

Genetic Characteristics of Redband Trout of the Metolius River- 2021

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U.S. Fish and Wildlife Service

Genetic Characteristics of Redband Trout Occupying the Metolius River in Central Oregon

Final Report

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In this presentation...

- Summary of findings from Adams and Nehmens 2023
- Provide context from past genetic analysis of redband trout in the Metolius River
- Relate findings to recent spawning surveys



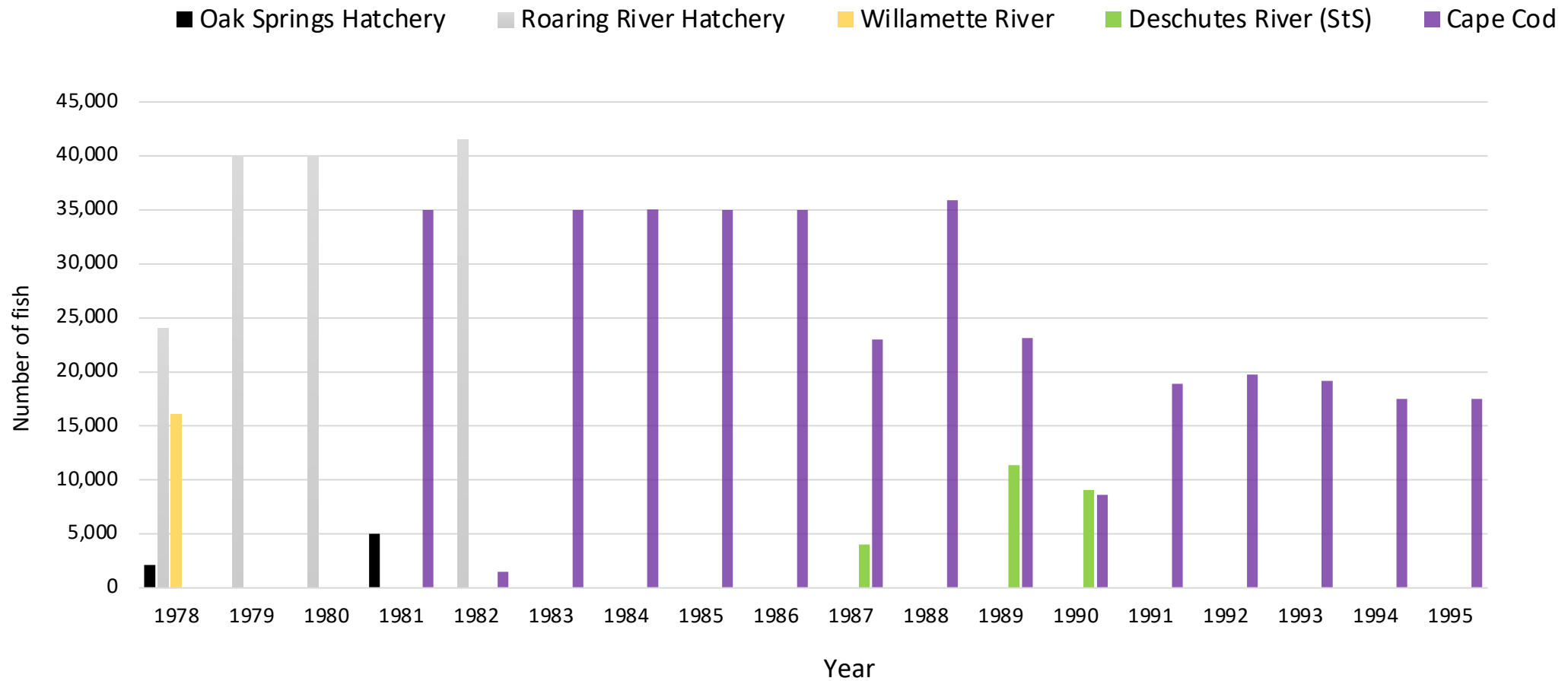
Objective-

Describe the genetic characteristics of Metolius River Redband Trout Population

History of Hatchery Fish in the Metolius River

- **Cape Cod Hatchery strain** was raised at Wizard Falls Hatchery and stocked as catchable trout in the Metolius River from 1981 to 1995.
- **Williams et al. 1997.** We attributed the upper-river results to hybridization between indigenous redband trout and the hatchery trout that had been stocked there for nearly 60 years.
- **Currens et al. 1997.** ... we concluded that introgression with nonnative hatchery rainbow trout has reduced the abilities of wild redband trout in the Metolius River to survive when conditions for ceratomyxosis infection occur.

