

What are the major phylogenetic lineages of rainbow trout (*Oncorhynchus mykiss*)

and their geographic ranges?

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Introduction

- The dynamic geological history in western North America has resulted in connected and separated streams over time.
- These events are thought to be a primary factor influencing the contemporary distribution of native fishes, and in many cases, has obscured the taxonomic relationship of fishes in this region.
- Rainbow trout (*Oncorhynchus mykiss*) are a freshwater fish species native to western North America.
- Many subspecies of rainbow trout have been hypothesized in different geographic regions.
- The relationship between taxonomic classification and major evolutionary lineages of rainbow trout is currently unknown.



Figure 2. Examples of intraspecific variation within rainbow trout. Specimens photographed were all collected in western Idaho.

Objectives

- Our study seeks to investigate potential morphological and genetic/genomic differences among *O. mykiss* populations from across their range.

Methods

- Fish will be collected using backpack electrofishing.
- Specimens, 25-50 from each sampling site, will be photographed, weighed, measured, and have a fin clip taken.
- Common morphological characters will be assessed, as well as mtDNA sequencing of ND2 and SNP analysis.
- Principal component (PC) analyses and phylogenetic analyses will be used to compare populations both morphologically and genetically and create a rainbow trout phylogeny.

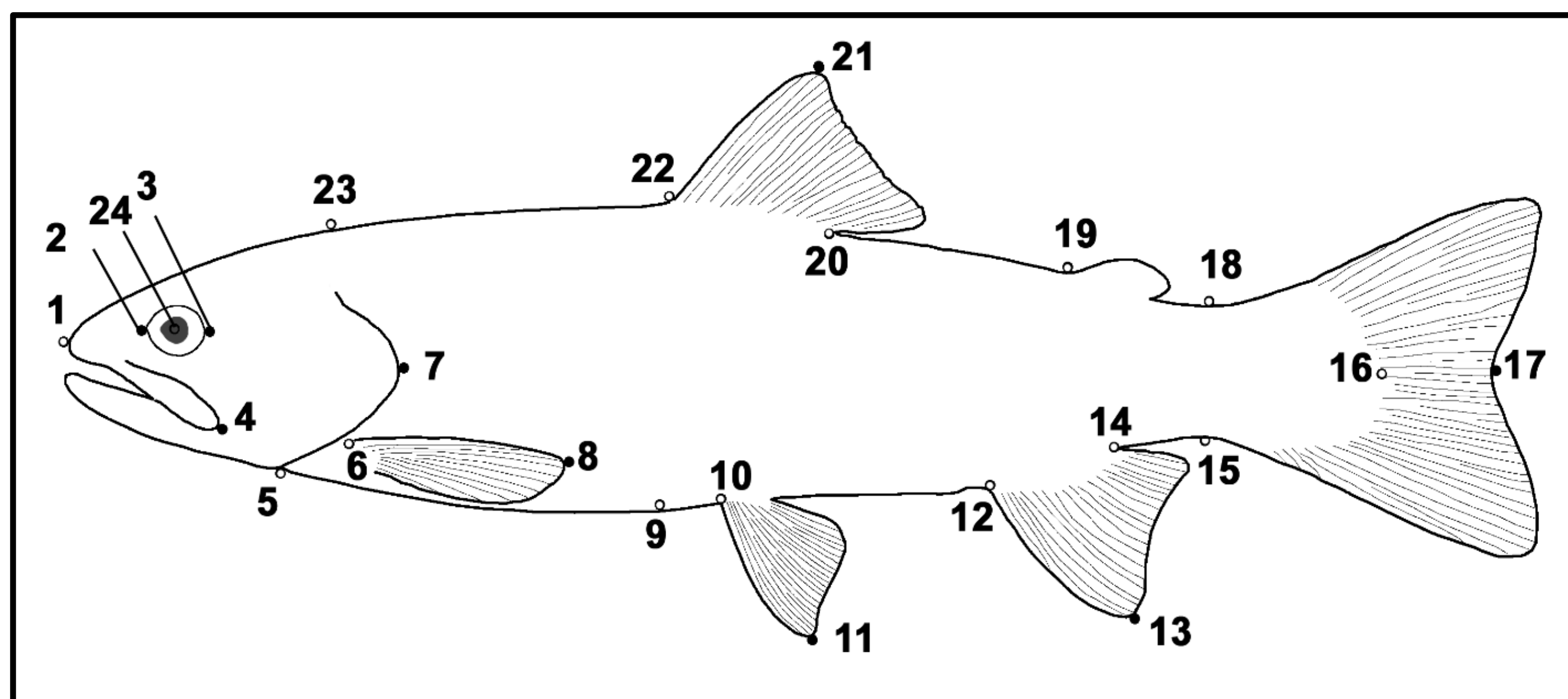


Figure 3. Example of landmarks placed on fish photos for morphometric analyses of body shape variation.

