Before the Secretary of the Interior

Petition to List the Umpqua Chub (*Oregonichthys kalawatseti*) as a Threatened or Endangered Species under the Endangered Species Act

Center for Biological Diversity

October 16, 2025

NOTICE OF PETITION

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Pursuant to Section 4(b) of the Endangered Species Act (ESA), 16 U.S.C. §1533(b); section 553(e) of the Administrative Procedure Act (APA), 5 U.S.C. §553(e); and 50 C.F.R. §424.14(a), the Center for Biological Diversity herby petitions the Secretary of the Interior, through the U.S. Fish and Wildlife Service (USFWS), to protect the Umpqua chub (*Oregonichthys kalawatseti*) as an endangered or threatened or species under the ESA.

This petition requests listing of the Umpqua chub based on threats from fish passage barriers, stream channelization, wetland drainage, nonpoint source pollution, and predation by invasive species. Petitioner requests that critical habitat be designated concurrently with listing, pursuant to 16 U.S.C §1533(a)(3)(A) and 50 C.F.R. §424.12.

The Umpqua chub is a freshwater fish and the USFWS has jurisdiction over this petition. This petition sets in motion a specific process, placing definite response requirements on USFWS. USFWS must issue an initial finding as to whether the petition "presents substantial scientific or commercial information indicating that the petitioned action may be warranted." 16 U.S.C. §1533 (b)(3)(A). USFWS must make this initial finding "(t)o the maximum extent practicable, within 90 days after receiving the petition."

The Center for Biological Diversity ("Center") is a non-profit, public interest environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law, supported by more than 1.8 million members and supporters. The Center works to secure a future for all species, great or small, hovering on the brink of extinction.

We submit this petition on behalf of our staff and members who hold an interest in protecting the Umpqua chub.

Submitted this 16th day of October, 2025

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Executive Summary

The Umpqua chub is a small minnow, with adults less than 3 inches long. Umpqua chubs are found only in the waterways of the Umpqua River basin. They prefer off-channel habitats with slow water velocities, low flow, silty organic substrate, abundant vegetation, and cover. Chubs may select benthic habitat for feeding on midge larvae, diving beetles and mayflies.

There are five ecologically distinct Umpqua chub populations, inhabiting the Smith River, Elk Creek, Calapooya Creek-Olalla Creek, Cow Creek-South Umpqua River, and North Umpqua River. The Umpqua chub was thought to be extirpated from the North Umpqua River, but in 2019 were documented in the North Umpqua for the first time in 93 years, with a small number of chub located in a short stream reach.

Umpqua chub surveys conducted in 1987, 1998, and 2006 have shown a decrease in distribution over three decades. The Umpqua chub decline has corresponded with an increase in nonnative smallmouth bass throughout the Umpqua River drainage, prompting concern that bass may displace Umpqua chub through some combination of ecological interactions such as predation or competition.

The Umpqua chub is also threatened by habitat loss from stream channelization and wetland drainage, passage barriers, nonpoint source pollution, climate change and invasive species.

Biology

a. Species Description

The Umpqua chub is a small freshwater minnow with an unscaled or partly scaled breast, a slightly subterminal mouth, and a short caudal peduncle (Markle et al. 1991). Umpqua chubs have a maximum length of about 65 mm FL (Markle et al. 2011).

Measurable morphometric, meristic, and enzymatic differences between Umpqua chub and Oregon chub are minor. Individual morphometric and meristic characteristics generally overlap between the two species; however, two separate discriminant function analyses showed that individuals of these species could be correctly classified based on combinations of morphometric measurements (95% correct classification) and on combinations of meristic measurements (98% correct classification) (Markle et al. 1991). Morphometric comparisons show that Umpqua chub have a shorter caudal peduncle than Oregon chub (Markle et al. 1991). The most prominent morphological difference between these two species is the presence and distribution of breast scales; scales are well distributed on the breast of Oregon chub but are less well distributed or absent on the breast of Umpqua chub (see Figure 2 *in* Markle et al. 1991). Additionally, the mouth position of Umpqua chub is more subterminal relative to Oregon chub.

b. Taxonomy

The Umpqua chub was formerly recognized as part of the Oregon chub (*Oregonichthys crameri*). By the 1980s it was noted that chub in the Willamette River and Umpqua River basin had different habitat requirements and that the differences might be subspecific (Long 1980; Bond and Long 1984). The Umpqua chub was formally described as new species (*Oregonichthys kalawatseti*) in 1991 by Markle et al. (1991), based on morphometric data and assay of 21 enzymes. Umpqua chubs are endemic to the rivers and streams of the Umpqua River drainage and are distinct from the congeneric Oregon chub (*O. crameri*) found within the Willamette River drainage (Markle et al. 1991).

Contemporary genetic and genomic methods had not been used to evaluate differences between Umpqua chub and Oregon chub (ODFW 2021a). However, enzyme electrophoresis has been used to evaluate protein polymorphism between Umpqua chub and Oregon chub. Among 21 enzymes assayed for these two species, one unique LDH-A allele was observed for Umpqua chub and one rare LDH-A allele was observed for Oregon chub. These observations were used to infer evolutionary differences between these species (Markle et al. 1991).

Umpqua chubs are distinct from Oregon chub based on allopatric distributions, subtle differences in morphology, behavioral differences, and the presence of one unique muscle lactate dehydrogenase (LDH-A) allele in Umpqua chub relative to Oregon chub (Markle et al. 1991). Markle (2019) hypothesized that *Oregonichthys* evolved as part of coastal Miocene Epoch fauna that was isolated in the ancestral Umpqua River by Grande Ronde Basalt flows, and that they colonized the Willamette River through a stream capture event in the headwaters of the Umpqua River drainage. Alternatively, the Umpqua River may have been a tributary to the Willamette River and a stream capture event during the late Cenozoic Era (Baldwin 1981; cited by Markle et al. 1991) may have geographically isolated these two drainages (Diller 1915; cited by Markle et al. 1991) leading to the allopatric distribution and speciation of Umpqua Chub and Oregon Chub (Markle et al. 1991). However, Markle (2019) believes that a Miocene-origin for *Oregonichthys* is more likely given the geological history of the region and large-scale patterns of fish faunal diversity.

O'Malley et al. (2013) rapidly surveyed all major Umpqua basin tributaries in 2006–2007 to qualitatively map the distribution of known chub aggregations or populations, and in 2008 took individual fin clip and otolith samples from 25 specimens in each of six nominal ecological populations to determine genetic and age structuring. Based on data from 10 microsatellite loci, O'Malley et al. (2013) found evidence for four evolutionary populations of Umpqua Chub. One population, in the Smith River, is isolated by the Umpqua estuary and is more than 100 river kilometers from the other three populations: Elk Creek, Calapooya Creek–Olalla Creek, and Cow Creek–South Umpqua River.

O'Malley et al. (2013) evaluated population genetic diversity, genetic structure, and population fragmentation for Umpqua chub, following an ecological population paradigm and an evolutionary population paradigm (*sensu* Waples and Gaggiotti 2006). Under the ecological population paradigm, analyses were performed based on *a priori* assignment of individuals to ecological populations (Smith River, Elk Creek, Calapooya Creek, Olalla Creek, Cow Creek, and South Umpqua River). Under the evolutionary population paradigm, Bayesian clustering was used to group Umpqua chub *de novo* into evolutionary populations prior to subsequent analyses.

Umpqua chubs exhibit relatively high and consistent levels of genetic diversity among ecological populations (O'Malley et al. 2013, Table 2). Genetic differentiation is significant among all pairs of ecological populations based on *FST* and estimates of genic and genotypic differentiation; additionally, Cavalli-Sforza and Edwards chord distances (Cavalli-Sforza and Edwards 1967) support genetic differentiation among the six ecological populations (O'Malley et al. 2013). Overall, genetic differentiation among ecological populations of Umpqua chub follows a pattern of isolation by distance (i.e., genetic differentiation increases with geographic distance). However, this pattern is strongly influenced by the Smith River ecological population such that isolation by distance is not supported if the Smith River population is removed from the analysis; additionally, the pairwise comparison between the Smith River and Elk Creek populations is an outlier in this analysis (O'Malley et al. 2013). Taken together, these analyses suggest that measurable genetic differences exist among the *a priori* defined, or hypothesized, Umpqua chub populations. Additionally, genetic differentiation of these populations is at least partly influenced by geographic separation, but that other factors likely influence genetic differentiation among ecological populations. *De novo* assignment of individuals into groups using Bayesian clustering suggests that there are four evolutionary populations of Umpqua Chub: Smith River, Elk Creek, Calapooya Creek-Olalla Creek, and Cow Creek-South Umpqua River.

Events that potentially isolate local populations of Umpqua Chub are temporally variable and encompass Holocene geological episodes to recent anthropogenic activities. For instance, a rising sea level approximately 2,500 years before the present would have created a salinity barrier separating the Smith River from upstream populations (Nelson 1992; Briggs 1994; Witter et al. 2003). More recent Holocene events include periodic tsunamis with an average recurrence interval of 520 years and the most recent at 330 years BP (±50 years; Briggs 1994). Potential anthropogenic events include introductions of nonnative predators and dam construction.

