

**AGRICULTURAL RESEARCH FOUNDATION
INTERIM REPORT
FUNDING CYCLE 2020 – 2022**

TITLE: Understanding the status of an endemic Oregon fish to inform best agricultural management practices

RESEARCH LEADER: Ivan Arismendi

COOPERATORS: Brooke Penaluna, USDA Forest Service PNW Research Station
Steve Clark and Jeff McEnroe, BLM

EXECUTIVE SUMMARY: Best management practices on agricultural lands are fundamental to protect water quality and fisheries. The Umpqua River basin in Oregon supports agriculture in its floodplains including tributaries of Mill Creek and Rock Creek. Land ownership in the Umpqua River basin is about 65% private with agricultural lands accounting for around 16% of the area. The Umpqua River Basin supports the endemic Umpqua Chub *Oregonichthys kalawatseti*. Substantial declines in its abundance and contractions in distribution have led to elevated protection of the species by designating it as sensitive–critical species by Oregon Department of Fisheries and Wildlife, and a special status species by the Bureau of Land Management and US Forest Service. Declines are mainly attributed to predation by exotic Smallmouth Bass and pollution from both agricultural lands and sewage, which seem to have left Umpqua Chub populations in upstream enclaves. This proposal will leverage current range-wide distribution efforts related to understanding the status of Umpqua Chub in the Umpqua River basin. Our findings will deliver maps of proximity between agricultural lands and most vulnerable Umpqua Chub habitats. This cartography will provide baseline information to assess the status of an endemic Oregon fish as well as identify critical habitats around agricultural lands that may require protection.

OBJECTIVES: To document range-wide distribution of Umpqua Chub throughout the Umpqua River basin using a combination of minnow trapping and environmental DNA from water samples (eDNA).

PROCEDURES: eDNA sampling and minnow trapping occurred throughout the Umpqua Basin at 175 sites. We collected, filtered, and stored water samples. eDNA extractions will be done at USFS PNW Research Station lab for consistency with previous efforts. Following extractions, we will run qPCR analyses using an already developed and validated species-specific primer for Umpqua Chub through machines in CGRB facility (Oregon State University). We will use the fish detection data (trap data and eDNA sampling) collected throughout the basin combined with continuous water temperature logging, hydrologic models obtained from LiDAR topographic data (by DOGAMI), and land-use distributions (by BLM). Once we identify the environmental variables influencing the presence of the Umpqua Chub in streams, we will use occupancy

models to map probabilities of occurrence and critical habitats for Umpqua Chub along the entire stream network. Maps will be available to the public.

SIGNIFICANT ACCOMPLISHMENTS TO DATE: Temperature loggers has been deployed and data has been collected. We are working to complete the hydrological modelling from LiDAR. Fieldwork has been completed and water samples are stored waiting for eDNA extractions (Fig. 1). Results from trapping efforts showed unexpected detection of the Umpqua Chub in the north portion of the basin (Fig. 2). We expect to confirm this finding with eDNA. Initially, eDNA extraction was projected to occur between February to May 2020. However, eDNA extraction has been delayed owing to a lack of access to labs early in the pandemic and now a limited capacity in the lab from COVID-19. We expect to complete the occupancy model after eDNA extraction and analyses is finished.