Results

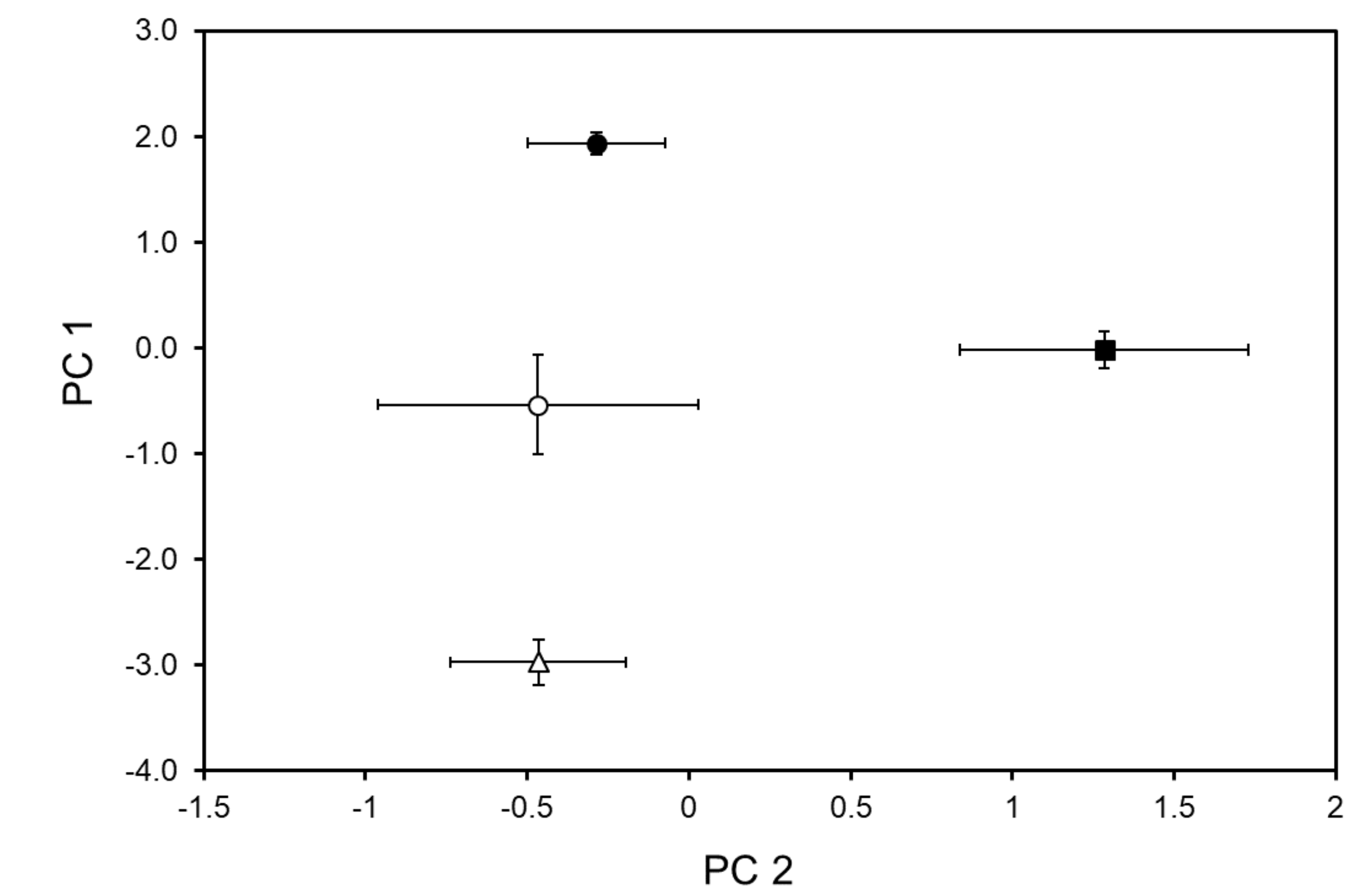


Figure 4. Hypothetical principal component analysis of morphological data for four populations of rainbow trout. Each