Genetic divergence among Umpqua chub populations may be greatest between the Smith River population and other populations. This population is the most genetically distinct population among ecological populations and was the first group to separate out among evolutionary populations (see Figure 5c *in* O'Malley et al. 2013). O'Malley et al. (2013) estimated that the Smith River population diverged (measured as splitting time; *see* Hey and Nielsen 2007) from other Umpqua chub populations about 188 years before present (from the time of their sample collection) and estimated that the other evolutionary populations diverged about 41-89 years before present. Although the precision of the estimated divergence time for the Smith River population was relatively low (i.e., 20-396 years before present), O'Malley et al. (2013) suggest that these estimates should be sufficient to eliminate isolating mechanisms such as Holocene era sea level rise and support a more recent divergence time among Umpqua chub populations.

O'Malley et al. (2013) assume that if bass predation pressure isolated the Smith River population, its effects were present by 1930–1950. Smallmouth bass were introduced into Takenitch Lake, 2 km north of the mouth of the Umpqua River, in 1924 or 1925 (Lampman 1946) and were accidentally released into the Umpqua River in 1964 (Simon and Markle 1999). By the 1970s, they were frequently reported in the South Umpqua and main stem. If smallmouth bass predation isolated upstream populations, as suggested by Simon and Markle (1999), their effects began prior to the 1987 survey and almost certainly by 1970. There is no way of knowing if their impacts were spatially uniform but O'Malley et al. (2013) assume they were variable over the period 1970–2008. In Elk Creek, the boundary between smallmouth bass and Umpqua chub appeared to be demarcated by Cunningham Dam, which was constructed in 1968. In summary, potential isolation events for the Smith River could have been at approximately 2,500 or more years (Holocene sea level), 330 years (last tsunami), or 70 years (striped bass). Potential isolation events for other populations upstream of the Smith River would have been less than 40 years, if caused by smallmouth bass predation or in 1968 if attributable to the Cunningham Dam. All populations may simply reflect isolation by distance.

Based on patterns of genetic diversity, genetic differentiation, estimated divergence times, and spatial genetic patterns, O'Malley et al. (2013) hypothesize that "Umpqua chub populations formed by peripheral isolation from a larger population, the remnant of which is the mid-drainage Calapooya-Olalla population." Furthermore, the Smith River evolutionary population may have been isolated about four times longer than other populations (O'Malley et al. 2013). Construction of Cunningham Dam may have isolated the Elk Creek evolutionary population and establishment of smallmouth bass and subsequent ecological interactions with Umpqua chub may have fragmented the Calapooya Creek-Olalla Creek and the Cow Creek-South Umpqua River evolutionary populations (O'Malley et al. 2013). However, further work is warranted to elucidate historic and contemporary factors associated with fragmentation among Umpqua chub populations.

c. Reproduction, Behavior, and Diet

Little is known about the reproductive biology of Umpqua chub (ODFW 2021a). Umpqua chub generation time has been speculated to be about 3-4 years (Markle et al. 2011; O'Malley et al. 2013) based on estimated growth rates of Umpqua chub and comparisons with the congeneric Oregon chub (Scheerer and McDonald 2003; Scheerer et al. 2005; DeHaan et al. 2012). Fecundity of two female Umpqua chub has been calculated at 322 eggs for a 45 mm SL Umpqua chub and at 231 eggs for a 47 mm SL Umpqua chub; mean egg diameter varied from 0.9-1.1 mm for these two Umpqua chubs (Pearsons 1989; Markle et al. 1991).

Putative spawning behavior has been observed for captive Umpqua chub held in 72-l aquaria and exposed to a solution of luteinizing hormone-release hormone ethylamide intended to induce spawning (Pearsons 1989; Markle et al. 1991). Pearsons (1989) and Markle et al. (1991) assumed that individual fish expressing agonistic behavior were males and individual fish that were passive and had fuller bodies were females. Spawning activity typically involved one female and one or more males and began when a dominant male would swim into the flank of the female. The female will typically swim up and down away from the male, with the male following and nudging the female with its head. Putative spawning would occur with the female taking a head down position with a straight body on a flat rock, and with the male moving next to the female and nudging the female (Markle et al. 1991). No egg laying was noted during observations, but these activities were assumed to be related to spawning (Pearsons 1989; Markle et al. 1991).

The lifespan of Umpqua chub is unknown, but Oregon chub live to 10 years (Simon and Markle 2006).

Information about the food habits of Umpqua chubs is available for a limited number of individuals (*N* = 20) collected from the Calapooya River (Pearsons 1989; Markle et al. 1991). Infaunal chironomids were present in the diets of 85% of the Umpqua chub and sand grains were present in the diets of 70% of the Umpqua chub. Other diet items commonly observed included epifaunal dytiscids, present 55% of the Umpqua chub; and ephemeroptera, present in 55% of the Umpqua chub (Pearsons 1989).

Age and growth of Umpqua chub has been characterized from 25 Umpqua chub collected from each of six ecological populations (Smith River, Elk Creek, Calapooya Creek, Olalla Creek, Cow Creek, and South Umpqua River) (Markle et al. 2011; O'Malley et al. 2013). Umpqua chub from this collection varied in length from 23-65 mm FL and varied in age from 1-7 years. Among populations, Umpqua chub growth rate is rapid during their first 2 years and slows thereafter, resulting in substantial overlap in length-at-age for Umpqua chub older than age-2 (Markle et al. 2011; O'Malley et al. 2013).

Putative differences in size, age, and growth rate among populations of Umpqua chub have not been sufficiently examined or documented to draw broad conclusions (ODFW 2021a). Markle et al. (2011) provide summaries showing that Umpqua chubs from the Smith River are smaller, younger, and have a slower mean growth rate than other populations, and that Umpqua chub from the South Umpqua River are larger, older, and have a faster mean growth rate than other populations. However, age-0 and age-1 fish are underrepresented within the sample of Umpqua chub examined (see Figures 2 and 3 *in* Markle et al. 2011). In fact, the only population where age-0 and age-1 Umpqua chub were collected was the Smith River population, the sample collected from the South Umpqua River comprised "a large proportion of fish older than 3 years", and individuals were collected from only one sample site per population (Markle et al. 2011; O'Malley et al. 2013). Markle et al. (2011) acknowledge limitations of their data to make definitive comparisons among populations.

d. Habitat Requirements

Limited data are available on habitat use by Umpqua chub (ODFW 2021a). The related Oregon chub (*Oregonichthys crameri*) lives in slack water off-channel habitats such as beaver ponds, oxbows, side channels, backwater sloughs, low gradient tributaries, and flooded marshes (USFWS 2015). These habitats for Oregon chub usually have little or no water flow, are dominated by silty and organic substrate, and contain considerable aquatic vegetation providing cover for hiding and spawning (Pearsons 1989; Markle et al. 1991; Scheerer and McDonald 2000).

Umpqua chubs are known to also live in moderate to no flow habitats. Habitat needs include off-channel habitat with low flow, silty organic substrate, abundant vegetation, and cover (ODFW 2021a). Umpqua chubs are typically found in habitats with slow water velocities (Pearsons 1989), such as run, slough, and pool habitats (Markle et al. 1991). During a 1987 distributional survey (Markle et al. 1991), Umpqua chubs were found in run, slough, or pool habitats where flow was generally slow and daytime water temperature averaged 21.5 C (range 17-26 C). When found in habitats with moderate to high water velocities, Umpqua chub have been observed along stream banks or behind structures that may reduce water velocity (Markle et al. 1991). Umpqua chub have been observed associated with both erosional and depositional substrates and associated with aquatic and riparian vegetation (Pearsons 1989; Markle et al 1991). Umpqua chub catch rates using baited minnow traps were greater in areas with aquatic and overhanging riparian vegetation compared to areas with other types of cover in one section of Elk Creek (Markle et al. 2011). The presence of infauna and sand in the diets of Umpqua chub (Pearsons 1989; Markle et al. 1991) may suggest association with, or selection for benthic habitat. Umpqua chub was observed to aggregate with juvenile redside shiner (*Richardsonius balteatus*) and Umpqua pikeminnow *(Ptychocheilus umpquae*).

In an aquarium setting, Oregon chub always chose vegetation for spawning substrates while Umpqua chub always chose rocks or hard surfaces for spawning substrates (Markle et al. 1991; Simon and Markle 2006). For field validation, Oregon chub choose vegetation for spawning substrates in the wild, but there were no wild spawning observations on Umpqua chub (Markle et al. 1991; Simon and Markle 2006).

e. Current and Historic Range

The Umpqua chub has a restricted distribution to the Umpqua River basin in the Coast Ranges, Klamath Mountains, and West Cascades.

Fishery scientists and managers had previously divided Umpqua Chub into six ecological populations: Smith River, Elk Creek, Calapooya Creek, Olalla Creek, Cow

Creek, and South Umpqua River. Contemporary genetic data suggest that Umpqua chub may comprise four evolutionary populations: Smith River, Elk Creek, Calapooya Creek-Olalla Creek, and Cow Creek-South Umpqua River. A small number of Umpqua chub (n = 34) have been recently re-detected at one stream location in the North Umpqua River (Penaluna and Ellenburg 2019).

