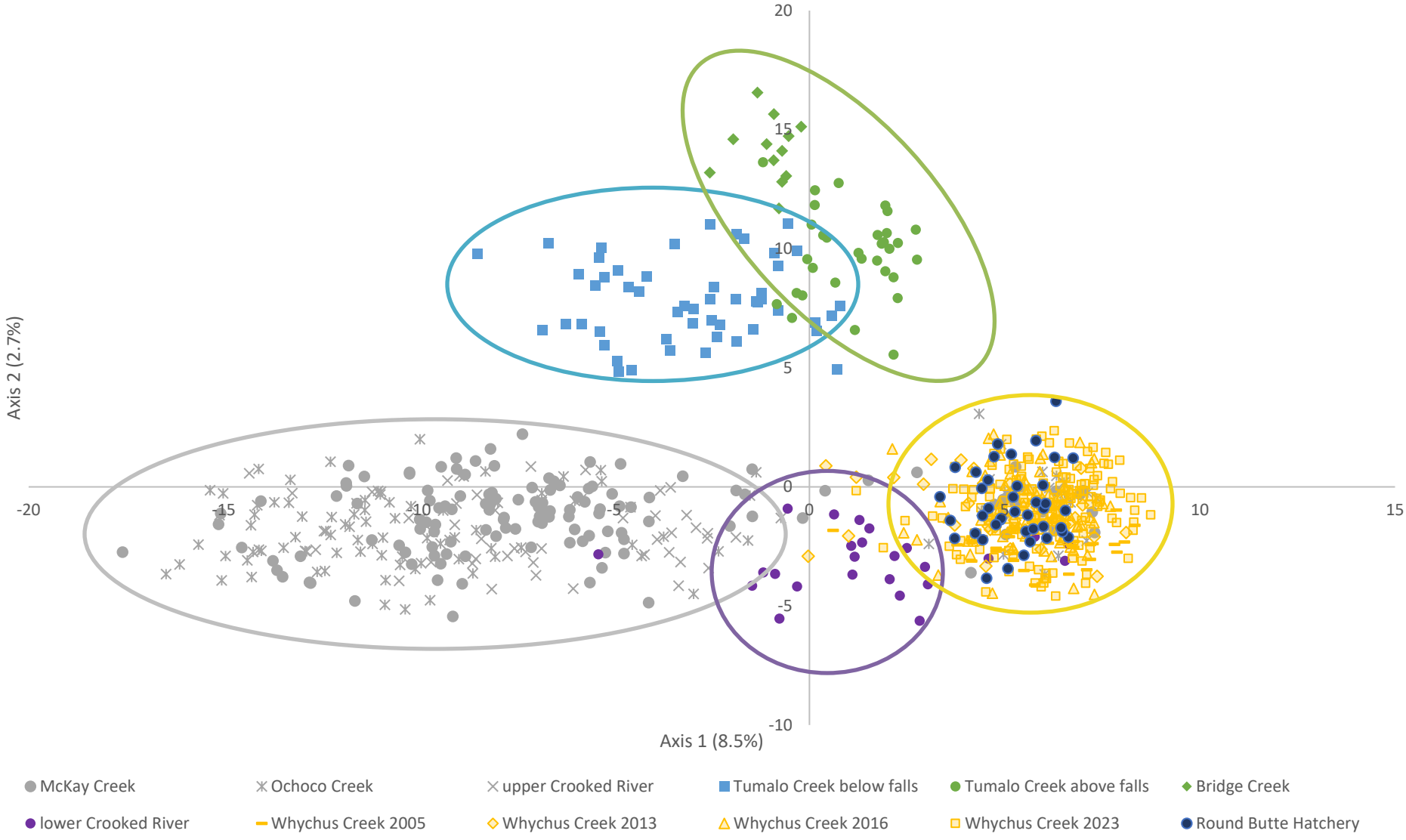


2013, 2016, and 2023 Sample Collections

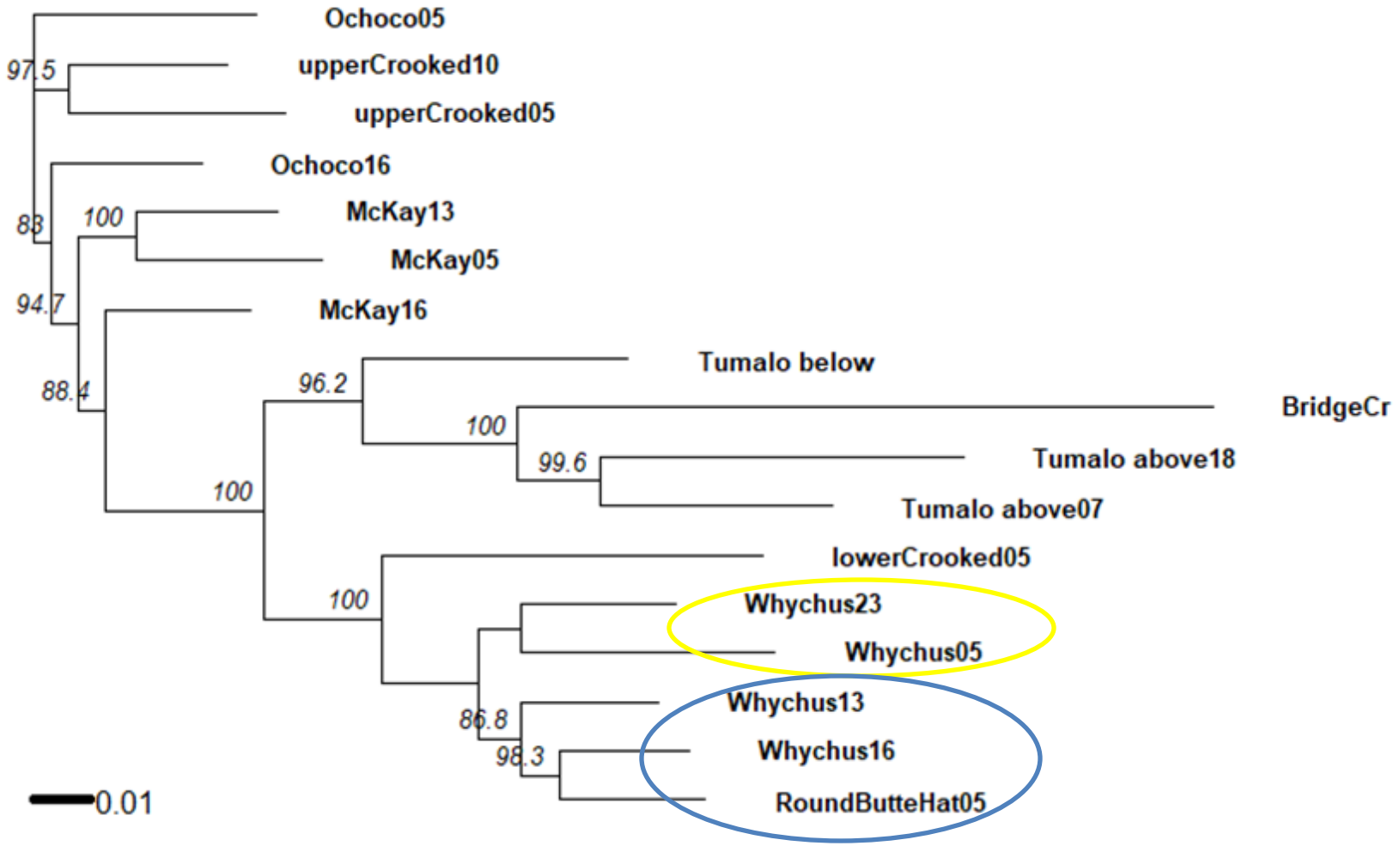
Population	n
McKay Creek 2013	35
McKay Creek 2016	76
Ochoco Creek 2016	94
Whychus Creek 2013	40
Whychus Creek 2016	81
Whychus Creek 2023	164