symbol represents a different population. Error bars are $\pm 1SE$.

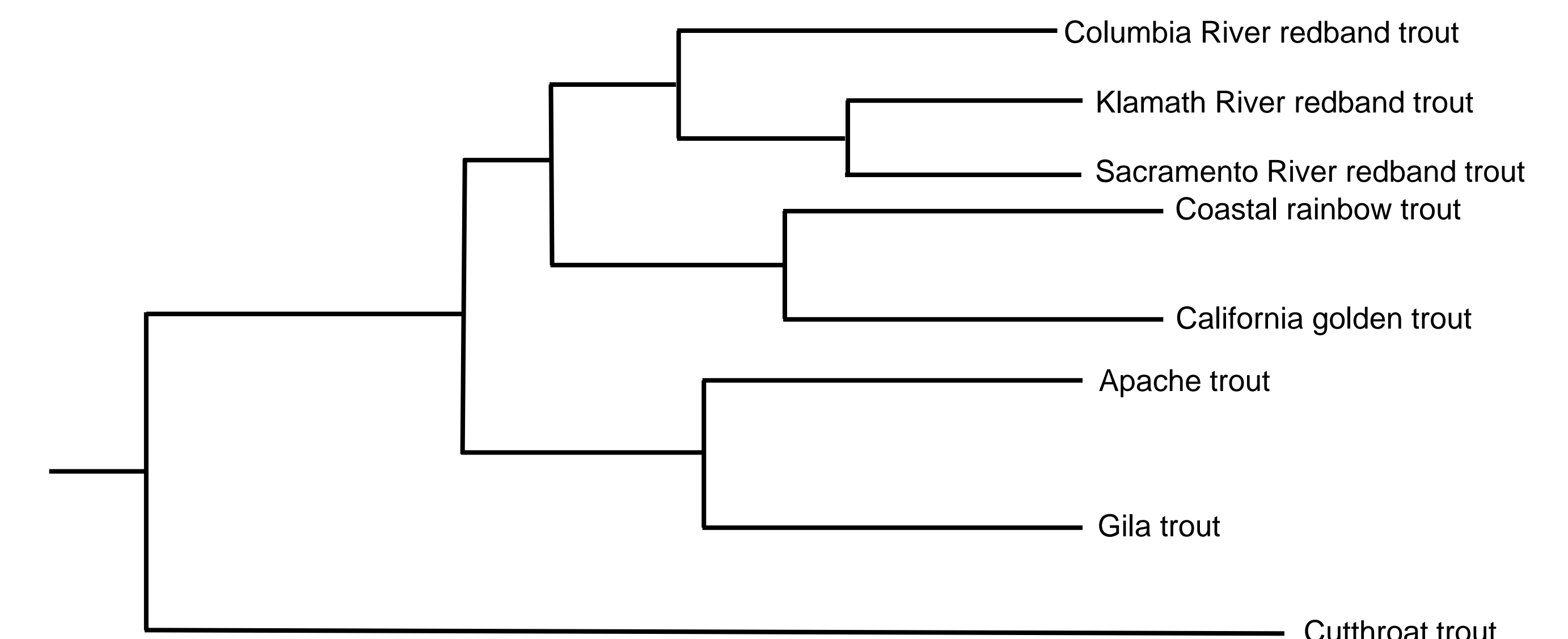


Figure 5. Hypothetical phylogeny of rainbow trout subspecies.