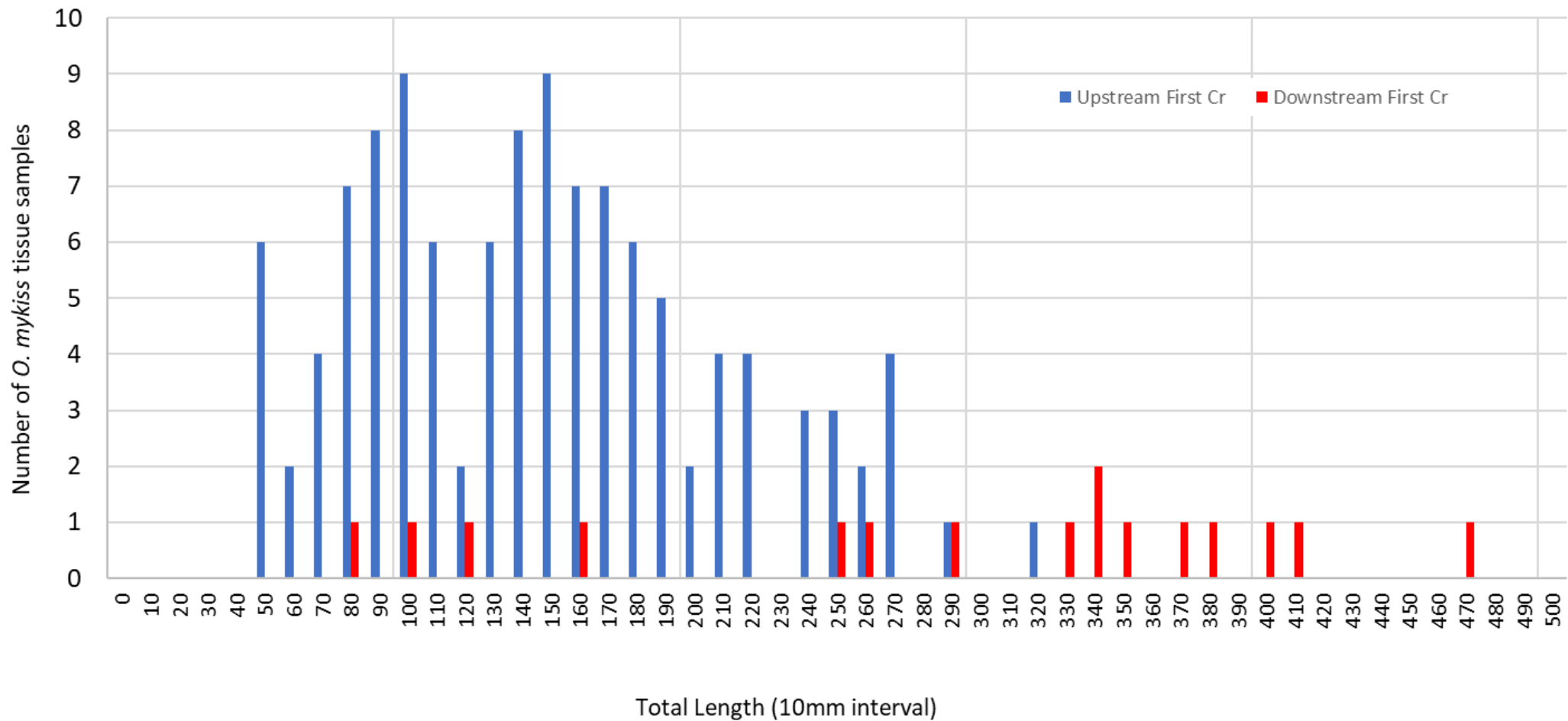




• Roaring River- ODFW South Santiam hatchery

Metolius River *O. mykiss* Hatchery Supplementation
by Stock Type 1978-1995





Length frequency of redband trout sampled for the genetic study

N = 132



Type of analysis

- Currens et al. 1997 and Williams et al. 1997 were based on allozyme and mitochondrial DNA markers.
- Adams and Nehmans 2023 study was based on genotyping using single nucleotide polymorphisms (SNPs).