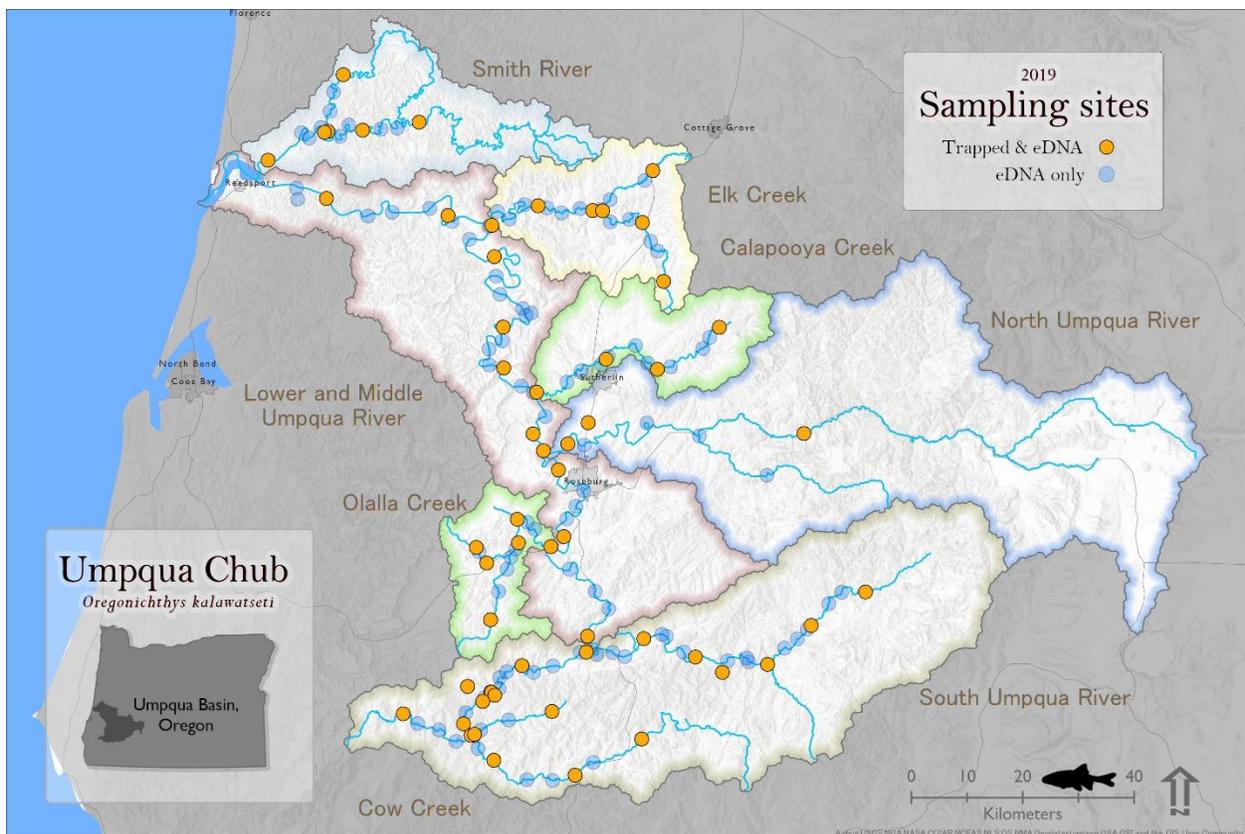


Fig. 1. Map of the Umpqua basin and the location of sampling sites for the Umpqua Chub.

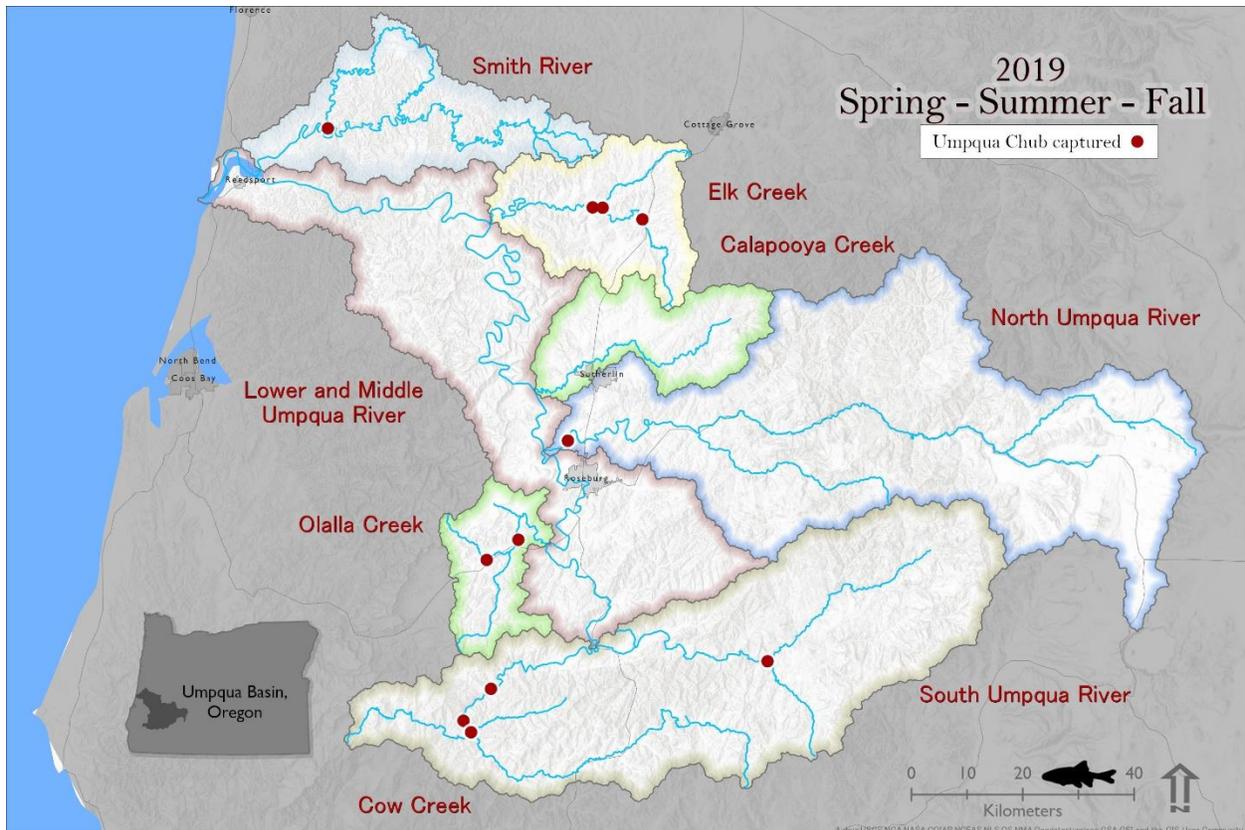


Fig. 2. Map of the Umpqua basin and the location sites with Umpqua chub detection from traps.

DELAYS ASSOCIATED TO COVID: Unfortunately, the eDNA extraction and lab processing has been delayed owing to COVID-19. Indeed, the federal building where these analyses are planned to be conducted on campus (USDA Forest Science Lab) is still at very minimum capacity so progress on sampling processing is very slow. However, we secured additional funding from our partners to support the human resources and labor needed to move forward with the lab analyses. We expect to have our preliminary results by June of this year and a final report by the end of 2022.