Conclusions

- Preliminary phylogenetic relationships will be assessed from existing samples from Alaska, Idaho, Oregon and British Columbia.
- Additional populations will be sampled from across the range FY2020-2021.
- The agreement of morphological and phylogenetic relationships will be assessed in as many unique populations as possible.
- The project described was supported by NSF award number OIA-1757324 from the NSF Idaho EPSCoR Program and by the National Science Foundation.

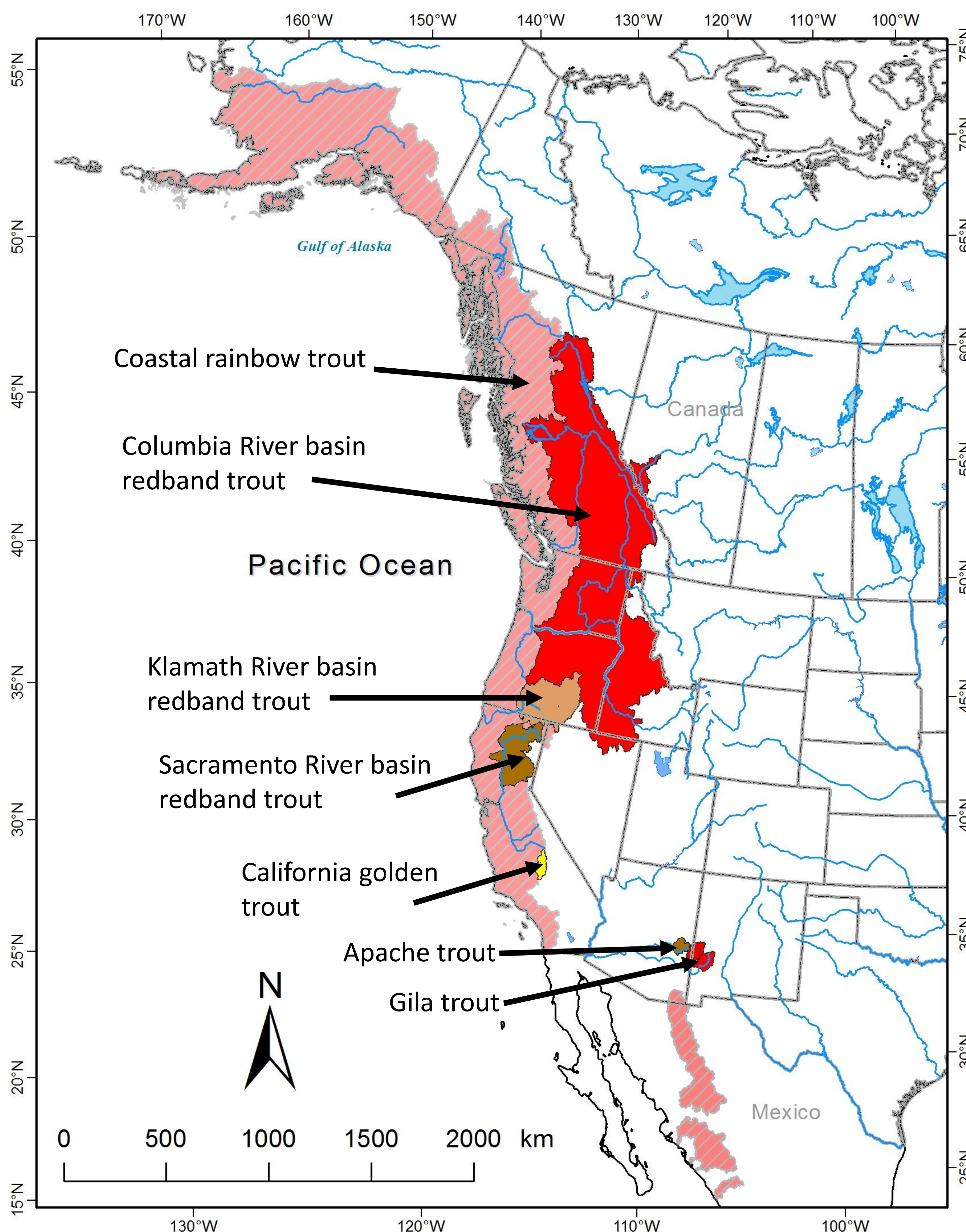


Figure 1. Major subspecies of rainbow trout. Each color indicates a different subspecific region.