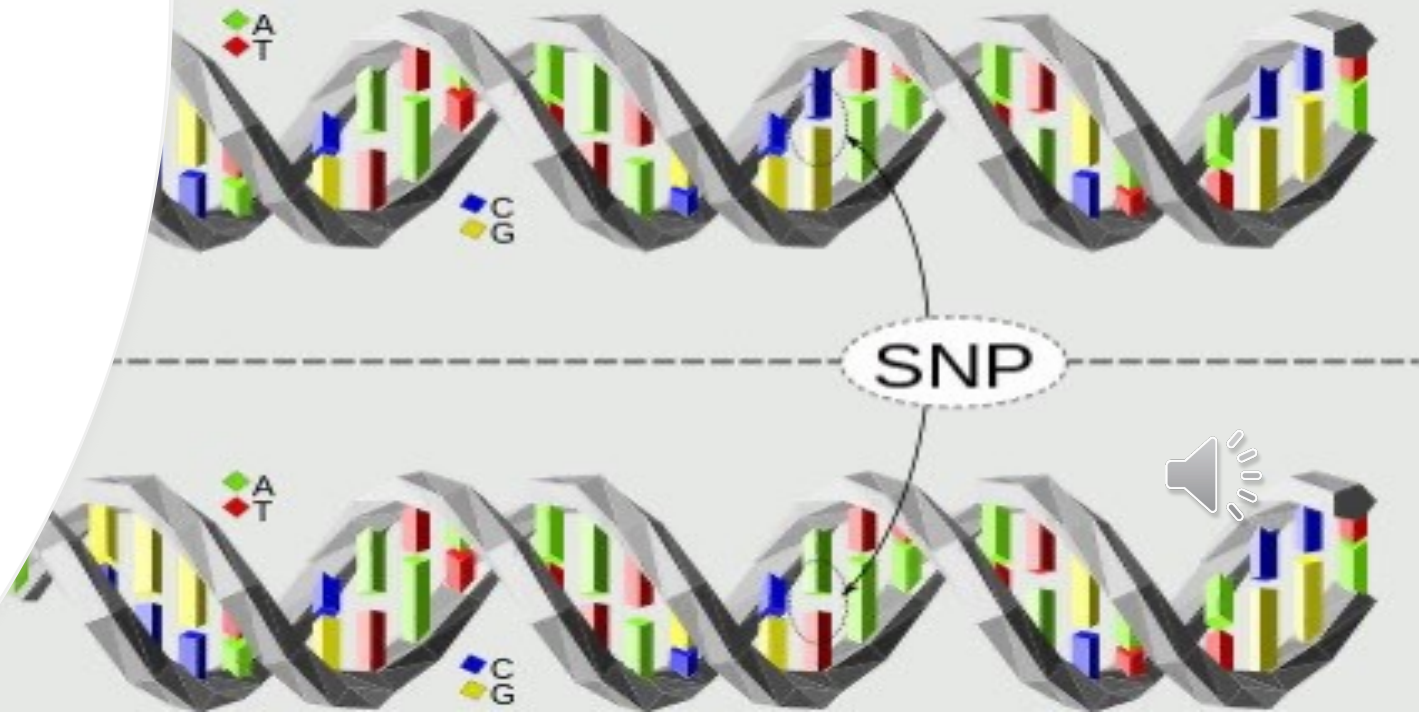


Figure 1. PCA of *O. mykiss* hatchery stocks (red), Wizard Falls hatchery stock (orange), Tumalo Creek watershed redband (blue), Whychus Creek redband (yellow), and Metolius River redband (green).