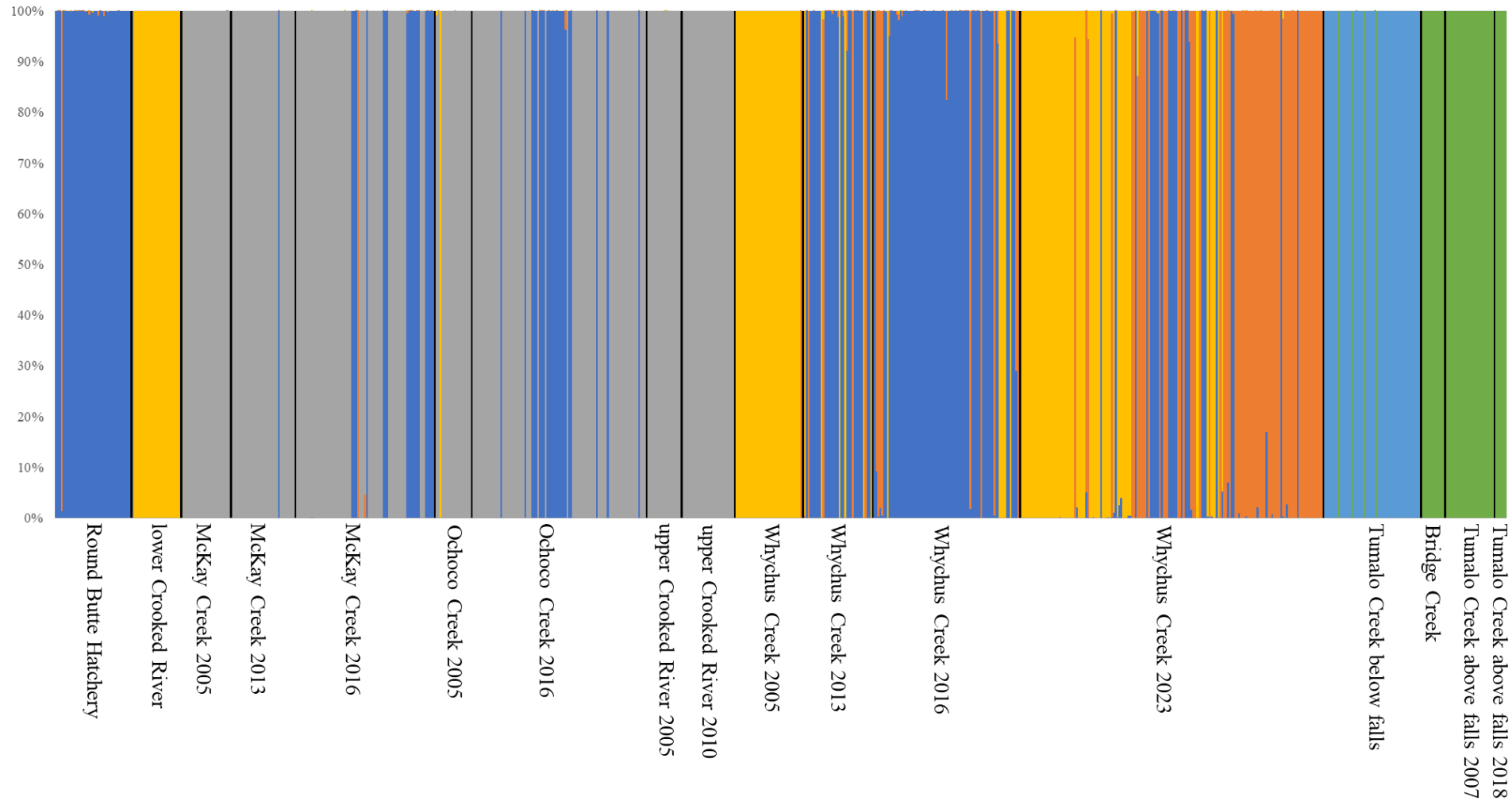
Population Structure



Population Structure

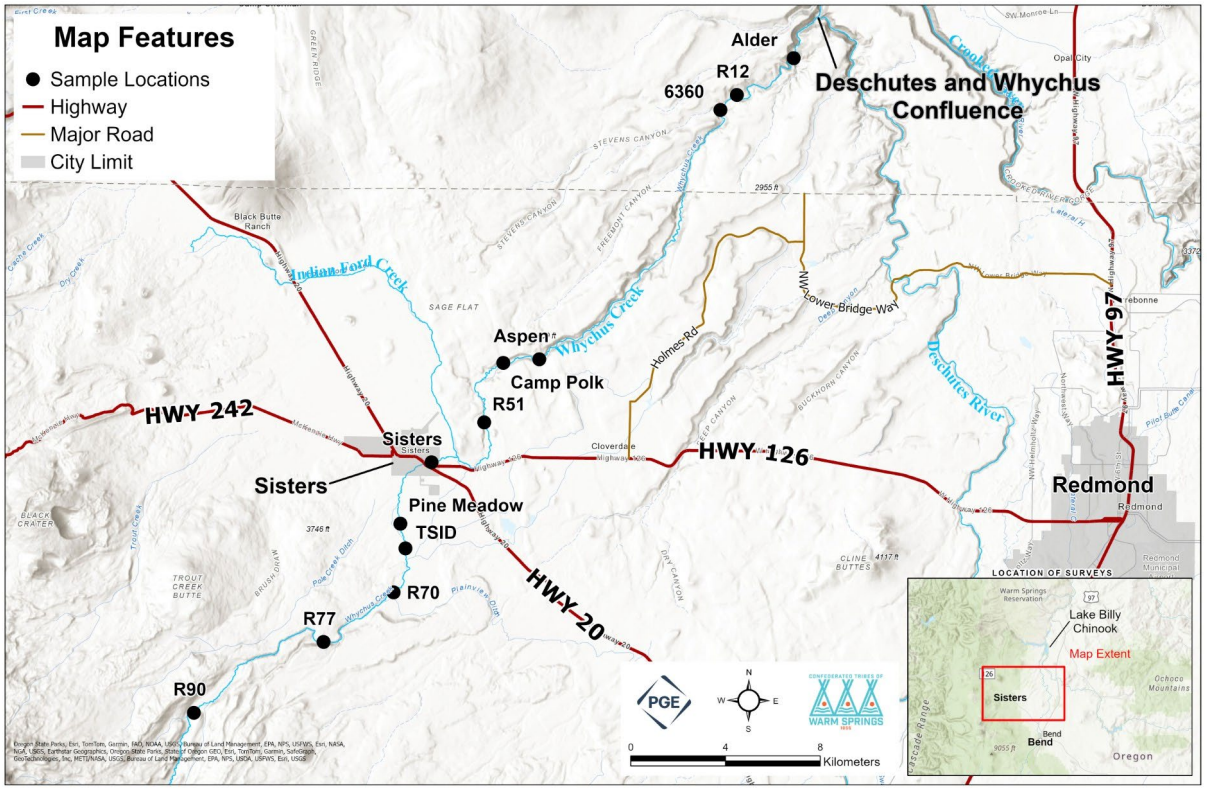


Population Structure

