BEFORE THE SECRETARY OF THE INTERIOR

PETITION TO LIST COLUMBIA YELLOWCRESS (*RORIPPA COLUMBIAE*) UNDER THE ENDANGERED SPECIES ACT AND TO CONCURRENTLY DESIGNATE CRITICAL HABITAT

Credit: Gerald D. Carr

CENTER FOR BIOLOGICAL DIVERSITY
August 6, 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(2); and 50 C.F.R. § 424.14(a), the Center for Biological Diversity hereby petitions the Secretary of the Interior, through the United States Fish and Wildlife Service ("FWS" or "Service"), to protect Columbia yellowcress (*Rorippa columbiae*) as a threatened or endangered species under the ESA.

FWS has jurisdiction over this petition. This petition sets in motion a specific process, placing definite response requirements on the Service. Specifically, the Service 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). FWS must make this initial finding "[t]o the maximum extent practicable, within 90 days after receiving the petition." *Id*. If FWS makes a positive initial finding, it must then determine within 12 months after receiving the petition whether the petitioned action is warranted, and if so, the Secretary shall "promptly" propose to implement the listing action with a general notice. 16 U.S.C. § 1533(b)(3)(B). Finally, the Secretary shall finalize the regulation to implement their listing determination "within the one-year period beginning on the date on which general notice is published." 16 U.S.C. § 1533(b)(6)(A). The petitioner also requests that critical habitat be designated for Columbia yellowcress concurrently with the species being listed, pursuant to 16 U.S.C. § 1533(a)(3)(A) and 50 C.F.R. § 424.12.

The Center for Biological Diversity ("Center") is a nonprofit, public interest environmental organization dedicated to the protection of imperiled species and the habitat and climate they need to survive through science, policy, law, and creative media. The Center is supported by more than 1.7 million members and online activists across the country. The Center works to secure a future for all species, great and small, hovering on the brink of extinction. The Center submits this petition on its own behalf and on behalf of its members and staff with an interest in protecting Columbia yellowcress and its habitat.

Submitted this 6th of August, 2025.

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Executive Summary

Columbia yellowcress (*Rorippa columbiae*) is a low-growing, rhizomatous, perennial herb of the mustard family with small, yellow flowers. The species grows in wet or damp habitats that are periodically disturbed by seasonal inundation patterns, such as the shorelines of lakes, playas, riverbanks, streams, marshes, and mudflats. Its life cycle is closely tied to hydrological cycles, flowering soon after water levels drop in the early summer and reproducing sexually and asexually until moisture is no longer available. Found in Washington, Oregon, and northern California, Columbia yellowcress is likely a relic species adapted to the glacial and interglacial cycles that created the ancient lakes of the Pleistocene epoch. Many of the modern-day lakes and wet patches in the Pacific Northwest where Columbia yellowcress still grows are remnants of those ancient lakes.

Columbia yellowcress is rare throughout its range and has experienced significant declines in both the number of remaining populations and the size of individual populations. Dam construction and subsequent management of water flows have extirpated many Columbia yellowcress populations and threaten many other populations by altering the hydrological cycles the species depends on. Cattle grazing and trampling and off-road vehicle use are also major threats to the species, directly destroying plants and degrading habitat. Encroachment from woody vegetation, competition from invasive weeds, continued alteration of hydrological cycles from climate change, and a host of other demographic, ecological, and anthropogenic factors also threaten the species. State regulations and federal efforts to monitor and conserve Columbia yellowcress have been inadequate to halt these threats or prevent the species' decline.

Alarmed by these declines and the continued threats to the existence of this species, this petition by the Center for Biological Diversity seeks Endangered Species Act protection and critical habitat designation for Columbia yellowcress. The U.S. Fish and Wildlife Service must take immediate action to ensure that this imperiled rare plant species will be protected today and for future generations.

I. Introduction

Columbia yellowcress was first rigorously observed in the late 1800s from specimens collected along the Columbia River near Bingen, Washington—a population which has long since been extirpated (Stuckey 1972, 295; Sauer and Leder 1985, 199). Columbia yellowcress is native to Oregon, Washington, and California. The primary environmental requirement that every Columbia yellowcress population shares is a watery habitat with seasonal inundation, generally inundated in winter, wet in spring, and quite dry by late summer (Goldenberg 1993, 6; Kentnesse 2017a, 48). The species has been found near all types of bodies of water with fluctuating levels, usually growing in a band along the high-water mark (Goldenberg 1993, 7; Gehring 1994, 2).

Columbia yellowcress occurrences can be divided into three broad regions: the Columbia River (Oregon and Washington), southern Oregon/northern California, and Malheur Lake in Oregon, which is presumed extirpated. NatureServe ranks Columbia yellowcress as vulnerable (G3) globally, vulnerable (S3) in Oregon, imperiled (S2) in California, and imperiled to critically imperiled (S1S2) in Washington, but these classifications have not been reviewed since 2009 (NatureServe 2025). The Bureau of Land Management (BLM) and U.S. Forest Service (USFS) classify it as a sensitive species (USFS 2019; BLM 2021, 21; USFS 2022, 2). The state of Oregon recently reviewed the status of Columbia yellowcress and determined it to be endangered under the Oregon Endangered Species Act (ODA 2024, 1).