See the range map in Figure 1.

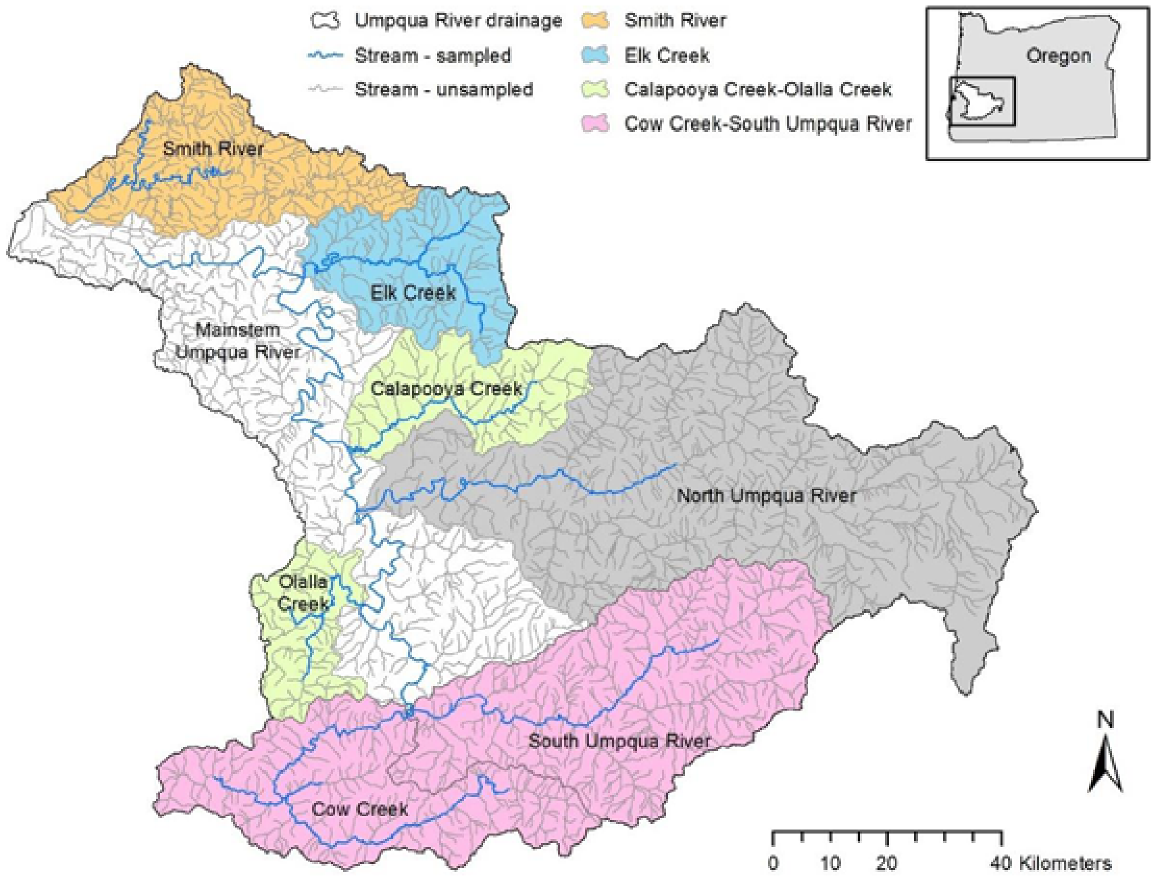

Figure 1. Umpqua chub range map from ODFW 2021a. The Smith River, Elk Creek, Calapooya Creek-Olalla Creek, and Cow Creek-South Umpqua River evolutionary populations are represented by distinctly colored polygons. The general extent of streams that have been sampled for Umpqua Chub at any point from 1987-2017 are shown in blue, the streams not sampled during this time period are shown in gray. Umpqua chub were subsequently discovered in the North Umpqua River.

Population Status

There was one verified historical collection of Umpqua chub from the North Umpqua River in 1926 near Winchester (UMMZ 94165).

During summer 1937 (Roth 1937) surveys of the South Fork Umpqua River, chubs were common in sections 1-5 (18.9 miles from Tiller to South Umpqua Falls); but chubs were not found above South Umpqua Falls or in any tributaries.

Markle et al. (1991) and Simon and Markle (2006) conducted Umpqua chub status surveys in 1987 and 1998 in the South Umpqua River and Cow Creek. In 1987 they found Umpqua chub at 12 of 37 sites (South Umpqua River, Cow Creek, Ollala Creek, Calapooya Creek, Elk Creek, Smith River, Umpqua River). In 1998 they found Umpqua chub at 6 of 37 sites (South Umpqua River, Cow Creek, Ollala Creek, Calapooya Creek, Elk Creek, Smith River). Umpqua chubs were not found in either 1987 nor 1998 in Tenmile Creek, Lookingglass Creek, Myrtle Creek, North Umpqua River, or Pass Creek.

During the first status survey in 1987, the Umpqua chub was broadly distributed between Elk Creek and the South Umpqua River near the Umpqua National Forest boundary (Markle et al. 1991). One downstream, isolated, population was discovered in the Smith River, separated by the Umpqua River estuary and 100 river kilometers from the nearest population in Elk Creek. However, during a subsequent survey in 1998 (Simon and Markle 1999), distributions upstream of Elk Creek appeared to be fragmented into smaller populations, Umpqua chub being restricted to lower-order stream sites while many main-stem sites were predominately inhabited by nonnative smallmouth bass.

In 2006, Simon and Markle (2006) surveyed intensively in Cow Creek and South Umpqua River for Umpqua chub. At 26 sites in the South Umpqua River they detected 505 chub and 1,669 bass; at 22 sites in Cow Creek they detected 429 chub and 329 bass; at 5 sites in West Fork Cow Creek they detected 118 chub and no bass; and at 3 sites in Middle Creek they detected 7 chub and no bass. At a total of 56 sites, they detected 1,059 chub and 1,998 bass. Simon and Markle (2006) concluded that Umpqua chubs were not widespread throughout Cow Creek or the South Umpqua River, were restricted to small portions of each river, and appeared to be limited by habitat in the upper reaches and by smallmouth bass in lower reaches.

Surveys conducted in 1987, 1998, and 2006-2007 suggest that Umpqua chub distribution was variable among sample periods, and likely among populations or sampling strata. However, overall patterns are indicative of a decrease in the distribution of Umpqua chub during the last three decades (ODFW 2021a).

O'Malley et al. (2013) observed or captured 2,859 Umpqua chub at 46 sites in 2006–2007. The six populations of Umpqua chub (the Smith River, Elk Creek, Calapooya Creek, Olalla Creek, Cow Creek, and South Umpqua River) were located in third-order through fifth-order stream sites. Umpqua chubs were found in two (9%) sixth-order streams, both in the Umpqua River between the mouths of Calapooya Creek and North Umpqua River, and in one first-order stream in Elk Creek. The Elk Creek population had the most extensive distribution and highest density. O'Malley et al. (2013) found age-0 Chub in every population.

In 2019, Penaluna and Ellenburg (2019) documented the first record in 93 years of Umpqua chub in the North Umpqua River. Although the North Umpqua River had been surveyed for Umpqua chub over the past 3 decades without success, Penaluna and Ellenburg (2019) captured 34 Umpqua chub on 14 May 2019, 5.8 km downstream from Winchester Dam on the North Umpqua River. Penaluna and Ellenburg (2019) set baited minnow traps at 55 of the same sampling sites used in 1987 and 1998 surveys. It is unknown whether the chub had always been there and just eluded capture, whether they travel seasonally throughout the basin (Penaluna and Ellenburg captured many chubs in

May but few to none in summer and autumn months), or if they are moving in response to pressure from invasive fish, like the smallmouth bass.

Threats

Present or Threatened Destruction, Curtailment, or Modification of Habitat or Range

Dams and Passage Barriers

The Oregon Conservation Strategy considers dams to be a threat to Umpqua chub (ODFW 2020b). Changes in flow regimes and habitat characteristics resulting from the construction of flood control dams was a factor implicated in the decline of the related Oregon chub (Pearsons 1989; ODFW 2021b).

There are 9 dams and reservoirs in the North Umpqua basin, which has been significantly altered by dams, flow diversions, and flow regulation in the headwaters. Winchester Dam on the lower North Umpqua near Roseburg, Oregon has a fish ladder intended for salmonid passage, but that does not meet NMFS passage standards (NMFS 2023). Umpqua chubs were documented in 2019 in the lower North Umpqua River, 5.8 km downstream of Winchester Dam. This dam likely prevents Umpqua chub from moving upstream in the North Umpqua River.

In the South Umpqua River, Galesville Dam completely blocks fish migration into the Cow Creek tributary (Kostow 1995).