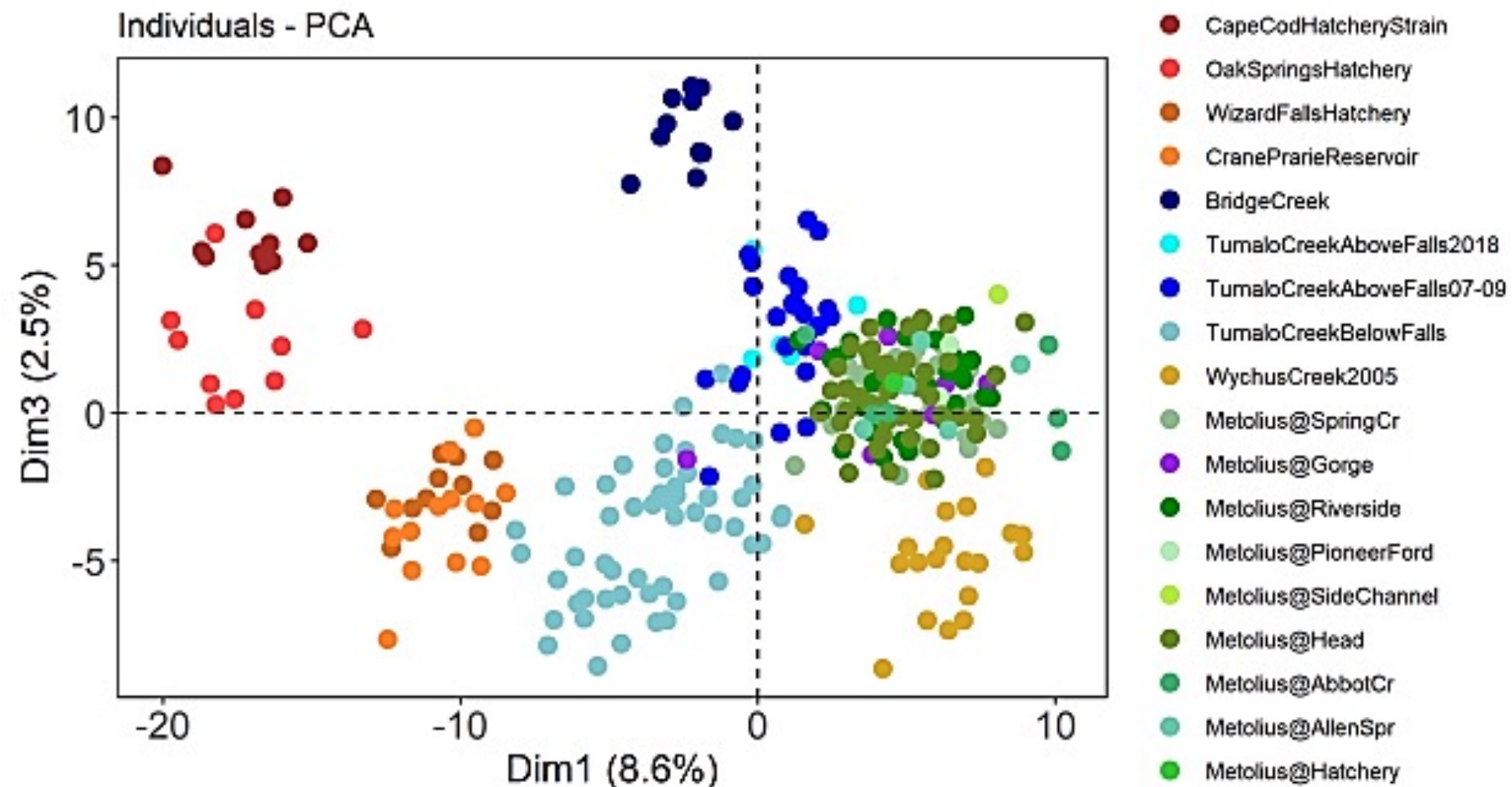


Figure 2. The genetic distance (F_{ST}) heatmap plot of collections used in this study.