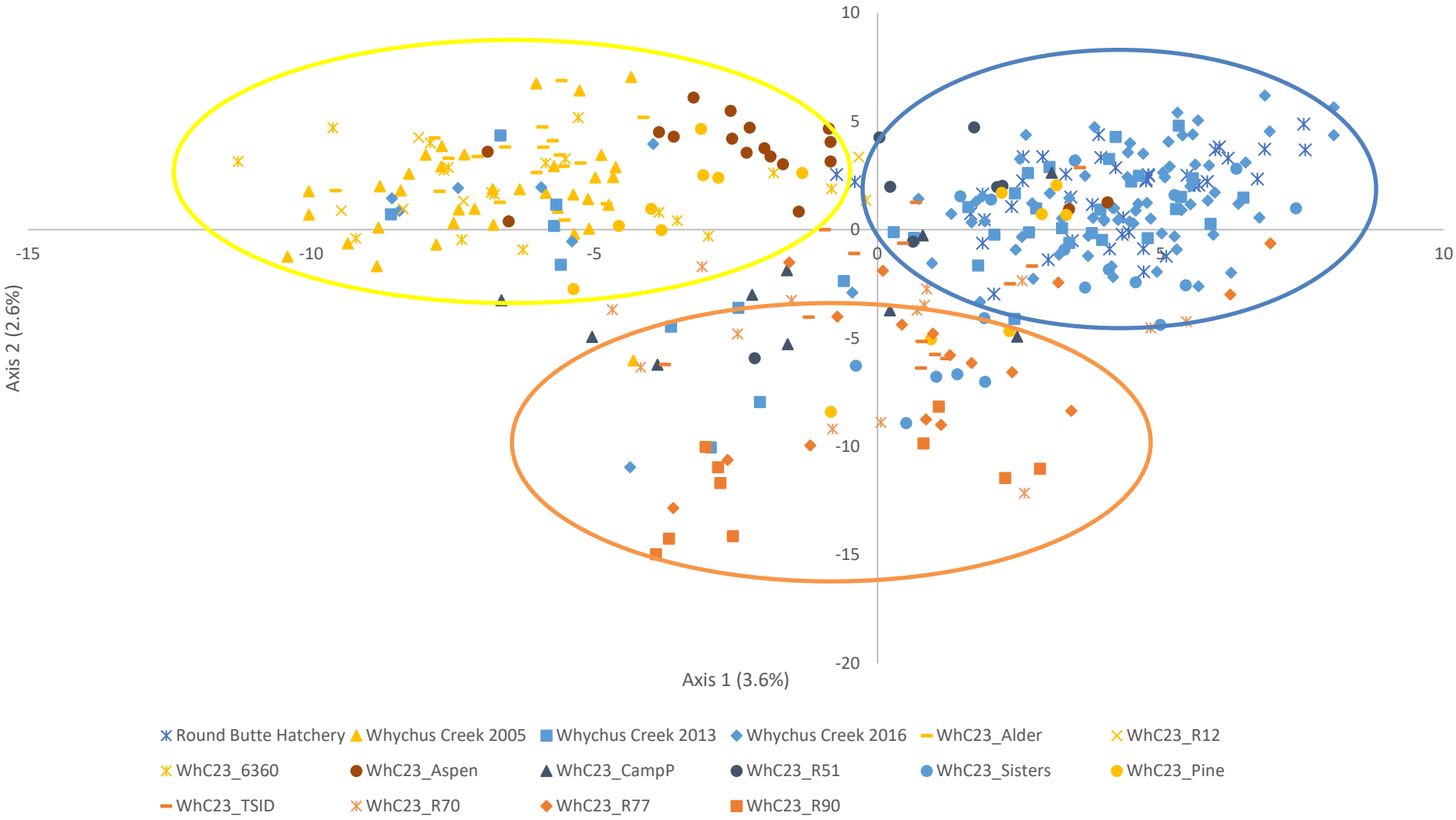


2023 Whychus Sample Collections

Population	n
Alder Springs	18
Reach 12	5
6360 crossing	19
Aspen	18
Camp Polk	10
Reach 51 (Willow Springs)	7
Sisters	18
Pine Meadow	15
TSID	13
Reach 70	14
Reach 77 (FS800)	17
Reach 90 (1514 crossing)	10