Columbia yellowcress was first considered for Endangered Species Act ("ESA") listing in 1975 (40 Fed. Reg. 27824, 27839, 27869, 27885). The U.S. Fish and Wildlife Service ("the Service") found that ESA protections were "not warranted" in 1993, but only because the Service claimed it lacked information to determine the species' status (58 Fed. Reg. 64828, 64829-30, 64843). The Service's determination also acknowledged that the species may require specific habitat that is vulnerable to alteration and that it may be threatened from man-caused changes to the environment (58 Fed. Reg. 64828, 64829-30).

Scientific understanding of Columbia yellowcress and the threats it faces has increased significantly in the over 30 years since the Service denied it protections, and the best available science shows that the species is imperiled. Columbia yellowcress has experienced significant declines across its range. Damming and other hydrological alterations have extirpated many historical Columbia yellowcress populations and threaten many others. Cattle impacts, off-highway vehicle use, and other demographic, ecological, and anthropogenic factors also threaten the species. To prevent the disappearance of this species, this petition requests the Service to immediately list Columbia yellowcress under the ESA and designate critical habitat.

II. Natural History

A. Description and taxonomy

Figure 1. Columbia yellowcress at Meiss Lake, California. Credit: Donald Burk.

Kingdom: Plantae (Plants)
Division: Magnoliophyta (Flowering plants)
Class: Magnoliopsida (Dicotyledons)
Order: Capparales
Family: Brassicaceae (Mustard family)
Genus: Rorippa (Yellowcress)

Species: *Rorippa columbiae* (Columbia yellowcress)

Columbia yellowcress is a rhizomatous perennial herb of the mustard family (*Brassicaceae*) (Al-Shehbaz 2012; Kentnesse 2017a, 7). It grows low to the ground with clusters of small, yellow flowers on elongated racemes, persistent sepals, and finely hairy features (Kentnesse 2017b, 3).

The species was first rigorously observed by Wilhelm Suksdorf, who distributed plants collected from the Columbia River near Bingen, Washington to several botanists (Stuckey 1972, 295).

Benjamin Robinson published the taxon in 1895 as "Nasturtium sinuatum Nutt. var. Columbiae, Suksdorf (as spec.)" in Sereno Watson's treatment of *Rorippa* in Asa Gray's *Synoptical Flora of North America* (Watson 1895, 147). Thomas Howell, unaware of Robinson's work, described the taxon as a species under the name *Roripa* [sic] *columbiae* in 1897 (Howell 1897, 40). Both works cited to Suksdorf's collection. Rollins treated it as a variety of *Rorippa calycina* (Rollins 1941) and at least one report confused Columbia yellowcress with *Rorippa calycina*, mistakenly expanding Columbia yellowcress's range to Montana, Nebraska, and New Mexico (Peck 1961, 369). But *Rorippa columbiae* is now treated as its own species within the section *Sinuatae*. According to Stuckey (1972), *Rorippa columbiae* and the five other taxa it is grouped with in *Sinuatae* comprise the group of *Rorippa* with the most primitive characteristics, likely indicating an old group of plants that were once more widespread and variable (p. 306). These primitive characteristics include: perennial growth habit, clone formation, petals longer than the sepals, elongate anthers apiculate at the apex, long styles, and relatively few and large, prominently colliculate seeds (Stuckey 1972, 306). However, modern techniques in systematics and detailed genetic analysis have not yet been performed on *Rorippa* or the section *Sinuatae* (Kentnesse 2017a, 4).

Rorippa columbiae does not currently have recognized subspecies or varieties (Kentnesse 2017a, 4). Common names include Columbia cress, Columbia yellowcress and Columbian yellowcress (USDA NRCS 2025). Previously accepted synonyms for *Rorippa columbiae* include *Nasturtium sinuatum* Nutt. var. *columbiae* Suksd. ex B.L. Rob, *Roripa sinuata* Nutt. var. *pubesens* Howell, *Nasturtium columbiae* Suksdorf ex Howell, *Radicula columbiae* (Howell) Green, and *Rorippa calycina* (Engelm.) Rydb. var. *columbiae* (Suksd. ex B.L. Rob.) Rollins (Stuckey 1972, 294; USDA NRCS 2025).

Rorippa columbiae is closely related to *Rorippa subumbellata*, but it differs in having more elongate racemes, densely pilose siliques, usually longer pilose style, and expanded stigma. *Rorippa columbiae* is also closely related to *Rorippa calycina* but is distinguished by the deeply pinnatifid lobes of the leaves with minutely toothed margins; more oblong, slightly thicker siliques on ascending pedicels; and well-developed expanded stigma (Stuckey 1972, 295). *Rorippa calycina* also has strigose (short and stiff hairy) vestiture (USFS 2022, 1). *Rorippa columbiae* is generally distinct from other North American *Rorippa* in that its stems, pedicels, sepals, siliques, styles, and both leaf surfaces are covered in soft, dense, spreading hairs. (Stuckey 1972, 295; Kentesse 2017a, 6).