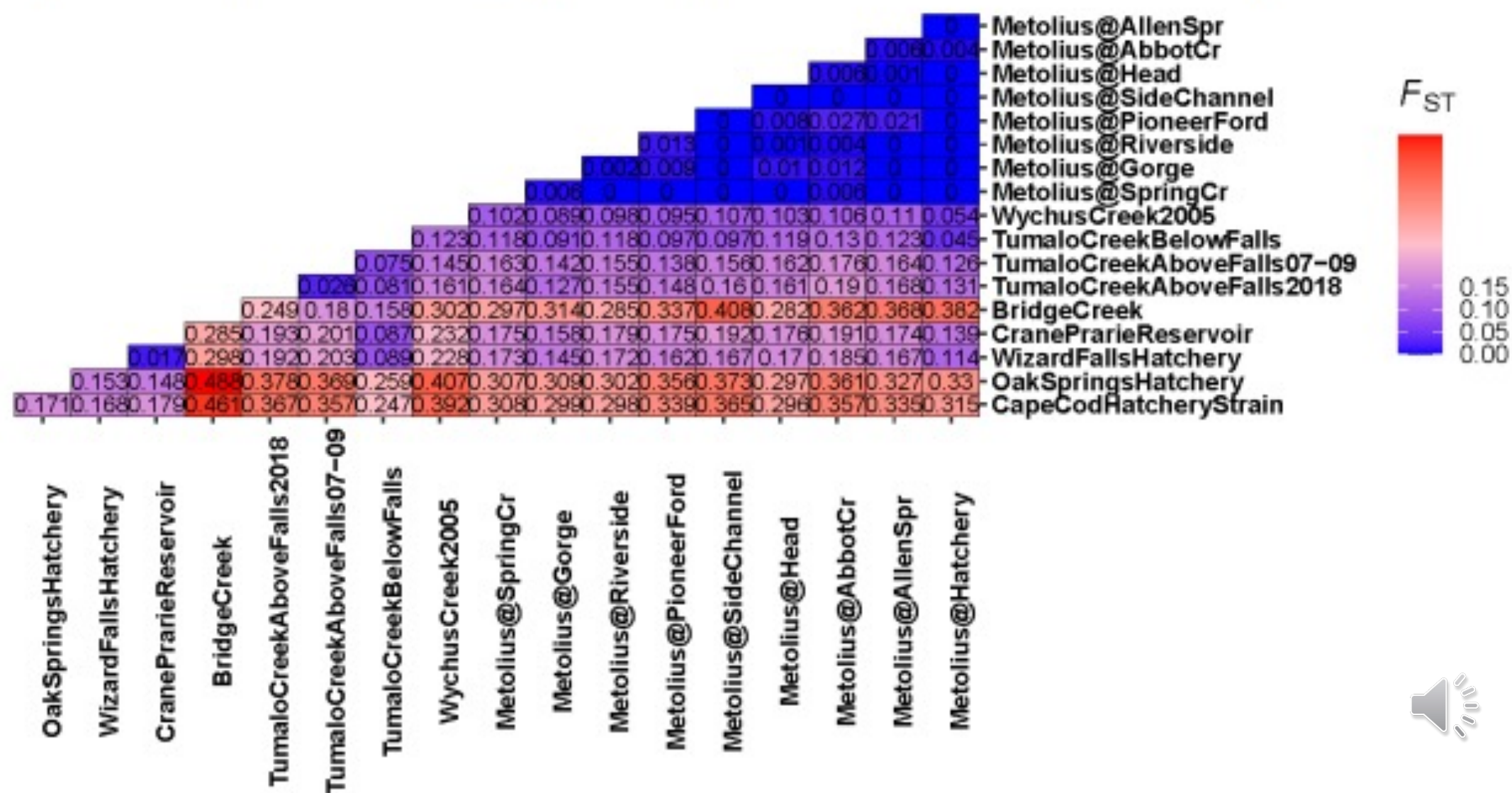


Figure 3. Output from the Snapclust analysis. Each vertical bar on the graph represents an individual fish in the analysis. The color on each bar represent the inferred population cluster of each individual's genotype.