Population Structure



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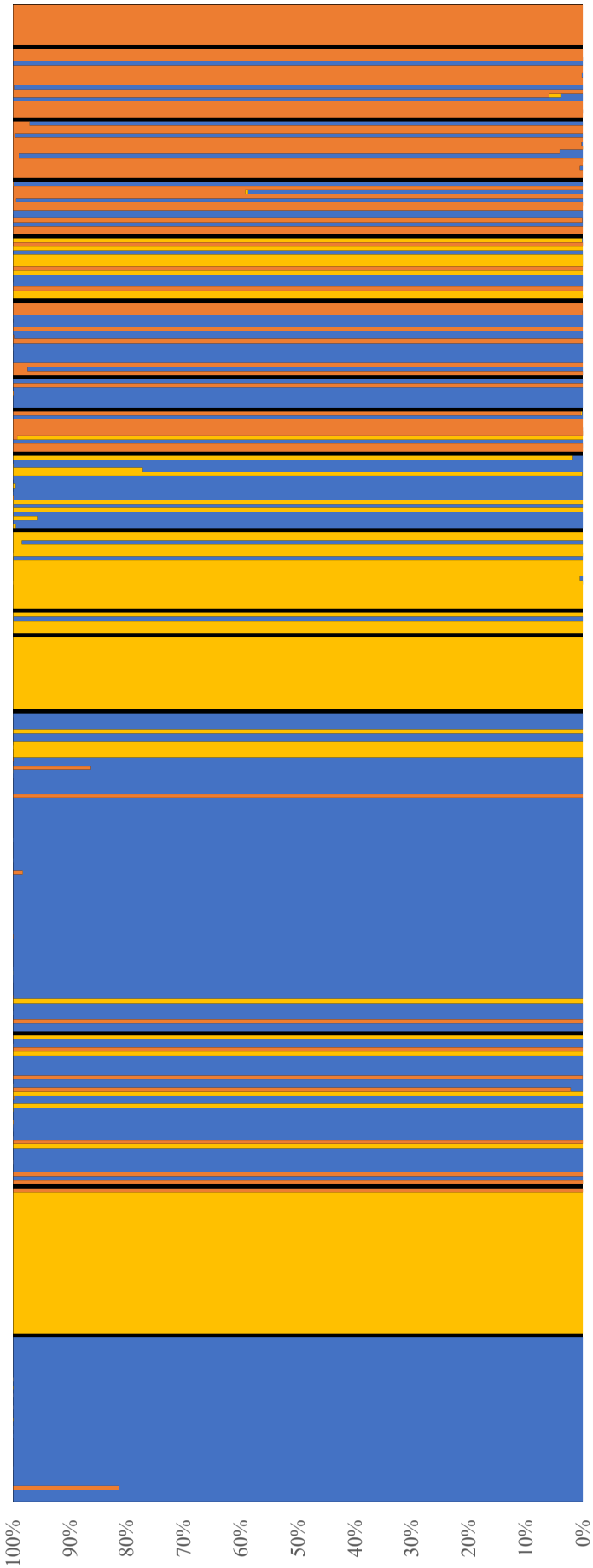