Kentnesse (2017a, 4-5) presents the following technical description synthesized from Peck (1961, 369), Stuckey (1972, 294-95), Hitchcock and Cronquist (1973), and Al-Shehbaz (2012):

> **General:** perennial, slender roots or rhizomes, all anatomical parts finely pubescent or papillose
>
> **Stems:** ± erect or decumbent to prostrate, repeatedly branched, weak, pubescent with soft spreading hairs, 1 – 40 cm long
>
> **Leaves:** lower leaves often petioled, can be sessile or clasping, 4 – 7 cm long; upper leaves often sessile or clasping, can be petioled, 2.4 – 5.2 cm long; all leaves with sinuate

to pinnatifid, sometimes irregular laciniate lobes, entire to dentate margins, oblanceolate to oblong shape, and ± pubescent

Inflorescences: terminal and axillary elongated racemes, spreading to ascending, 4 – 8 mm long, flower pedicels ± appressed

Flowers: 4 yellow petals, oblanceolate to spoon-shaped, pedicellate, 2.7 – 4.2 mm long, 0.7 – 1.7 mm wide, petals longer than sepals; sepals ascending, oblong, pubescent, persistent long after anthesis, slightly saccate at base, 2.0 – 3.5 mm long; stigma not lobed or divided, style 1 – 2.5 mm long, pubescent; 6 stamens; flowering can occur from May to November depending on location

Fruits: ± compressed silicles; ovate to oblong, turgid, pubescent, slightly arcuate, pedicellate, 2 valved, 3 – 7 mm long, 1.5 – 3 mm wide; dry, dehiscent separation of two carpels when ripe with persistent placentae and septum

Seeds: ovoid-spheric, tan-orange, 20 – 40 seeds per silicle, 0.7 – 0.9 mm long.

Figure 2. Columbia yellowcress flowers. Credit: Gerald D. Carr.

B. Habitat requirements

Columbia yellowcress's life cycle likely reflects adaptations to the habitat of ancient lakes of the Pleistocene epoch (1.8 million to 11,700 years ago) that covered large portions of southeastern Oregon and parts of northern California. The glacial and interglacial climatic cycles of the Pleistocene epoch created lakes that experienced continuous cycles of rising and falling waters. Many of the lakes and wet patches in Columbia yellowcress's range are remnants of these ancient lakes (Kentnesse 2017a, 48-49).

Columbia yellowcress grows in damp to wet soils of a variety of types, including clay, sand, gravely, sandy silt, cobblestones, and rocks (Gehring 1992, 2). The primary environmental requirement that every Columbia yellowcress population shares is seasonally inundated habitat, including both lotic and lentic systems (Kentnesse 2017a, 48). Accordingly, Columbia yellowcress has been observed near all types of bodies of water, including natural ones, such as rivers, intermittent snow-fed streams, permanent lakes, snow-fed lakes, internally drained lakes which may be dry for extended periods of time, riparian flood-meadows, and playas; and man-made wetlands like irrigation ditches and roadside ditches (Gehring 1992, 2). The species is consistently reported to grow in a band just above, at, or below the high-water mark of environments with fluctuating water levels (Goldenberg 1993, 7; Gehring 1994, 2). Generally, the habitats are inundated in winter, wet in spring, and may be quite dry by late summer (Goldenberg 1993, 6). As a result of seasonal inundations, these habitats tend to be open, with low cover of associated species (Goldenberg 1993, 7-8; Kaye 1996, 4). Generally, Columbia yellowcress appears to be less successful near dense vegetation that competes for light (Kentnesse 2017a, 44).

Thus, although Columbia yellowcress grows on graded landscapes and has been noted to occasionally grow in more shaded habitats, it tends to be most successful in open landscapes at a lower gradient. (Kentnesse 2017a, 43-44). The most successful Columbia yellowcress populations appear to be high-flow lotic systems with ample wet, terrestrial habitat, most notably the Hanford Reach population on the Columbia River (Kentnesse 2017a, 48).

However, Columbia yellowcress likely cannot survive either too much or too little water (Habbeger 1997, 11). Although it is well-adapted to regularly disturbed environments, human water management regimes such as dam-controlled water flows that keep water levels unseasonally high can interfere with the species' growing season (Harris 1992, 3; Kentnesse 2017a, 50-52).

Figure 3. Columbia yellowcress habitat on the north shore of Pierce Island, Washington in 2007. Credit: Joe Arnett, Washington Department of Natural Resources, Natural Heritage Program.

Figure 4. Columbia yellowcress at Pierce Island, Washington in 2018. Credit: Walter Fertig.

C. Life history and reproductive biology

The life history of Columbia yellowcress is closely tied to the water regime of its habitat (Salstrom and Gehring 1994, 18). Though Columbia yellowcress is a perennial that regrows from extensive underground roots and rhizomes each spring, it also behaves like an annual, growing quickly and producing abundant flowers, fruits, and seeds (Kentnesse 2017b, 3). Once water levels drop to reveal Columbia yellowcress habitat, shoots have been reported to appear 10-14 days afterwards (Gehring 1990, 9; Kentnesse 2017b, 16). The plant matures quickly thereafter, often displaying buds and entering anthesis within a month of initial emergence. Fruits typically develop within a month of flowering. The window for flowering and fruiting can be a short as 1 month or as long as 3 months or longer (Kentnesse 2017b, 16).

Both sexual and vegetative reproduction are strategies for Columbia yellowcress. Columbia yellowcress produces abundant flowers, fruits, and seeds relatively soon after germination, typically described as producing between 20-40 seeds per silicle (Al-Shehbaz 2012; Kentnesse 2017a, 19) and numerous fruits per ramet, as many as 4,033 (Kentnesse 2017a, 19). Flowering typically begins in May and June (and has been noted to begin as early as April), although it can begin as late as September or October (Gehring 1992, 9; Salstrom and Gehring 194, 18-19; Kentnesse 2017b, 16-17). Flowering ends as moisture becomes less available. As moisture becomes less available, Columbia yellowcress stops flowering and fruiting, dries out, and dies back for winter (Kentnesse 2017b, 16-17).