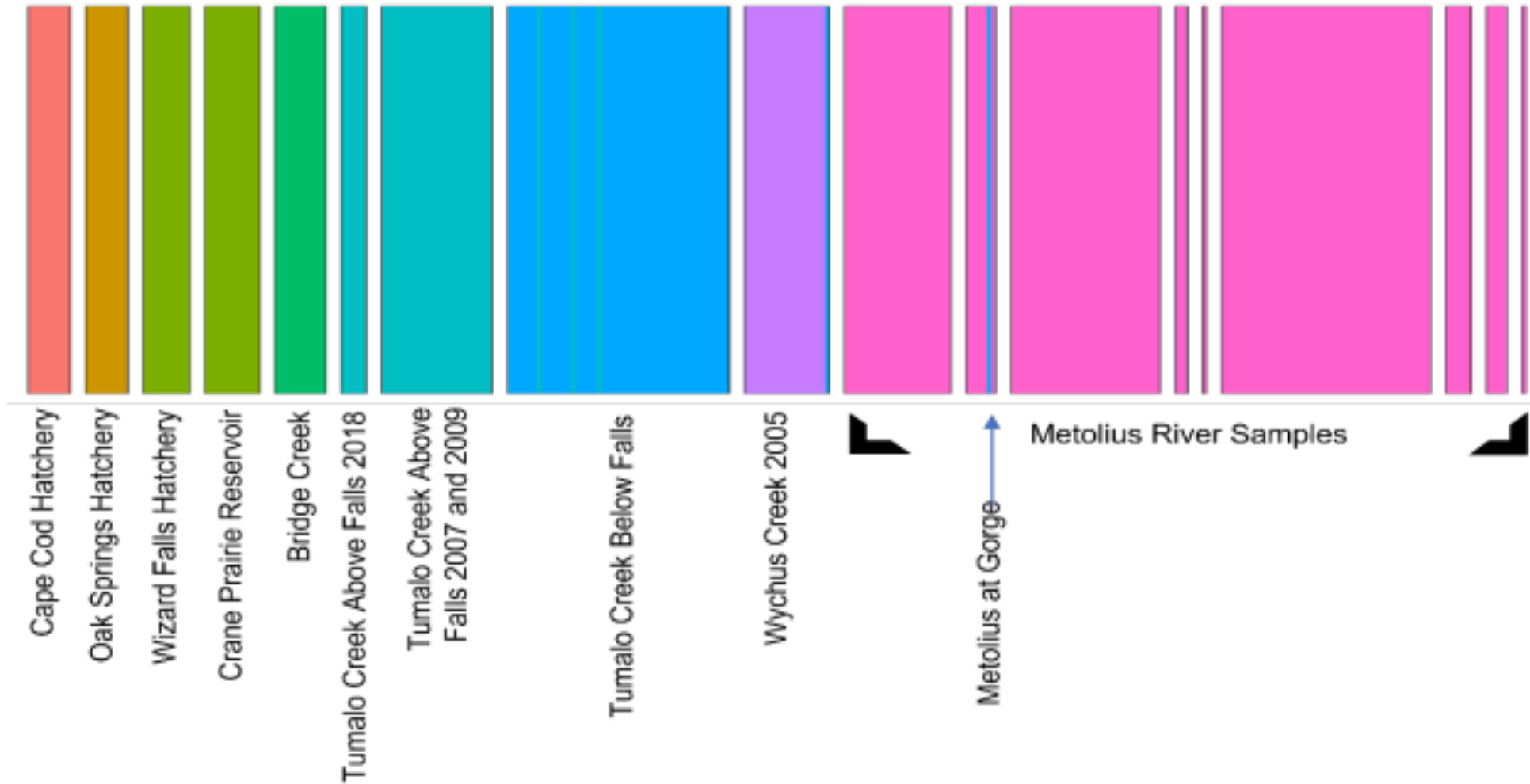
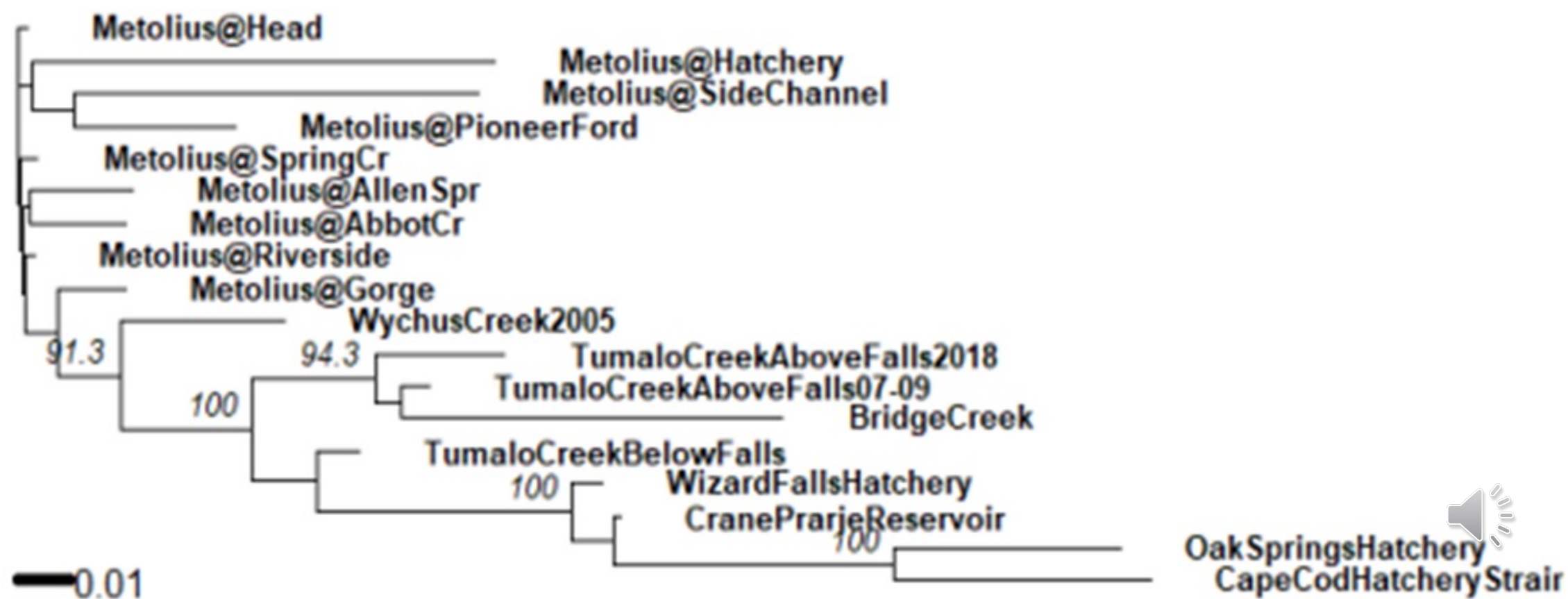


Figure 4. Neighbor-joining tree based on Nei's genetic distance showing the relationship among collections used for this study. Bootstrap values represent the percentage of time out of 1000 bootstraps that each branching pattern was observed, bootstrap values >80% are shown.