Construction of Cunningham Dam in 1968 may have isolated the Elk Creek evolutionary population of Umpqua chub (O'Malley et al. 2013).

Culverts blocking fish passage are a threat for Umpqua chub (ODFW 2020b).

Stream Channelization

The Oregon Conservation Strategy considers stream channelization to be a threat to Umpqua chub (ODFW 2020b). Stream channelization was a factor implicated in the decline of the related Oregon chub (Pearsons 1989; ODFW 2021b). River channelization has damaged fish habitat in the lower mainstem Umpqua River (Kostow 1995).

Wetland Drainage

The Oregon Conservation Strategy considers wetland drainage to be a threat to Umpqua chub (ODFW 2020b). Diking and the drainage of wetlands were factors implicated in the decline of the related Oregon chub (ODFW 2021b).

Nonpoint Source Pollution

The entire Umpqua River basin is on the impaired waters list for temperature violations (USEPA 2024). The EPA 303(d) list, mandated by the Clean Water Act, identifies water bodies that are not meeting applicable water quality standards and require further action, such as developing Total Maximum Daily Loads (TMDLs), to restore them.

Runoff from residential and commercial roads that have proliferated near the North Umpqua threatens water quality from poorly controlled delivery of nutrients and sediment. Many streams in the Umpqua Basin do not meet water quality standards set to protect beneficial uses including fish and aquatic life and water contact recreation (ODEQ 2025). The Oregon DEQ has documented water quality issues in the South Umpqua River including high fecal coliform, rural/industrial non-point sources, high biochemical oxygen demand (indicating significant presence of organic pollutants, leading to oxygen depletion and potentially harming aquatic life and overall water quality), high water temperatures, and eutrophication (Simon and Markle 2006). In the Umpqua Basin, DEQ has identified aquatic weeds, chlorophyll-a, dissolved oxygen, E. coli, fecal coliform, excess algal growth, pH, temperature, total phosphorus, and sedimentation, as water quality impairments (ODEQ 2006, 2025).

The Oregon Health Authority has issued a permanent health advisory for specific areas within the Umpqua Basin due to the recurring presence of cyanobacteria (blue-green algae) and associated toxins. This advisory specifically targets the South Umpqua River from Canyonville downstream to its confluence with the mainstem Umpqua River and extends along the mainstem Umpqua River downstream past Elkton to Sawyers Rapids. The concern arises from pools in the bedrock along the river's edge, which are known to develop harmful cyanobacteria blooms. Cyanobacteria blooms in the Umpqua Basin are caused by a combination of environmental and human-influenced factors, including: nutrient pollution and eutrophication from agricultural runoff (fertilizers, manure, and pesticides from farms introduce high levels of nitrogen and phosphorus into waterways, fueling algal growth); sewage and septic systems (leaking septic tanks and wastewater discharges can release nutrients into rivers and lakes); urban runoff (stormwater carries fertilizers, pet waste, and lawn chemicals into the water); warm temperatures (cyanobacteria thrive in warm, stagnant water); climate change (which is leading to higher water temperatures and longer growing seasons for algae; low water flow and stagnation (reduced river flows and standing water in pools allow cyanobacteria to flourish; drought, water withdrawals for irrigation, and dam operations contribute to these conditions); lack of natural predators (when ecosystems are imbalanced natural consumers of algae like certain aquatic insects and filter-feeding organisms may not be able to keep bloom levels in check; and legacy nutrient loading (even if nutrient inputs are reduced today, past pollution of nutrients stored in sediments can continue fueling blooms for years).

Agriculture

Bottom et al. (1985) cited low stream flows and high summer temperatures exacerbated by water withdrawals as a problem for native fish in the Umpqua River. There have been extensive water withdrawals and water diversion development in the upper Umpqua River basin (Kostow 1995), where diversion of water for agriculture reduces base stream flow and may result in higher summer stream temperatures (NMFS 2011).

Oregon water use policies encourage water waste. Open ditch irrigation systems are often used in the Umpqua basin to flood irrigate or over-irrigate hey fields and pasture lands. The utilization of archaic irrigation systems wastes considerable water and there is little assistance given to agricultural operations to replace outdated irrigation systems. There are not state policies or initiatives to deter irrigation when removal of water from river and resultant summer low flows are detrimental to aquatic species. There is inadequate monitoring of how much water is being used.

Livestock Grazing

Cattle grazing is known to cause large-scale changes in riparian ecosystems, including the trampling and overgrazing of streambanks, soil erosion, loss of streambank stability, poor water quality, and drier, hotter conditions (Belsky et al. 1999, pp. 8–12). In arid regions, the effects of grazing act synergistically with climate factors to contribute to water loss and poor stream health (Fleischner 1994, pp. 634–35).

Logging

The related Oregon chub is found in similar habitats to Umpqua chub, and that species has been impacted by excessive siltation from logging, degradation of water quality due to forestry chemical runoff, and close proximity to logging roads (ODFW 2021b). Excessive siltation resulting from logging can fill in the shallow aquatic areas utilized by chub and can also lead to the succession of open water habitats to wet meadow (ODFW 2021b). While siltation resulting from timber harvest has not been identified as a significant threat to Oregon chub, there was at least one instance in the 1990s where siltation from timber harvest may have contributed to a decrease in habitat suitability and availability that resulted in a drop in chub abundance in the East Fork Minnow Creek (USFWS 2015).

The vast majority (90%, 2.92 million acres) of the Umpqua River basin is utilized as federal, state and private forestland. The North Umpqua basin has been altered by extensive logging and roads on private industrial forest, USBLM, and USFS lands over the past 50 years. However, despite the wide scope of activity, the North Umpqua retains a large proportion of its catchment in unlogged, roadless blocks of primary old growth and mature forest cover. The North Umpqua watershed was not logged as heavily and extensively in early years of the previous century—prior to the advent of laws regulating forest practices—as most other Oregon rivers were.

Despite substantial investment in habitat restoration, beaver reintroduction, and riparian forest protection measures in the upper South Umpqua River by federal land management agencies, the viability of South Umpqua salmonid populations has not improved and in fact may have deteriorated. It appears likely that climate change and the catchment scale hydrologic effects of logging have largely offset any restoration gains. The legacy of logging and related log transportation impacts in the South Umpqua basin likely reduces the carrying capacity for native fish compared to historical conditions. Dose and Roper (1994) documented long-term channel changes in the South Umpqua stream system associated with logging and road impacts. They found the most extreme changes in upper-basin streams and postulated that these habitat impacts still play an important role in the decline and continuing depression of salmon populations. Short-rotation logging of second-and third-growth stands on private and state forest lands in recent decades has contributed to keeping forest cover in all of these catchments in a state dominated by stands less than 50 years of age, where evapotranspiration demand is maximal and summer low flows are likely greatly depleted compared to historical flows under forest mosaics dominated by a large area of mature stands.

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Harvest or collection is not known to be a threat for this species.

Disease or Predation

There is no information about disease for the Umpqua chub. Predatory invasive fish species are a potentially severe threat; see the section below on invasive species.

Inadequacy of Existing Regulatory Mechanisms

a. Federal Mechanisms

i. Federal Endangered Species Act

The Umpqua chub is listed as a "Species of Concern" by the U.S. Fish and Wildlife Service (USFWS 2025). This designation merely identifies species that deserve prompt conservation attention to stabilize or increase populations or to secure threatened habitats but does not offer any substantive protections and does not give the Fish and Wildlife Service the authority to impose conservation measures.

The Umpqua chub could benefit from overlap with and conservation efforts for other fish species listed as endangered or threatened under the ESA.

The Oregon Coast ESU of coho salmon (*Oncorhynchus kisutch*) was listed under the ESA in 2008, and its range in the Umpqua River basin overlaps somewhat with Umpqua chub. Although ESA listing of Oregon Coast coho has resulted in some improved habitat protections on state, federal, and private forest lands, there is little evidence to date that habitat restoration and protection have been effective enough to lead to recovery of coho salmon populations in this ESU (NMFS 2022). There has been a steady decline in other, unlisted salmonids in the Umpqua basin, such as spring Chinook in the North Umpqua and South Umpqua (ODFW 2020c), and North Umpqua summer steelhead (ODFW 2022). Some actions intended to benefit listed coho salmon could potentially also benefit Umpqua chub in the same watersheds, but conservation actions to date in western Oregon appear insufficiently effective to produce consistent population increases or recovery of either species. NMFS (2022) noted that limiting factors for coho in the Umpqua River watershed include: insufficient stream habitat complexity (including lack of large wood debris and off-channel overwintering habitat) throughout the basin, impaired water quantity during summer low flow periods in the Middle Umpqua and South Umpqua; impaired water quality, especially high water temperature during the summer, in the Middle, South and Lower Umpqua; loss of beaver pond habitat through removal of beavers and beaver dams in the South, Middle, and Lower Umpqua; lack of fish passage and access in the Lower Umpqua; habitat degradation associated with large wildfires (salvage logging, increased water temperatures, debris flows, reduction in stream complexity) in the South Umpqua and North Umpqua; reduced survival of juvenile coho salmon in all freshwater areas, but particularly the South Umpqua population, due to drought, extremely low summer flows, increased stream temperatures, and increased predation by smallmouth bass; and inadequate riparian buffers on private timberlands in the Lower Umpqua, Middle Umpqua, and South Umpqua.