However, the amount of sexual reproduction varies considerably both across populations and from year to year (Gehring 1992, 9). The amount of reproduction seems to depend on the habitat suitability and annual conditions (Gehring 1992, 9; Salstrom and Gehring 1994, 18; Kentnesse 2017b, 16). Reproductive success of the species appears to require long days of sun exposure well into the season; otherwise, flowering may not occur. High water levels in rivers and other habitats may thus interfere with reproduction by inundating individuals (Gehring 1994, 10). In most populations, a high percentage of above-ground stems remain vegetative and do not flower (Gehring 1992, 9).

Columbia yellowcress also reproduces asexually through vegetative clonal growth. Although there is some unresolved terminology discrepancy around what root versus rhizome is for the species, the species' root/rhizome material clearly produces viable shoots, and root material near root tips produces new green, leafy ramets when exposed to light (Kentnesse 2017a, 10). Columbia yellowcress found growing in clusters of above-ground stems may be largely clonal (Gehring 1992, 8; Gehring 1994, 2). Clones may be very large, as stems have been observed in clusters numbering in the thousands (Gehring 1994, 2). Vegetative growths have been observed reaching at least 3 meters in length (Kentnesse 2017a, 10-11). But separate individuals have also been observed at distances of only a few centimeters from each other, so closely situated stems cannot always be assumed to be clonal ramets (Kentnesse 2017a, 11).

Water is likely the primary dispersal method for seeds and rhizome fragments (Salstrom and Gehring 1994, 20; Kentnesse 2017a, 17). Seeds are well-adapted for dispersal by water as they have shown propagule buoyancy, flotation longevity, and post-immersion viability (Kentnesse 2017a, 18). Waterfowl may also disperse seeds by carrying them externally or ingesting them

and Columbia yellowcress occurs at sites frequented by waterfowl (Salstrom and Gehring 1994, 20-21). Given the small size and mass of seeds, wind dispersal may also be possible (Kentnesse 2017a, 18).

Columbia yellowcress is likely adapted for insect pollination (Salstrom and Gehring 1994, 20). Several species of insects, including butterflies, moths, bees, wasps, and flies have been observed visiting the flowers and may be pollinators (Gehring 1992, 9; Salstrom and Gehring 1994, 20; Kentnesse 2017a, 14). Generally, Columbia yellowcress flowers are unspecialized and could theoretically accept a variety of insect pollinators (Kentnesse 2017a, 14). The species can also probably self-pollinate (Gehring 1992, 9).

Columbia yellowcress has been observed surviving seasonal inundations on the Columbia River, and apparently, roots and rhizomes can survive with no above-ground growth for several years (Gehring 1992, 9). Plants not seen for several years have in later years been seen covering large areas. Some observations suggest that plants may be able to initiate dormancy during the growing season if conditions become unfavorable (Salstrom and Gehring 1994, 19). Experimental results suggest that Columbia yellowcress requires light and warm temperatures to germinate and has the greatest success in full-light conditions and temperatures between 15-25°C and greater (Kentnesse 2017b, 28-33; Mitchell and Harris 2025, 11-12). These conditions are likely obtained after seasonally inundating waters have retreated, providing warmth and light and perhaps ensuring less competition from other species (Kentnesse 2017b, 33). Dry conditions may stress plants and limit future reproductive success if the plants divert energy into maintaining vegetative tissues instead of reproductive structures (Mitchell and Harris 2025, 14).

The limits of the species' life span are unknown but may be at least ten years (Kentnesse 2017a, 7).

D. Current and historical range

Columbia yellowcress is found in southern Washington and northern Oregon on the gravelly shoreline of the Columbia River. It is also found in seasonally wet areas in the high desert in south-central Oregon and northern California (Kentnesse 2017a 40-41; USFS 2022, 2; Natureserve 2025). Columbia yellowcress occurrences can be divided into three regional concentrations: the Columbia River (Oregon and Washington), southern Oregon/northern California, and Malheur Lake in Oregon, which is presumed extirpated.

Columbia yellowcress's range may track the lava soils of the Columbia River lava plateau from the Tertiary age (Stuckey 1972, 296). Thus, Columbia yellowcress may be a relic species with a much wider historical range throughout the old soils of the Columbia River lava plateau (Stuckey 1972, 296, 386-90). Kentnesse (2017a) suggests that the historic range of Columbia yellowcress was fairly consistent with its current range, but was more abundant, widespread, and continuous throughout its range (p. 24).

E. Population status and trends

Columbia yellowcress has experienced significant declines in both the number of surviving populations and the sizes of those populations across its remaining range. The best-studied populations are in Oregon and Washington, and almost all these populations have exhibited declines, including the species' largest population center at the Hanford Reach in Washington state. Populations in California are less well-studied, and while available data suggest that some of these populations may be relatively stable or increasing, others are decreasing.

Washington

Columbia yellowcress in Washington state is located only along the banks and islands of the Columbia River. These occurrences can be separated into two distinct regions: one large population of Columbia yellowcress along the Hanford Reach in central Washington, and several smaller, scattered populations located along the Lower Columbia, below the Bonneville Dam.

Washington-based Columbia River Columbia yellowcress populations are perhaps the best-studied in the species' range and have been surveyed with relatively high frequency from 1985 to the present (Kentnesse 2017a, 33; Exe and Johnson 2025, 3-33).