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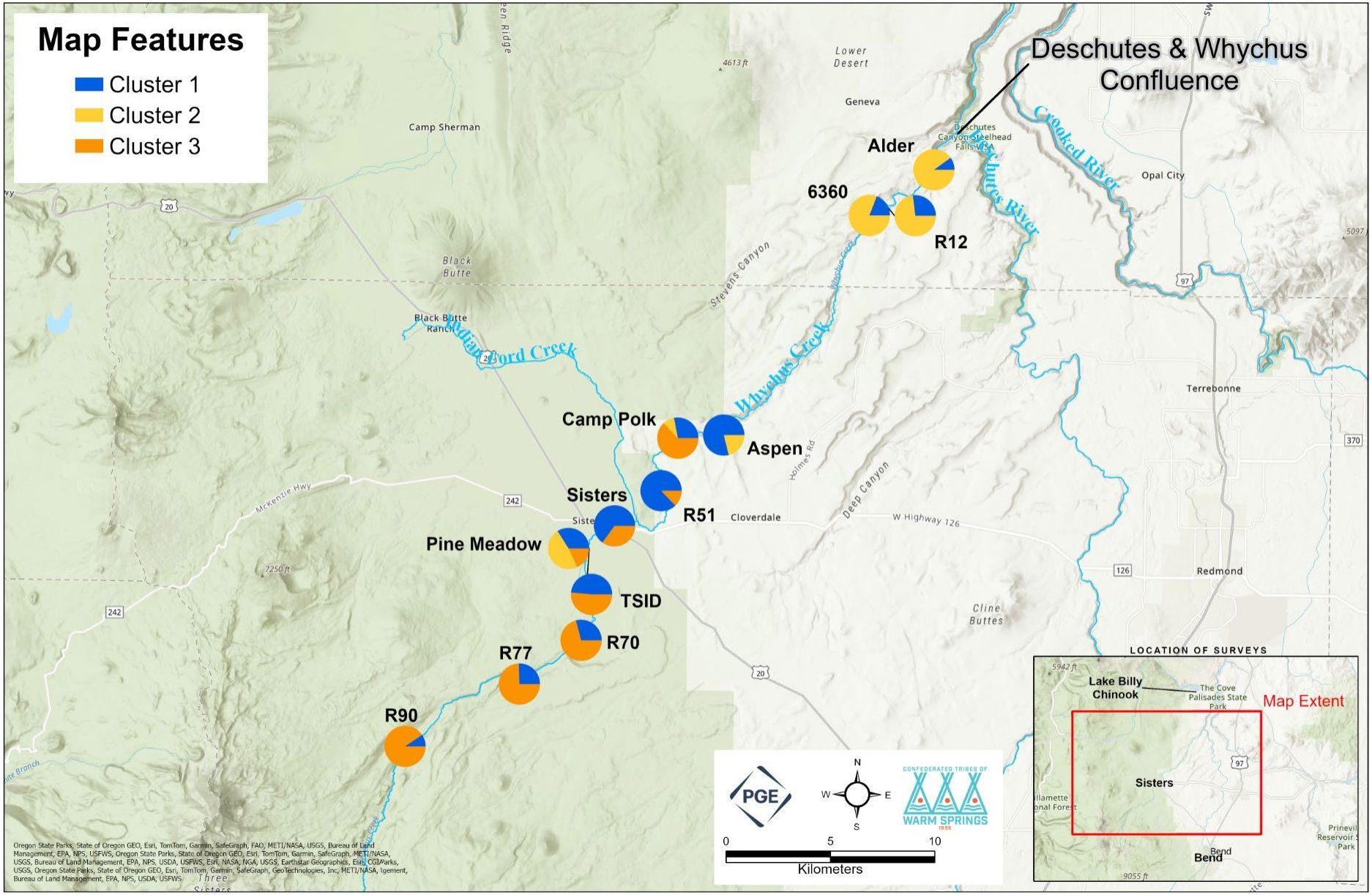