ii. National Forest Management

The Trump administration executive orders on accelerated logging on federal lands, attempts to sell off public lands, and rescinding of the roadless rule will lead to massive damage to national forests and wildlife habitat from increased logging and road building, including throughout Oregon and likely in the Umpqua River basin. Nearly 1 million acres of forest in the Umpqua National Forest are at risk of accelerated logging. The Trump administration has directed the secretaries of Commerce, Interior and Agriculture to design plans that would "facilitate increased timber production," expand their legal authority to extract timber, and eliminate protections that create an "undue burden" on cutting down trees. The Secretary of Agriculture issued a memorandum in 2025 declaring an "emergency" across 110 million acres of national forest, including tens of millions of acres of designated wilderness areas, wilderness study areas and inventoried roadless areas, as well as more than 300,000 acres of research natural areas, which the Forest Service typically manages to protect from all human activity. Most of these areas are critically important wildlife habitat. Logging projects proposed within "emergency" areas would receive reduced environmental review and limited opportunities for opponents of harmful projects to challenge them in court. The Secretary of Agriculture also announced in 2025 a repeal of the "roadless rule" to allow for timber harvest on more than 58 million acres of national forests; this would allow logging on an estimated 2 million acres of roadless forests in Oregon. The Umpqua National Forest has 9,488 acres of inventoried Roadless Areas that are at risk.

Sensitive Species Designation

The Umpqua chub is designated as a "sensitive species" by the USFS for Region 5, which covers the Modoc National Forest (USDA 2013) and for Region 6, which covers the Fremont National Forest (USDA 2021). It is also considered "Oregon-Sensitive" by the Bureau of Land Management-Forests Service Interagency Special Status Sensitive Species Program (FS/BLM 2020). Sensitive species are defined as those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density and habitat capability that would reduce a species' existing distribution. Management of sensitive species "must not result in a loss of species viability or create significant trends toward federal listing." The Regional Forester is responsible for identifying sensitive species and coordinating with federal and state agencies and other sources, as appropriate, in order to focus conservation management strategies and to avert the need for federal or state listing as a result of National Forest management activities.

However, this designations as a "sensitive species" offer little protection for individual chubs, chub populations, or chub habitat. The designation merely requires that the impacts to the species be considered, but does not prevent agency actions, such as logging, road building, cattle grazing or mining, which could harm the species or its habitat. Sensitive species cannot be impacted without an analysis of significance of adverse effects on the populations, their habitat, and on the viability of the species as a whole. All Forest Service planned, funded, executed, or permitted programs and activities are reviewed under NEPA for possible effects on sensitive species, through a Biological Assessment and Evaluation. Yet the Forest Service can conclude in a Biological Evaluation that even though individual chubs or chub populations will be harmed or destroyed by an action, it can still carry out this action.

Northwest Forest Plan

The Northwest Forest Plan is a federal management policy with potential benefits for Umpqua chub. The entire South Umpqua basin is labeled a key watershed under the Northwest Forest Plan. The river itself is contained in the Upper Umpqua ESU (Environmentally Sensitive Unit) and plays a strategic role in the Oregon Coastal Recovery Domain. The Northwest Forest Plan contains an aquatic conservation strategy to limit timber harvest impacts, with buffers to protect stream and riparian habitat for freshwater fish. However, the strategy does not adequately address impacts to freshwater fish habitat from roads, culverts, or grazing. In 2024 the U.S. Forest Service proposed amendments to the Northwest Forest Plan (USFS 2024b) that will dramatically increase logging throughout the Pacific Northwest and reduce stream and riparian habitat protections.

Aquatic Conservation Strategy

In 2018, the USFS implemented an Aquatic and Riparian Conservation Strategy for the Northwest Forest Plan Area, which comprises western Oregon, western Washington, and northwestern California, and lands in eastern Oregon and Washington that are implementing PACFISH and INFISH strategies (USFS 2018). Region 5 of the USFS adopted an Aquatic Conservation Strategy (ACS) for the Pacific Southwest Region (USFS 2013), which covers national forests within the state of California, including the Modoc National Forest.

Fundamental goals and essential components of the 2013 ACS include:

- Habitat connectivity within and among watersheds to support ecological integrity, biodiversity and resilience of aquatic resources
- Physical integrity of the aquatic system, including shorelines, banks, and bottom configurations, to promote resilient aquatic habitats
- Water quality necessary to support healthy riparian, aquatic, and wetland ecosystems
- In-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to achieve desirable patterns of sediment, nutrient, and wood distribution
- Habitat to support well-distributed populations of native plant, invertebrate, and vertebrate aquatic and riparian-dependent species
- Sediment regime, including the timing, volume, rate, and character of sediment input, storage, and transport, that supports identified beneficial uses
- Timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands to provide groundwater recharge, stream flow, and maintenance of riparian areas
- Aquatic species composition and distribution in lentic and lotic habitats that reflect inherent biodiversity and productivity

- Species composition and structural diversity of plant communities in riparian areas to provide riparian functions and processes including shade, wood recruitment, and sediment capture.

In order to achieve these goals, the Region 5 Fisheries Program, in partnership with the Hydrology and Watershed Programs, implements the ACS by focusing on the following core elements:

- Development and implementation of species recovery plans, conservation assessments and strategies to conserve and recover TES aquatic species in collaboration with state and federal agencies and other organizations.
- Collaboration in the design and management of in-stream flows associated with hydropower, flood control, agricultural and municipal water operations that will maintain or restore aquatic resources (e.g. Federal Energy Regulatory Commission relicensing process).
- Assessment and restoration of aquatic organism passage at road-stream crossings to provide for unobstructed migration and dispersal, and reconnect habitats needed to fulfill the life-history requirements of aquatic species.
- Treatment of sediment delivery sources associated with roads, trails, and abandoned mines to reduce or eliminate sediment delivery where fine sediment is limiting the biological productivity of the water body
- Meadow restoration to re-establish or improve hydrologic processes and natural biotic communities
- Eradication or control of non-native aquatic species where they compromise the biological integrity of a water body and prevention of aquatic invasive species introductions through education, inspection and decontamination
- Silvicultural treatments in young riparian stands to accelerate the development of mature forest conditions and promote shade-producing canopy, vegetative diversity, wood recruitment, and a broader complex of habitats for aquatic and riparian species.
- Developing and sustaining partnerships to restore and enhance aquatic resources

There have been repeated agency (USFS and USBLM) and legislative proposals to substantially reduce protective provisions of the Northwest Forest Plan and specifically the Aquatic Conservation Strategy (ACS) by increasing the extent of logging and other mechanized forest management, such as fuels treatments. Proposed changes, including reduced riparian reserve protections and a substantially lowered burden of proof for watershed-disturbing activities, are not scientifically justified (Frissell et al. 2014; CRA 2014). Observed and anticipated effects of climate change, and of cumulative anthropogenic stressors operating in the nonfederal lands surrounding federal lands strongly indicate the need to strengthen, not weaken key ACS protections. Roads and ground disturbance associated with mechanical thinning and fuels reduction activities, especially within Riparian Reserves, cause adverse environmental impacts that generally offset or exceed presumed restorative benefits. Headwater streams warrant wider riparian forest buffers than current ACS provisions to ensure effective retention of sediment and nutrients derived from upslope logging, fire, and landslides. Widespread and sustained ecological harm caused by roads is now widely recognized, and ACS measures should be strengthened to more effectively arrest and reduce road impacts in all catchments. Grazing, mining, post-disturbance logging (e.g., fire salvage), water withdrawal, and aerial application of toxic chemicals can cause both acute and chronic harm to aquatic ecosystems. Existing ACS standards and guidelines would need to be strengthened to more effectively control these impacts.

iii. National Environmental Policy Act

The National Environmental Policy Act (NEPA) was intended to require federal agencies to consider the effects of management actions on the environment. Only projects with a federal nexus (i.e. federal funding, authorization, or permitting) fall under NEPA, and therefore actions taken by private landowners generally are not required to comply with this law (USFWS 2009, p. 16). NEPA previously required federal agencies to fully and publicly disclose the potential environmental impacts of all proposed projects. Actions taken by federal agencies, such as the U.S. Forest Service or U.S. Bureau of Land Management, with the potential to impact the Umpqua chub and its habitat were subject to the NEPA process. The NEPA process required these agencies to describe a proposed action, consider alternatives, identify and disclose potential environmental impacts of each alternative, and involve the public in the decision-making process. The public could provide input on what issues should be addressed in an Environmental Impact Statement and comment on the findings in an agency's NEPA documents. Lead agencies were required to take into consideration all public comments received on NEPA documents during the comment period. However, NEPA still did not explicitly prohibit federal agencies from choosing alternatives that may negatively affect imperiled species. Even if the Umpqua chub or its habitat were present in a federal agency's project area, NEPA did not prohibit these agencies from choosing project alternatives that could negatively affect individual chubs, chub populations, or chub habitat. A recent recission of 40 CFR 1500-1508 (and thus all CEQ NEPA implementing regulations) no longer requires agencies to propose mitigation to offset significant environmental effects (CEQ 2025, p. 10611).