Almost all Columbia yellowcress populations in Washington state appear to have declined over time, and the vitally important Hanford Reach population shows signs of only limited sexual reproduction. A population once reported above the Bonneville Dam has long been extirpated.

Hanford Reach

The Hanford Reach is an over 50-mile stretch of the Columbia River, delimited by the Priest Rapids Dam upstream at River Mile 397 and the McNary Dam pool downstream at River Mile 345, near Washington's tri-cities (Harris 1992, 1-2). The river channel was carved over 10,000 years ago by intense meltwater flows from retreating glaciers (Harris 1992, 2). Today, the Hanford Reach has a substrate of gravel, cobble, and bedrock along a swiftly flowing current punctuated by numerous islands, gravel bars, and other features that alter the flow (Harris 1992, 2). It is a warm, semi-arid, high light environment. (Kentnesse 2017a, 56).

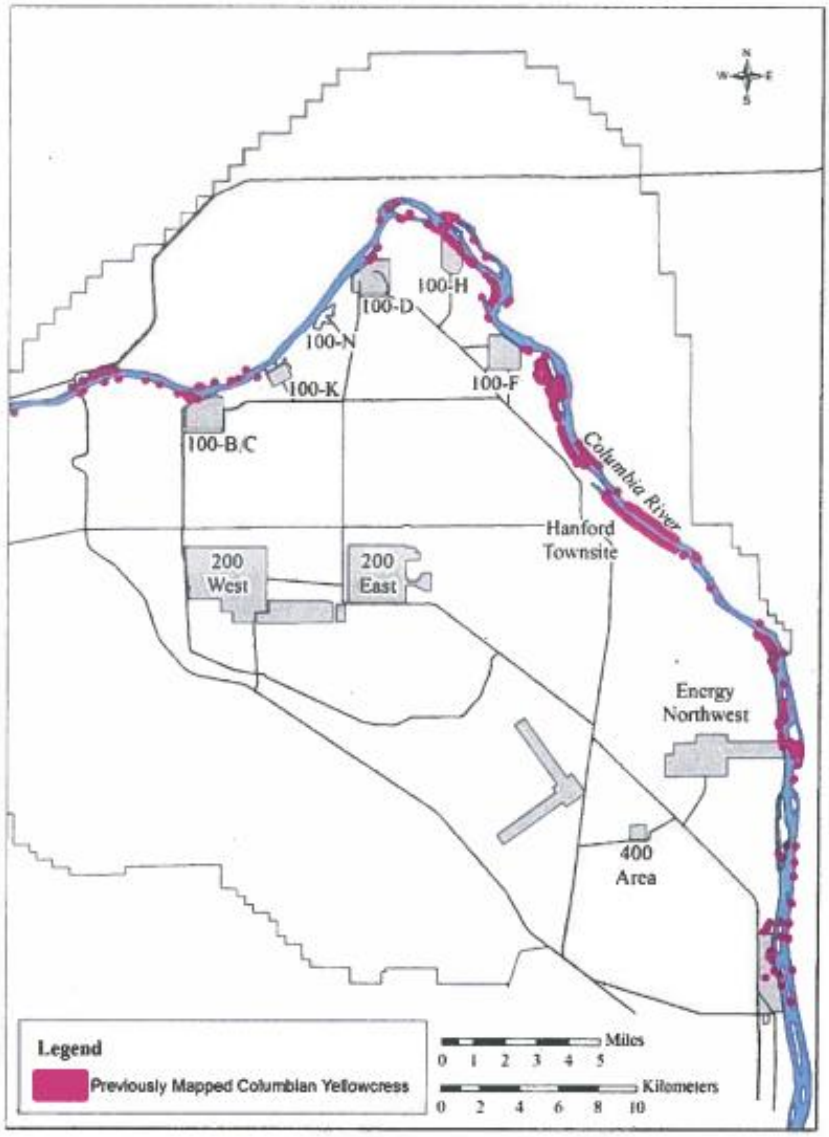
The Hanford Reach population is the largest population center for Columbia yellowcress; the most recent survey in 2012 counted at least 90,000 stems growing in the area, 74% of the total stems for the species across its range (Marshall 2024, 6). At least 16 populations occur along the Hanford Reach, although previous studies and local database record-keeping practices do not clearly distinguish boundaries between populations (Kentnesse 2017a, 56). Kentnesse (2017a) provides the following list of 16 populations:

1. Vernita Bridge
2. 100 B&C areas
3. Coyote Rapids Island
4. 100-D area
5. Wahluke area
6. 100-H area
7. Locke Island
8. White Bluffs Ferry
9. SE of 100-F area
10. Hanford Townsite
11. Savage Island
12. Plow Island
13. Ringold Boat Launch
14. Homestead Island

15. Wooded Island 16. Johnson Island

(p. 56)

Figure 5. Previously mapped Columbia yellowcress populations around the Hanford Reach circa 2010. Source: Salstrom et al. 2012.