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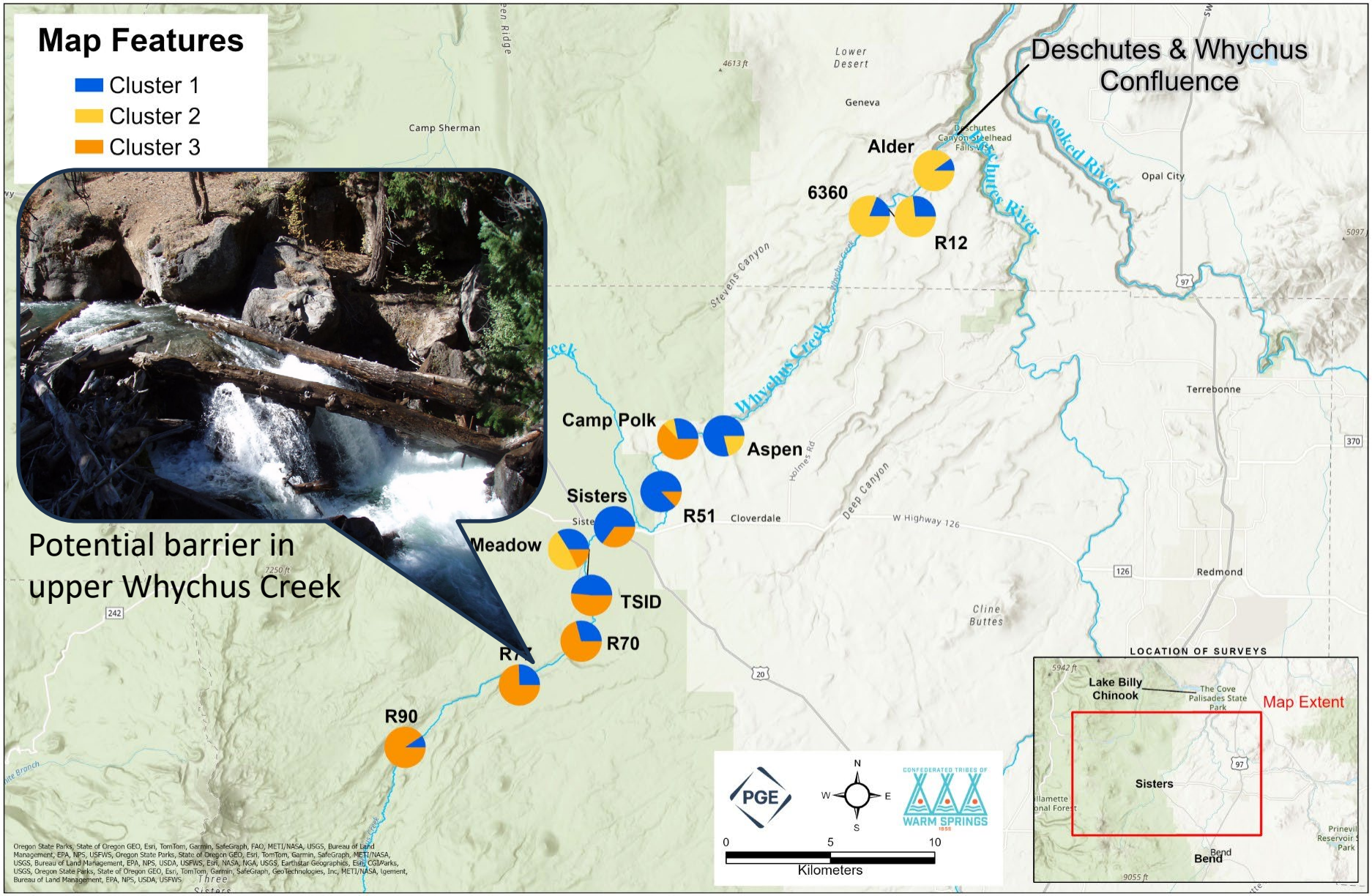

Acknowledgements

Funding provided by Portland General Electric
Sample collection by US Forest Service, ODFW, and PGE

Adams, B., P. DeHaan, and C. Smith. 2015. Genetic Determination of Stock of Origin for *Oncorhynchus mykiss* Collected in the Upper Deschutes River Basin. AFTC Final Report:24.

Hawkins, D., B. Adams, and B. Kammerer. 2011. Genetic determination of stock of origin of *Oncorhynchus mykiss* collected in the Crooked River. AFTC Final Report:14.

Matala, A., S. Marx., and T. Wise. 2008. A genetically distinct wild redband trout (Oncorhynchus mykiss gairdneri) population in Crane Prairie Reservoir, Oregon, persists despite extensive stocking of hatchery rainbow trout (O. M. irideus). Conservation Genetics 9:1643-1652.

Smith, M. and J. Von Bargen. 2018. Genetic Determination of Stock of Origin for *Oncorhynchus mykiss* Collected in the Upper Deschutes River Basin. AFTC Final Report:43.

The findings and conclusions in this presentation are those of the authors and do not necessarily reflect those of the U. S. Fish and Wildlife Service.