In July 2025 the Trump administration revoked regulations governing environmental reviews under NEPA for numerous federal agencies, including the Department of Agriculture, Department of the Interior, Department of Energy, Department of Transportation and the Federal Energy Regulatory Commission. The decision will affect logging, mining and many other projects on federal lands.

iv. Clean Water Act

The Clean Water Act (CWA) exists to establish the basic structure for regulating the discharge of pollutants into U.S. waters, and for regulating quality standards of U.S. surface waters. Under the CWA, the U.S. Environmental Protection Agency (EPA) implements pollution control programs and sets wastewater standards for industry and water quality standards for all contaminants in surface waters. Theoretically the CWA should provide some protection for stream habitats used by the Umpqua chub. However, The CWA contains no specific provisions to address the conservation needs of rare species. Implementation of the CWA, and the Section 404 program in particular, has fallen far short of Congress's intent to protect water quality (e.g., see Morriss et al. 2001).

Under Section 404 of the CWA, discharge of pollutants into waters of the U.S. is prohibited absent a permit from the U.S. Army Corps of Engineers (Corps). The Corps is the federal agency with primary responsibility for administering the section 404 program.

The Corps can issue nationwide permits for certain activities that are considered to have minimal impacts, including minor dredging and discharges of dredged material, some road crossings, and minor bank stabilization. The Corps seldom withholds authorization of an activity under nationwide permits unless the existence of a listed threatened or endangered species would be jeopardized. Activities that do not qualify for authorization under a nationwide permit, including projects that would result in more than minimal adverse environmental effects, either individually or cumulatively, may be authorized by an individual permit or regional general permit, which are typically subject to more extensive review. Regardless of the type of permit deemed necessary under section 404, rare species such as the Umpqua chub may receive no special consideration with regard to conservation or protection absent listing under the ESA.

Corps guidelines do not specify a methodology for assessing cumulative impacts or how much weight to assign them in decision-making. The Corps continues to lack a comprehensive and consistent process to address the cumulative effects of the continued development of waterfront, riverine, coastal, and wetland properties. The Corps authorizes certain floodplain fill and removal activities with nationwide permits (NWPs). In 2021, the Corps finalized the reissuance of existing nationwide permits with modifications (USOFR 2021c,d). The modifications are likely to increase the amount of fill and destruction of floodplain habitat allowed for nationwide permits. The NWP authorizations will disconnect off-channel stream and floodplain areas and result in simplification of stream habitats.

In 2023, the Supreme Court, ruling in Sackett v. Environmental Protection Agency, 598 U.S. 651 (2023), redefined the Clean Water Act's coverage of WOTUS. In its opinion, the Supreme Court ruled that the CWA extends protection only to those waters that are described "in ordinary parlance" as "streams, oceans, rivers, and lakes," and to wetlands only if those wetlands have a "continuous surface connection" to such waters "making it difficult to determine where the water ends and the wetland begins." One potential outcome would be a decline in water quality resulting from changes in regulation of activities in seasonally flooded floodplain wetlands and other areas outside of lake or stream habitats. The extent to which this affects Umpqua chub habitat will depend in large part on how EPA and the Corps choose to implement the Supreme Court's ruling.

v. FERC Relicensing

The Federal Energy Regulatory Commission (FERC) authorizes the construction, operation and maintenance of non-federal hydropower projects and reconsiders licenses under the Federal Power Act (FPA) every 30 to 50 years. Section 10(j) of the FPA allows federal wildlife agencies (U.S. Fish and Wildlife Service and National Marine Fisheries Service) to conduct environmental reviews and to make recommendations during relicensing that have the potential to add conditions and mitigations that can benefit native fish. Major issues addressed in comments by USFWS during FERC relicensing usually relate to salmonids, including protecting fish from being entrained into dam turbines or impinged on trash racks, providing upstream and downstream fish passage past dams, providing adequate base flows downstream from projects, reducing impoundment fluctuations, and providing flows in dewatered reaches.

Under the Fish and Wildlife Coordination Act (FWCA), FERC is supposed to give fish and wildlife resources "equal consideration" with hydropower and other purposes of water resource development and incorporate the recommendations of federal and state fish and wildlife agencies. Measures suggested by USFWS or NMFS to mitigate for project impacts to fish and to provide protection and enhancement - or an equivalent level of protection - must be accepted by FERC and incorporated into the license; unless FERC determines that the recommendations are inconsistent with the FPA or other applicable law. Section 18 of the FPA gives NMFS mandatory conditioning authority to prescribe upstream or downstream fish passage; these prescriptions must be incorporated into the license by FERC.

However, state and federal wildlife agency recommendations for fish passage and protection measures can be rejected by FERC if they make a determination that there is not substantial evidence of need – this has resulted in FERC refusing to require fish passage or deferring fish passage for projects which clearly block fish migration. FERC is the federal arbiter of conflicts between federal and state fishery agencies and hydropower developers, who often resist mitigation and compensation measures because they can be expensive and result in reduced power generation.

Historically, FERC has failed to adequately protect anadromous fish during licensing and relicensing; given inadequate consideration to fish and wildlife issues in its licensing decisions; been reluctant to impose license conditions for protection of fish and wildlife; and favored hydroelectric development over conservation of fish and wildlife (Bodi and Erdheim 1986). Bodi and Erdheim (1986) detailed FERC's poor track record in complying with statutory standards for protecting anadromous fish, issuing exemptions for small hydropower projects and preliminary permits, deferring consideration of the effects of projects on fish and need for fishways until after it has approved projects, avoiding comprehensive planning for river basins, and inadequately consulting with fish and wildlife agencies. More recent FERC relicensing proceedings may have implemented more enlightened conservation measures in some cases (the biological adequacy of those measures often remains a matter of professional and public controversy) however, because FERC licenses extend for 30 to 50 years, threats inherent in past licensing actions often remain.

FERC relicensing often involves negotiations between NMFS, dam owners, states, other federal agencies such as the Army Corps of Engineers, and stakeholders, that can take very long –sometimes decades – to complete. Negotiated settlements that balance the needs of fish with other competing uses, such as power generation and recreation, may result in minimal gains for native fish. The fact that FERC licenses come up for review only every 30 to 50 years means that for most rivers with FERC hydroelectric projects that impact native fish, there will be no opportunity to address dam impacts through the FERC process in the near future.

North Umpqua Hydroelectric Project

The North Umpqua Hydroelectric Project (including Soda Springs Dam) is a FERC project on the North Umpqua (NMFS 2025). Constructed between 1947 and 1956, for more than 50 years, the eight-dam hydroelectric project blocked access to historical habitat and degraded downstream habitat for ESA-listed fish. Safter a 2001 settlement agreement with NMFs and USFWS, several improvements targeted at salmon and trout were incorporated into the project, as required by a new license issued in 2003. These include providing fish passage into blocked habitat above Soda Springs Dam, construction of tailrace barriers, increased stream flows downstream of the dam, reduced ramping, and habitat restoration. However, these FERC facilities and management obligations are far upstream of known Umpqua chub populations and are tailored to benefit salmon and trout.

Winchester Dam

Winchester Dam on the lower North Umpqua ceased generating hydroelectric power in 1923. In 1982, a previous owner of the dam obtained a FERC permit to reestablish power generation, but litigation led to the project losing its status as a small-scale hydro project exempt from FERC relicensing requirements. Hydroelectric generation ceased in 1985 and the project was abandoned. Subsequently the Oregon state legislature prohibited any new water rights for power generation on that reach of the North Umpqua River (ORS section 541.875(3)). In 2010 the current dam owner, Coastal Hydropower LLC, submitted a permit application with FERC for hydroelectric power generation. NMFS, state agencies and conservation groups intervened and the dam owner withdrew the FERC application in 2011. Oregon state law makes it unlikely there will be any new FERC permit given for hydroelectric power at Winchester Dam, so there will likely not be any FERC mechanism for addressing fish passage.

b. State Mechanisms

i. Species of Special Concern/Sensitive Species

The Umpqua chub is listed as an Oregon “Sensitive Species” (ODFW 2021c). Unlike the legal standing afforded by a threatened or endangered status, “sensitive status is an administrative status used as a sort of watch list for species in decline” (ODFW 2021c). This Oregon state designation does not offer any substantive protections for individual Umpqua chubs, chub populations, nor chub habitat.

ii. State Conservation Plans

The Umpqua Chub is a strategy species under the Oregon Conservation Strategy (ODFW 2020b). The 2006 Oregon Conservation Strategy is an entirely voluntary state strategy for conserving fish and wildlife and prioritizing conservation needs. The Oregon Conservation Strategy has a goal to maintain healthy fish and wildlife populations by maintaining and restoring functioning habitats, preventing declines of at-risk species, and reversing declines in these resources where possible (ODFW 2024a). However, the strategy provides no substantive protections for Umpqua chub or their habitat. ODFW has only identified “conservation goals” and opportunity areas and provides a “conservation toolbox” for communities, planners, and other organizations (ODFW 2024a). Conservation actions under the strategy are not binding or enforceable and are merely “priority actions recommended to conserve the species” (ODFW 2024a).

iii. Other State Policies

ODFW has a nongame fish policy that applies to the Umpqua chub. The policy requires that nongame fish be “managed to maintain self-sustaining populations,” OAR 635-500-1720(1). OAR 635-500-1700 provides “management objectives” for fish habitat that include influencing land management decisions to benefit fish habitat, improving quantity and quality of habitat, and “strongly advocat[ing] and support[ing] habitat protection and restoration on private and public land.” OAR 635-500-1700(1). Oregon Administrative Rules Division 7 contains regulations for the Native Fish Conservation Policy, which includes codified objectives such as “maintain[ing] and restor[ing] sustainable naturally produced native fish species living and reproducing successfully in their natural environments.” OAR 635-007-0504(3)(a). The Policy is to be implemented through conservation plans, but no conservation plan has been developed for the Umpqua chub.

Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Invasive Species

Smallmouth Bass

Smallmouth bass (*Micropterus dolomieu*) were introduced into Oregon in the mid-1920s, and the 1964 floods apparently liberated bass from farm ponds into the South Umpqua River (Simon and Markle 2006). By the early 1970s smallmouth bass was common in the South Umpqua River and by the late 1970s had reached the mainstem Umpqua (Simon and Markle 2006).

Survey data suggest a potential decline in Umpqua chub distribution since the mid-1980s, with a concurrent increase in the distribution of nonnative smallmouth bass within the Umpqua River drainage, prompting concern that smallmouth bass may displace Umpqua chub through some combination of ecological interactions such as predation or competition (Simon and Markle 1999; Simon 2008; O’Malley et al. 2013).

The distribution of Umpqua chub has been periodically evaluated since the mid-1980s to describe general characteristics of this species and its habitat, and to evaluate suspected changes in its distribution. The distribution of Umpqua chub and smallmouth bass has been described based on three datasets; these data sets were collected in 1987 (Markle et al. 1991), 1998 (Simon and Markle 1999), and 2006-2007 (Simon 2007a, 2007b, 2008; O’Malley 2013). The distribution of sample sites and the sampling intensity were nearly identical in 1987 and 1998, with the exception that 38 sample sites were visited in 1987 and only 37 of those sites were sampled in 19981. These sample sites were primarily located in areas where Umpqua chub had been observed at some time during the past based on historical records from the Oregon State University fish collection database. Compared to efforts in 1987 and 1998, the sampling intensity was increased substantially to 141 sample sites in 2006-2007 and the spatial distribution of sample sites was greater; with the exception that sampling did not occur in the North Umpqua River in 2006-2007.

Sampling protocols and sampling gears used in 1987, 1998, and 2006-2007 were variable. Neither Markle et al. (1991) nor Simon and Markle (1999) provide information on sample site dimensions for sites sampled in 1987 and 1998. Sample sites “typically” comprised two, adjacent, 100-m reaches in 2006 (Simon 2007a), and were 200-m in 2007 (Simon 2007b); however, Simon (2008) notes that sites sampled in 2006-2007 varied in length from 50-400 m. Sites were sampled using some combination of seines, dip nets, snorkeling, and electrofishing in 1987 (Markle et al. 1991), and some combination of seines, dip nets, push nets, hook-and-line, and visual observation in 1998 (Simon and Markle 1999). Sample sites were sampled using some combination of snorkeling, shoreline visual surveys, and beach seine hauls in 2006-2007 (Simon 2007a, 2007b); specifically, snorkeling was conducted at 95 sites, shoreline visual surveys were conducted at 16 sites, a combination of snorkeling and shoreline visual surveys were conducted at 18 sites, beach seine hauls were conducted at 11 sites, and a combination of beach seine hauls and shoreline visual surveys were conducted at 1 site (Simon 2008). ODFW (2021a) urges caution when making comparisons among these three datasets given the known and potential unknown differences in sampling methodology.

Results from surveys conducted in 1987, 1998, and 2006-2007 suggest that Umpqua chub distribution was variable among sample periods, and likely among populations or sampling strata. Umpqua chubs were detected at 13 of the 38 sample sites in 19874, but only at 6 of the 37 sample sites in 1998 (ODFW 2021a, Figure 2). Umpqua chubs were present in some high-order stream reaches of the mainstem Umpqua River in 1987 where they were not detected in 1998. In 2006-2007, the percent of sample sites where Umpqua chub were detected varied from 9-50% among sampling strata (ODFW 2021a, Table 3). Umpqua chubs were rarely detected in the mainstem Umpqua River in 2007 (ODFW 2021a, Figure 3), and the frequency of sample sites where Umpqua chubs were detected was inversely related to stream order (see Figure 2 *in* O'Malley et al. 2013).

O'Malley et al. (2013) observed or captured an estimated 5,060 smallmouth bass at 73 sites throughout the Umpqua basin, all in fourth-order through sixth-order streams. O'Malley et al. (2013) detected smallmouth bass in all drainages with Umpqua chub populations except the Smith River. The frequency of Umpqua chub and smallmouth bass detection was related to stream order. Umpqua chubs were found in over 30% of third-order and fourth-order sites and declined to less than 10% in sixth-order sites. In contrast, smallmouth bass were absent from third-order streams but were detected in over 90% of sixth-order streams. Umpqua chub and smallmouth bass appeared sympatric in parts of Cow Creek, South Umpqua River, and Calapooya Creek.

The known distribution of nonnative smallmouth bass in the Umpqua River drainage is converse to that of Umpqua chub in many ways. Smallmouth bass were detected at 7 of the 38 sample sites in 1987 and 19 of the 37 sample sites in 1998 (ODFW 2021a, Figure 2). In 2006-2007, the percent of sample sites where smallmouth bass were detected varied from 0-95% among sampling strata (ODFW 2021a, Table 3). Smallmouth bass were present throughout the mainstem Umpqua River in 2006-2007 (ODFW 2021a, Figure 3), and the frequency of sample sites where smallmouth bass were detected was positively related to stream order (see Figure 2 *in* O'Malley et al. 2013). In 2006-2007, smallmouth bass were associated with all ecological populations and sampling strata evaluated, with the exception of the Smith River population. Interestingly, smallmouth bass were detected in the Smith River with only limited sampling (i.e., 2 sample sites) during 1998; additional surveys in the Smith River strata are warranted to evaluate the presence of smallmouth bass. Within the geographic extent of individual ecological populations, Umpqua chubs were typically observed in high elevation stream reaches, smallmouth bass were typically observed in low elevation stream reaches, and a zone of sympatry was observed at mid-elevation stream reaches for some Umpqua chub populations (ODFW 2021a, Figure 3). However, the extent of sympatry between smallmouth bass and Umpqua chub was relatively small overall (13% of all sample sites were sympatric) and variable among ecological populations (range: 0-28% of sample sites among sampling strata) (ODFW 2021a, Table 3).

Overall, observations from 1987, 1998, and 2006-2007 have prompted some fishery scientists and managers to speculate that "smallmouth bass may have replaced Umpqua chub in mainstem [river] sections and restricted them to lower order tributaries [within the Umpqua River drainage]" (Simon and Markle 1999; Simon 2008). Furthermore, Simon and Markle (1999) and Simon (2008) suggest that Umpqua chub populations have been fragmented and isolated over time, and that this fragmentation may have demographic and genetic effects.

ODFW (2021a) concurs that observations from available data are indicative of a reduction in the spatial extent of Umpqua chub and an increase in the spatial extent of smallmouth bass. However, ODFW (2021a) urges caution when interpreting these data and calls for additional research. ODFW (2021a) notes that previous surveys were implemented using a variety of sampling gears, which were not always well documented, and over a variety of spatial scales, so limitations exist related to making estimates of status or trend using these datasets. Methodological differences among samples collected during 1987 1998, and 2006-2007 are substantial, and although these differences likely do not account for all of the variability observed among sample periods, they should be considered carefully. Sampling gears used varied considerably among sample sites within sample periods, and among sample periods; with unknown effects on detection probabilities for target species. The sampling intensity and spatial distribution of sample sites varied considerably between the combined 1987 and 1998 sample period and the 2006-2007 sample period, and observations from 2006-2007 suggest that spatially explicit or spatially implicit analyses may be more appropriate for evaluating Umpqua chub distribution than simple calculations of the number of sites where target species were observed (ODFW 2021a).