Although long-term trends can be difficult to discern because the number of stems can fluctuate widely depending on climatic conditions year to year, one of the few long-term monitoring projects for the species shows precipitous population declines in the lower Hanford Reach (Kentnesse 2017a, 32-33). Monitoring transects on Homestead Island showed a decrease from 1,176 stems in 1994 to 0 stems in 2002, and similar declines from around 1,000 stems to fewer than 10 in transects on North Forked Island and Plow Island (Caplow 2003, 1-3–1-4). In 1992, the area from White Bluffs Boat Launch to the Ringold Boat Launch supported at least 36,000 stems, but visual surveys in 2002 reported only 200 stems (Caplow 2003, 1-4). The upper and

middle portions of the Hanford Reach may be relatively stable, by contrast (Salstrom et al. 2012, 14). Large populations have been reported along the Hanford Reach most recently in 2019 (Fertig 2020, 84). But more recent monitoring at a subset of sites along the bank of the Columbia River reveals continuing decline of the species—2,134 stems in 2024 down from a high of 5,575 stems in 2011 (Exe and Johnson 2025, 3-33).

Even more concerning is the evidence of limited sexual reproduction throughout the Hanford Reach. The presence of flowers and fruit decreased precipitously between 1995 and 1998, with virtually no sexual reproduction taking place in 1998 or 2002 (Caplow 2003, 1-4). And of the 90,000 stems that Salstrom et al. reported in 2012, only 126 had evidence of flowers or flower buds (although this low count may be due in part to some of the survey being conducted early in the season when stems were just emerging, p. 8).

Lower Columbia River

Columbia yellowcress occurs at several locations in Washington along the Lower Columbia River. These populations are part of the Columbia River Gorge population complex that also occurs nearby on the Oregon side of the river (Gehring 1992, 2; Kentnesse 2017a, 26). Kentnesse (2017a) estimates that Columbia yellowcress populations along the Lower Columbia (both Oregon and Washington) represent 4% of global Columbia yellowcress stems (p. 26).

The populations downstream of the Bonneville Dam have all declined over time. The one population that was known to exist upstream of the Bonneville Dam has long been extirpated.

Pierce Island on the Columbia River was formerly owned by The Nature Conservancy and is now owned and managed by the Columbia Land Trust (Kentnesse 2017a, 55). Pierce National Wildlife Refuge is adjacent to the island, on the north shoreline of the Columbia River. Columbia yellowcress habitat occurs on the north, east and south sides of the island on open, bare gravel and cobble, and across from the island on the bank of the wildlife refuge (Kentnesse 2017a, 55). Monitoring of six permanent transects on the island and refuge showed declines in stem density and frequency in all but one transect, and infrequent flowering from 1991 to 1998 (Habegger et al. 2001, 74). Earlier studies had also reported population declines, and that these declines were not merely the result of yearly variations (Gehring 1994, 11). The most recent estimates of stem counts are 2,785 at Pierce Island and 525 at Pierce National Wildlife Refuge (Kentnesse 2017a, 27).

A very small population has been reported at Beacon Rock State Park, a short distance downstream from Pierce Island (Gehring 1990, 5). But a mere 20 stems were reported in 2000, and no plants were observed in 2012 (Kentnesse 2017a, 32).

Two small populations occur shortly upstream of Pierce Island on Ives Island (55 stems estimated in 2007) and Hamilton Island (385 stems estimated in 2016) (Kentnesse 2017a, 27).

Although a Columbia yellowcress population once existed upstream of the Bonneville Dam near Bingen, Washington, as this is one of the first places that specimens were collected, this population has long been extirpated, likely after the original site was inundated following completion of the Bonneville Dam in 1938 (Sauer and Leder 1985, 199; Kentnesse 2017a, 32).

No seed development has been observed for years in the Columbia River Gorge Columbia yellowcress populations (Kentnesse 2017a, 33).

Oregon

In Oregon, Columbia yellowcress can be grouped into three regional concentrations: along the Lower Columbia (part of a population complex with occurrences in Washington); the mountains and high deserts of southern Oregon (part of a population complex that extends into northern California); and at Malheur Lake in southeastern Oregon, which has been extirpated (Marshall 2024, 6). Two populations in central and eastern Oregon have also long been extirpated (Marshall 2024, 8).

The status of the extant populations along the Lower Columbia is either unknown or relatively stable. But most of the southern Oregon populations have seen stem declines over the past several decades, and many other southern Oregon populations have long been extirpated.

Lower Columbia River

Several populations of Columbia yellowcress in Oregon are part of the Columbia River Gorge population complex that includes occurrences on the Washington side of the river (Gehring 1992, 2; Kentnesse 2017a, 26). Kentnesse (2017a) estimates that Columbia yellowcress populations along the Lower Columbia (both Oregon and Washington) represent 4% of global Columbia yellowcress stems (p. 26). Two populations (Old Mouth and Sandy River Delta) appear to be relatively stable or even growing and the status of one (Moore Island) is unknown, but the other three (Sauvie Island, McCord Creek, Umatilla County) are likely extirpated.

A population at the Old Mouth of the Sandy River was first observed in 1980 with 100-300 plants, in 1982 with 500-1000 plants, and 200 plants in 1987. The most recent estimate, in 2013, is 1,057 stems (Gehring 1992, 2; Kentnesse 2017a 27, 32; Marshall 2024, 8).

A population at the Sandy River Delta was estimated to have 750 stems in 1982, 50 plants in 1992, and 548 stems in 2013 (Marshall 2024, 8; Kentnesse 2017a, 27, 32).

A population occurring on tidal flats at Moore Island near Portland, Oregon was last observed in 2004, with an unknown number of stems (Kentnesse 2017a, 27, 54).

A population of only 3 stems was observed at the mouth of McCord Creek in 1984 but has not been observed since (Kentnesse 2017a, 32).

Herbarium specimens were collected from a population at Sauvie Island in 1884, which is now presumed to be extirpated (Marshall 2024, 8).