Redband Trout Redd Surveys 1995-2023

US Forest Service,
Portland General Electric,
Oregon Department of
Fish and Wildlife



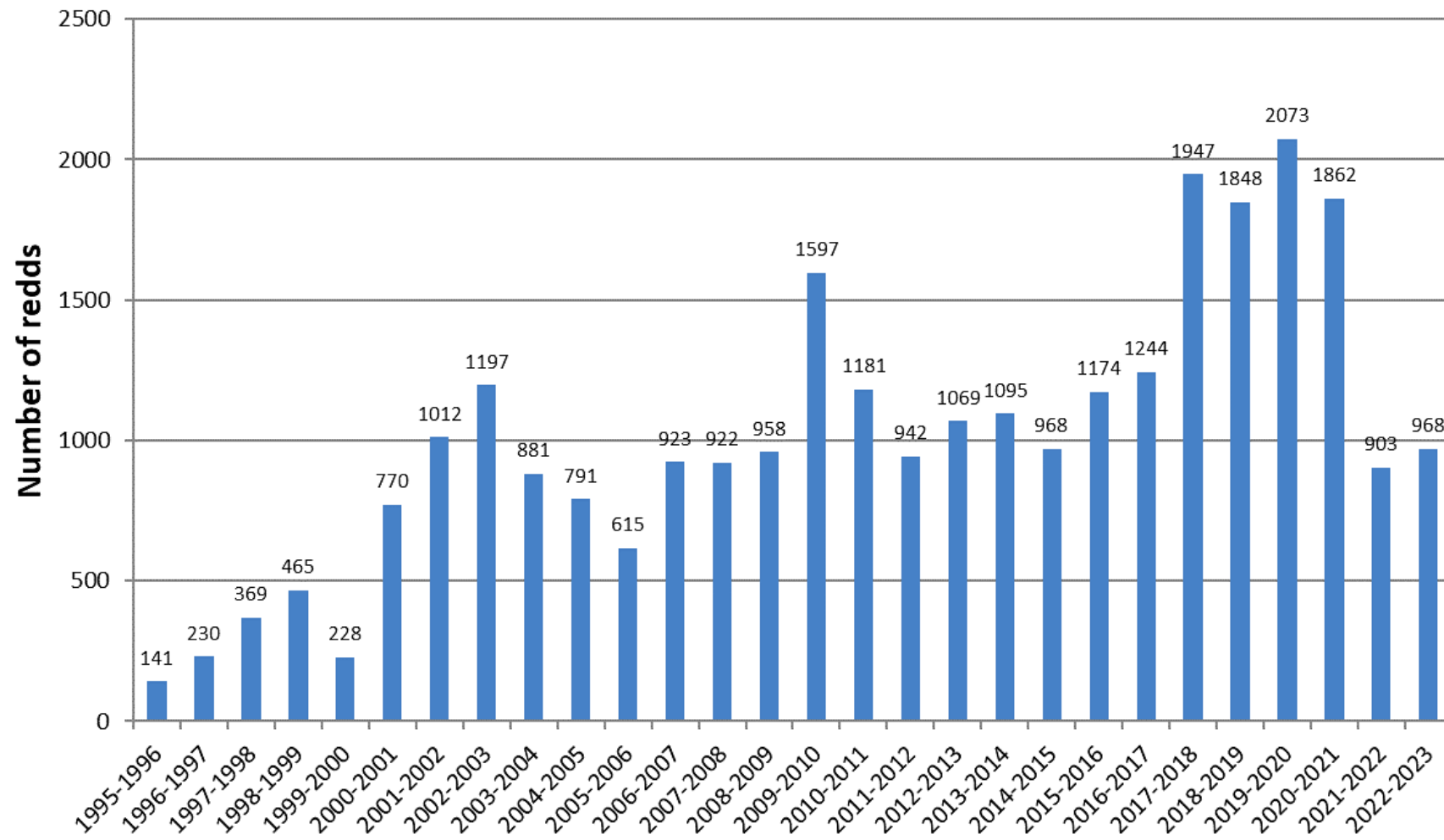


Figure 5. Annual redband trout redd counts for the Upper Metolius River from the headwaters to immediately upstream of Spring Creek.