ODFW (2021a) evaluated the efficacy of a variety of analytical techniques for estimating Umpqua chub detection probability, occupancy, and abundance using data collected from 2015 through 2017. ODFW (2021a) concluded that monitoring Umpqua chub using double-pass snorkeling and multistate occupancy models may provide a reasonable compromise between sampling efficiency and power to detect trend over time. ODFW (2021a) found no evidence that Umpqua chub detection probability or occupancy differed when smallmouth bass were present or absent at the site level. This finding is contrary to the assumption that smallmouth bass are responsible for the apparent decline in Umpqua chub abundance and distribution (Simon and Markle 1999; Simon 2008; O'Malley et al. 2013). However, there are a number of plausible explanations for why ODFW (2021a) did not observe an effect of smallmouth bass on Umpqua chub detection and occupancy, including: the resolution of the sampling may have been too coarse to evaluate interactions between smallmouth bass and Umpqua chub; spatial extent of ODFW sampling may have been too fine; and the sample size may be insufficient to detect an effect of smallmouth bass.

Wohner et al. (2023) used snorkel survey data from the Umpqua basin to develop a two-species occupancy model for Umpqua chub and smallmouth bass that incorporates multiple abundance states (i.e., absent, present, abundant) of chub. Wohner et al. (2023) concluded that average occupancy was low for both fishes, and that when non-native bass were present, overall native chub occupancy in the present and abundant states was higher than when bass were absent, indicating that bass were not excluding the native chub. However, chubs were much more difficult to detect when non-native bass are present, compelling evidence that native chub may be changing behavior in response to the presence of a predatory bass.

Invasive Crayfish

Two invasive crayfish species have been introduced into the Umpqua basin, ringed crayfish (*Faxonius neglectus*) and red swamp crayfish (*Procambarus clarkii*) (Pearl et al. 2013). A global meta-analysis of the ecological impacts of non-native crayfish (Twardochleb et al. 2013) consistently found strong negative effects on native fish, amphibians and aquatic ecosystems. Non-native crayfish prey on native fish eggs and juveniles, spread diseases to native crayfish, and compete with native animals for food resources (Twardochleb et al. 2013). In addition, red swamp crayfish are burrowers and damage the bed and banks of streams, which impacts habitat for native fish species of concern.

There has historically been minimal data collected on invasive crayfish in the Umpqua basin (NUF 2024). Ringed crayfish have been documented in the basin in Calapooya Creek and downstream near Winchester Dam, and in the nearby Row River. Red swamp crayfish were reported in the nearby Sutherlin Creek drainage (USGS 2025). Ringed crayfish were found during preliminary surveys in 2022-24 at study sites up to the Colliding Rivers boat ramp, which is 0.2 miles below the confluence of Little River and the North Umpqua River (NUF 2024). No invasive crayfish were found at sites upstream on the tributaries. There was reporting of an isolated population of ringed crayfish in Cavitt Creek on private land by a reliable source (NUF 2024). Access was not granted to monitor, but surveys on County, BLM and USFS lands indicate that the ringed crayfish have not spread widely yet. The Calapooya Creek surveys showed invasive crayfish at two downstream sites, but not at upstream sites.

Climate Change

The Earth's climate is rapidly changing due to anthropogenic forces, causing widespread impacts, such as drought, that are projected to worsen exponentially in the coming decades. The speed at which the climate is changing means that many species will be unable to adapt quickly enough and will instead be lost. Across much of the West, heat waves are already occurring with increased frequency; for instance, the summer of 2021 was the warmest in Oregon's recorded history, with heat indexes exceeding 90°F on many more days than the most recent 30-year average (Fleishman 2023, p. 45).

In some parts of Oregon, under the RCP 8.5 emissions scenario, "the heat index is projected to exceed 90°F on most summer days" (Fleishman 2023, p. 48). Further, "projections suggest that if the concentration of greenhouse gases does not decrease, the frequency and magnitude of days with an extreme heat index will increase substantially throughout most of Oregon by the middle and late twenty-first century" (Fleishman 2023, p. 48).

Precipitation patterns will be greatly affected by climate change in the coming decades, and these changes are already being observed - droughts have been "persistent and severe" in Oregon since 2000, and in 17 of the last 23 water years, Oregon's precipitation was below average (Fleishman 2023, pp. 53, 55). The average temperature in Oregon also was warmer than normal in 18 of the last 23 water years, which contributed to increases in evapotranspiration and drought frequency (Fleishman 2023, p. 54). In the West's arid regions, decreased precipitation will likely cause some perennial streams to become increasingly intermittent, i.e., surface water will only be present for part of the year instead of year-round. An increase in fire frequency or intensity in this dry landscape may decrease riparian shading, add sediment, or otherwise make streams less suitable for tui chubs and other fishes (Moyle et al. 2015).

The effects of climate change on hydrology in southwest Oregon will be significant (Halofsky et al. 2022); decreased snowpack and earlier snowmelt will shift the timing and magnitude of streamflow; peak flows will be higher, and summer low flows will be lower. Projected changes in climate and hydrology will affect aquatic ecosystems, especially as frequency of extreme climate events (drought, low snowpack) and ecological disturbances (streamflow, wildfire, insect outbreaks) increase. Isaak et al. (2022) found that although the direct effects of climate change on Umpqua chub are predicted to be low to moderate, the secondary effects may be high via predation by a smallmouth bass population that is expanding as stream temperatures increase.

Population Fragmentation

O'Malley et al. found that Umpqua chub populations are highly fragmented, consisting of four evolutionary populations and peripheral isolation as the mechanism of fragmentation. The most downstream group is the Smith River, which is separated from the next closest group, Elk Creek, by the Umpqua River estuary, a dam on Elk Creek, and 100 river km that harbors introduced striped bass and smallmouth bass. The other four ecological populations upstream of the mouth of Elk Creek have no physical barriers but appear to have been separated by introduced Smallmouth Bass, which occupy mid-order and high-order streams and effectively isolate Umpqua chub in low-order streams. Some mid-order and high-order sites were formerly occupied by Umpqua chub as recently as 1987 (Markle et al. 1991).

Although levels of genetic diversity observed by O'Malley et al (2013) in Umpqua chub are relatively high, continued disruption of natural connectivity by nonnative predators will probably lead to an increase in genetic drift and a reduction in genetic diversity in small, isolated populations. The tributary-based populations show reduced levels of genetic variation and may face a greater risk of extinction as a result (Rieman and Allendorf 2001).

Insufficient Information and Surveys

There are significant data gaps regarding Umpqua chub life history, abundance estimates and trends, and population dynamics (ODFW 2021a). The Oregon Department of Fish and Wildlife did not have any information on surveys or status information for the Umpqua chub in response to a 2025 public records request. The fact that the Umpqua chub is not well studied is in itself a threat, since land and water management decisions, as well as conservation strategies for other fishes, are being made without certainty as to impacts on its life cycle and essential habitat.

Request for Critical Habitat

Petitioners urge the Service to designate critical habitat for the Umpqua chub concurrent with listing the species as threatened or endangered under the ESA. Critical habitat as defined by Section 3 of the ESA is: (i) the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the provisions of section 1533 of the ESA, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) the specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 1533 of the ESA, upon a determination by the Secretary that such areas are essential for the conservation of the species.16 U.S.C. § 1532(5).

Congress recognized that the designation and protection of habitat is essential to the recovery and/or survival of listed species, stating that: "classifying a species as endangered or threatened is only the first step in ensuring its survival. Of equal or more importance is the determination of the habitat necessary for that species' continued existence… If the protection of endangered and threatened species depends in large measure on the preservation of the species' habitat, then the ultimate effectiveness of the Endangered Species Act will depend on the designation of critical habitat." H. Rep. No. 94-887 at 3 (1976).

Critical habitat is an extremely effective and important component of the ESA, without which the Umpqua chub's chance for survival significantly diminishes. Petitioners request that the Service propose critical habitat for the Umpqua chub concurrently with its listing, consisting of the reaches of the Smith River, Elk Creek, Calapooya Creek-Olalla Creek, Cow Creek-South Umpqua River, and North Umpqua River with known and potential habitat for the Umpqua chub, as well as riparian habitat and buffers sufficient to maintain the ecological function of stream habitats for the Umpqua chub. Both occupied and unoccupied habitat should be included in the designation.

Conclusion

Umpqua chub surveys conducted in 1987, 1998, and 2006 have shown a decrease in distribution over three decades. The Umpqua chub decline has corresponded with an increase in nonnative smallmouth bass throughout the Umpqua River drainage, prompting concern that bass may displace Umpqua chub through some combination of ecological interactions such as predation or competition. There is scientific debate over whether smallmouth bass are responsible for the apparent decline in Umpqua chub abundance and distribution.

Umpqua chub populations are also threatened by habitat loss from stream channelization and wetland drainage, passage barriers, nonpoint source pollution, climate change and invasive species.

Existing regulatory mechanisms are inadequate to reduce the risk of extinction for the Umpqua chub. Most of the stream reaches for Umpqua chub flow through lands where dams, agricultural activities, livestock grazing and logging uses divert water and impact stream and riparian habitat. National Forest management on public lands has not adequately addressed the impacts to Umpqua chub habitat from logging, livestock grazing, water diversions, or roads.

The Umpqua chub is threatened by three of the five Endangered Species Act listing factors: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. With climate change decreasing stream flows in streams and increasing competition for water and riparian habitats between native fishes and human uses such as livestock and agriculture, Endangered Species Act protections are critical to the continued existence of the Umpqua chub.

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