One population was reported in 1915 at an unspecified location much farther upstream along the Columbia River in Umatilla County, and is presumed extirpated (Marshall 2024, 8).

Table 1. Plant counts of *Rorippa columbiae* in the Columbia River Gorge by Oregon Biodiversity Information Center (ORBIC) Element Occurrence ID (EO ID). Population trend included, if known. Herbarium specimen information from OregonFlora; some locations are too general to warrant EO records per ORBIC policy. Adapted from Marshall 2024.

EO ID	Land ownership	Site name	Presence	Obs. year	Count
	Private / Unknown	(Sauvie Island, Multnomah Co.)	Presumed extirpated	1884	herbarium
27846	City of Portland	Moore Island	Presumed extant	2004 1884	present herbarium
15214	USA / Unincorporated	Sandy River Delta	Presumed extant	2013 1992 1982	548 50*, herbarium 750
4882	USA / Unincorporated	Old Mouth of Sandy River	Presumed extirpated	2013 1987 1982	1057 stems 200 200
2164	Oregon Parks and Recreation Dept (OPRD) / US Forest Service (USFS) Mt Hood NF	Mouth of McCord Creek	Presumed extirpated	1992 1988 1984 1932	0 a few a few herbarium
	Private / Unknown	(Union or Umatilla Co.)	Historical	1987	present
	Private / Unknown	(Columbia River, Umatilla Co.)	Presumed extirpated	1915	herbarium

* From Kentnesse 2017a: indicates stem counts are exact counts

Southern Oregon

Columbia yellowcress populations in southern Oregon are part of a population complex extending into northern California. Generally, Columbia yellowcress in southern Oregon is separated by mountain ranges and uplands and therefore limited by topographical depressions that collect water within the landscape (Kentnesse 2017a, 28)

In southern Oregon, Columbia yellowcress populations are clustered within four drainage basins: the Middle Rogue subbasin, Sprague River subbasin, Lost River subbasin, and Goose and Summer Lakes basin (Kentnesse 2017a, 28). In the Middle Rogue subbasin, one Columbia yellowcress population occurs at Emigrant Lake, a dam-impounded reservoir southeast of Ashland (Kentnesse 2017a, 57). In the Sprague River subbasin, four populations are found along the Sprague River, one is found in the Rock Creek tributary (also known as Dam's Canyon – Dam's Meadow), and one is found in the Buck Creek tributary (Kentnesse 2017a, 57). In the Lost River subbasin, two populations occur in shallow reservoirs on Stukel Mountain, a high elevation recharge zone that channels snowmelt and precipitation into the Lost River, and one occurs in Malone Reservoir (Kentnesse 2017a, 57). In the Summer Lakes basin, Columbia yellowcress occurs within the Lakeview Area; two populations occur in high desert playas east of Lake Albert, and one population occurs in a roadside ditch near the town of Silver Lake, with seasonal water sourced from both natural perennial rivers and wetlands, and flood irrigation (Kentnesse 2017a, 57).

Five of the 13 extant southern Oregon populations are very small, having 12 stems or less. Total abundance for southern Oregon Columbia yellowcress in 2017 was estimated at 11,380 mature plants, approximately 9% of the total for the species (Kentnesse 2017a, 28).

Of those populations that have not been extirpated in southern Oregon, the majority are declining. Some of these declines have been drastic. In the Lakeview area, for example, the Foley Lake population has dropped from approximately 1,000 plants at its peak in 1983, to 0 plants in 2016, although plants were once again present in 2023 (Kentnesse 2017a, 34; Marshall 2024, 17). The Dam's Canyon and Meadow occurrence had only 115 plants in 2023, down from a peak of over 2,700 in 1997 (Marshall 2024, 17).

The two Stukel Mountain sites lost so many stems that in 2022, the Institute for Applied Ecology (IAE) partnered with the Bureau of Land Management Lakeview District to outplant seeds at Stukel Mountain (Mitchell and Harris 2023, 1; Marshall 2024, 7, 17). IAE collected seed from five different sites in Oregon and outplanted plugs at Stukel Mountain in 2023 and at Foley Lake, Featherbed Lake, Paulina Marsh, and Stukel Mountain sites 1 in 2024 (Marshall 2024, 17; Mitchell and Harris 2025, 7-9). IAE also outplanted plugs to establish two new sites at Stukel Mountain, Stukel Mountain 3 and 4 (Mitchell and Harris 2025, 7-9). Survival rates of the outplanted plugs varied but do not generally appear to be high. For example, IAE estimated an 85.9% survival rate for combined natural and outplanted plants at Stukel Mountain 1, but Stukel Mountain 3 had a success rate of only 3.9% and Featherbed Lake had a survival rate of only 12.6% (Mitchell and Harris 2025, 7-9). All told, only two sites appeared to have a greater than 50% rate of survival but the other four had a survival rate of 20% or less (Mitchell and Harris 2025, 12). Additionally, these survival rates merely from preliminary years, and may decline further.

In southern Oregon, only the Sprague River Main site in Klamath County appears to maintain a healthy Columbia yellowcress population that is naturally increasing in number, from 650 stems in 1994 to over 6,300 in 2016 (Kentnesse 2017a, 34). Paulina Marsh in Lake County has also showed signs of natural increase, from 100 stems in 1985 to over 3,600 in 2016 (Kentnesse 2017a, 34). But Columbia yellowcress plants were not readily visible to biologists from the Oregon Department of Agriculture who visited the site in 2023, and appeared to have declined in abundance to hundreds, rather than thousands, of plants. However, more plants may be present on the privately owned portions of Paulina Marsh on either side of the road (Jordan Brown, personal communication, August 5, 2025).