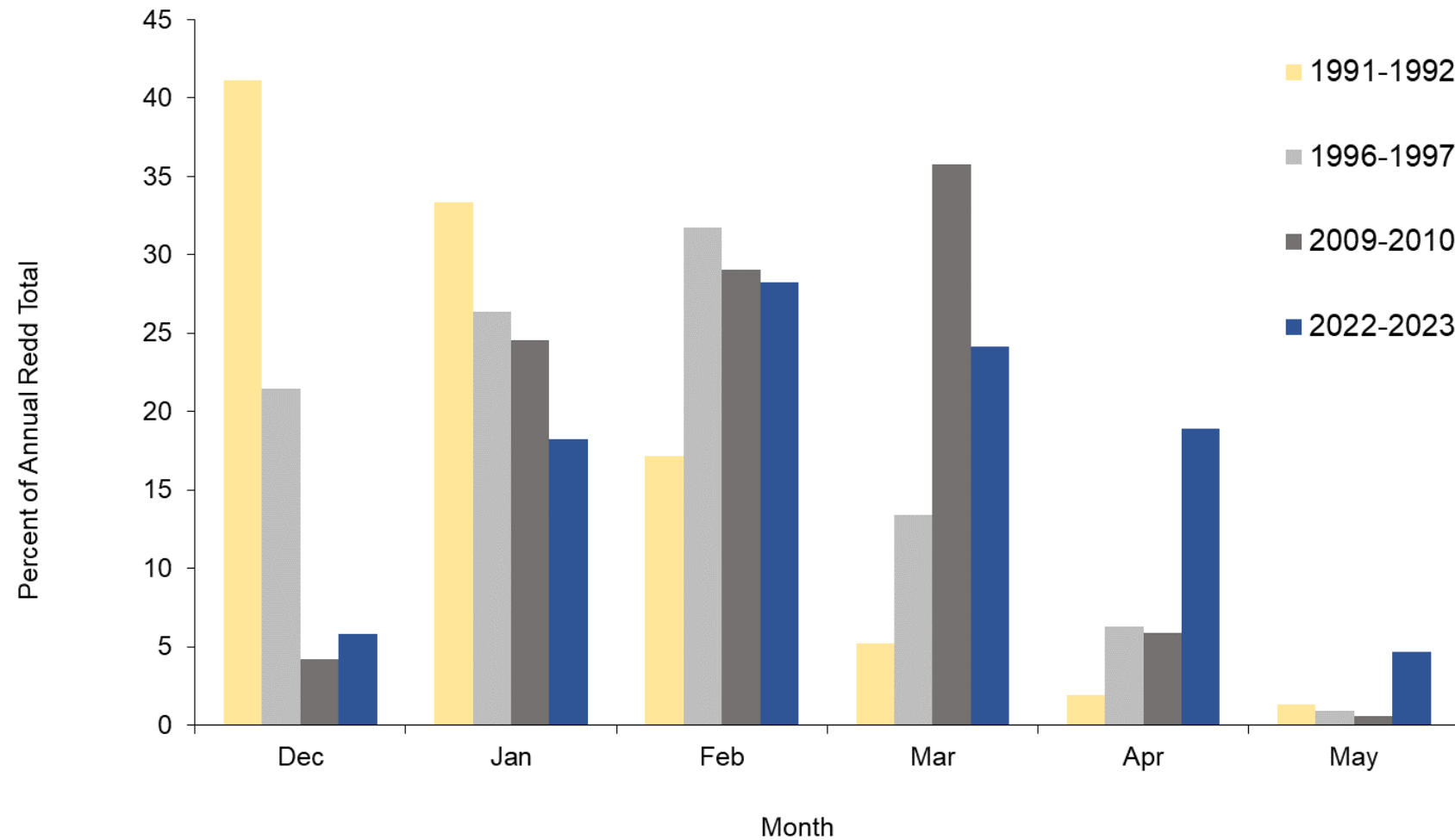


Figure 6. Spawn timing by month of redband trout in the upper reaches of the Metolius River from 1991-1992 to 2022-2023. Hatchery fish had been modified to spawn in the fall for rapid growth for stocking. Stocking of hatchery fish into the Metolius River was discontinued in 1995.



Conclusions

- Redband Trout from the Metolius River currently have little impact from hatchery-origin fish.
- Each of the clustering methods used indicated the Metolius River collections were more like each other than any hatchery-origin strains in the comparison.
- Comparisons between natural-origin Redband Trout collected in the Deschutes and Metolius River indicated that sample collections were found to be genetically distinct based on watershed.
- Despite previous work by Williams et al. (1987), current Metolius River Redband Trout do not appear to be descendants of, or hybrids with, the Cape Cod strain of *O. mykiss*.
- Redband trout redd counts have greatly increased from 141 redds in 1996 to between 1000 and 2000 redds.
- Since hatchery fish stocking has been discontinued, there has been a shift in redband trout spawn timing, from a December peak in 1991-1992, to a February/March peak.
 - Percentage of redds in December and January have declined.
 - Percentage of redds in March, April and May have increased.



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