Many populations and subpopulations once found in southern Oregon have likely been extirpated, including: at Mt. McLoughlin; on the Sprague River; at Binkey Lake; on the Buck Creek Tributary; and near Keno and Klamath Falls. A population near Silver Lake that once had 350 stems has not been seen since 2001 (Kaye et al. 1993, 14-19; Kentnesse 2017a, 33; Marshall 2024, 8-16).

Table 2. *Rorippa columbiae* plant counts in southern Oregon by Oregon Biodiversity Information Center (ORBIC) Element Occurrence ID (EO ID). Population trend included, if known. Herbarium specimen information from OregonFlora; some locations are too general to warrant EO records per ORBIC policy. Adapted from Marshall 2024.

EO ID	Land ownership	Site name	Presence	Obs. year	Count
	USFS Rogue River - Siskiyou NF	Mt. McLoughlin	Presumed extirpated	1916	herbarium

	Unknown	(Jackson Co.)	Historical	1951	herbarium
39099	USA	Emigrant Lake	Presumed extant	2016	36
39098	Jackson County	Emigrant Lake	Presumed extant	2016 2013 2012	4 herbarium herbarium
39097	USA	Emigrant Lake	Presumed extant	2016	40
34026	USFS / Oregon Dept of Transportation (ODOT)	Odell Lake	Presumed extant	2005	herbarium
32009	USFS / ODOT	Hwy 58 (S of Crescent Lake State Airport)	Presumed extant	2020 2005	0 herbarium
4598	USFS Fremont-Winema National Forest (FWI) / Private	Sprague River Seput Land Exchange	Presumed extant	2016 2015 2014 1994 1993	12** 7 6 17 3
39101	The Nature Conservancy	Williamson River Delta	Presumed extant	2016 2014	47 present
2989	USFS FWI	Sprague River Main	Extant	2023 2022 2016 2015 2014 1995 1994	present present 6390* 2756* 2620* < 650 650
39096	Klamath Lake Land Trust	Sprague River KLLT	Presumed extant	2016 2015	574 500*
18754	USFS FWI / Private	Dam's Canyon & Meadow	Extant	2023 2017 2016 2015 2014 2001 1997 1995 1993	115 538, herbarium 398** 230 246 present 2772 present 2279
23447	USFS FWI	Buck Creek Tributary	Presumed extant	2017 2016 2015 2014 1999 1997 1995 1994	6 7** 1 11 309 265 < 150 150
7309	USFS FWI	(Sprague River West)	Presumed extirpated	2014 1997 1993	0 0 24 stems
	Private	west of Klamath Falls	Historical	1960	herbarium
	Private	Klamath Falls	Presumed extirpated	1927	herbarium
	Private / Unknown	4 miles E of Klamath Falls	Presumed extirpated	1916	herbarium
39523	ODOT / Private	Hwy 140	Presumed extant	2012	present

	Unknown	(Klamath Co.)	Presumed extirpated	1937	herbarium
	Private	5 miles SE of Klamath Falls	Presumed extirpated	1919	herbarium
	Unknown	near Keno (Klamath Co.)	Presumed extirpated	1931 1920	herbarium
25920	Bureau of Land Management (BLM) Lakeview District	Stukel Mountain 1/ Stukel pond / BLM Stukel Site 1 Cluster 6	Extant	2024 2023 2022 2020 2019 2018 2017 2016 2015 2014 2001	250**** 202 22 7 4 3 3 3 14 43*** 20
294	BLM Lakeview District / Private	Stukel Mountain 2	Extant	2024 2023 2022 2020 2018 2016 2015 2014 2000 1999 1997 1996 1995 1994 1993 1992 1983 1937	0 0 6 9 12 21 45 43*** 193 252 202 156 101 72 54 26 115 herbarium
	Private	Malin (Klamath Co.)	Historical	1951	herbarium
39100	Private	Malone Reservoir	Presumed extant	2016 2015 1951	0 12 herbarium
22953	Private	Paulina Marsh	Presumed extant	2012 2010 2006 1999 1990 1985 1980	5 298 10, herbarium present 1200 60-80, herbarium herbarium
29779	Private / Lake County	Paulina Marsh	Extant	2023 2016 1996 1985	present 3657* herbarium ~30
20799	ODOT / Private	Silver Lake (Lake Co.)	Presumed extirpated	2016 2012 2001 1995 1991 1989	0 0 present 0 herbarium (blank)

				1985	350, herbarium
				1919	herbarium
29778	BLM Lakeview District	Summer Lake	Presumed extant	2007	present
14372	BLM Lakeview District	Featherbed Lake / ROCO3_B	Presumed extant	2023	15
				2018	0
				2016	113**
				2015	10
				2013	56
				2012	34
				2011	0
				2007	9
				1995	0
				1994	0
				1991	present
				1990	200
				1989	100
				1988	not found (late)
				1983	100, herbarium
14375	BLM Lakeview District	Foley Lake / ROCO3_A	Presumed extant	2023	present
				2018	0
				2016	85**
				2015	47
				2014	0
				2013	0
				2011	0
				2007	89
				2005	0
				2003	550
				1996	371
				1995	290
				1994	5500
				1992	5500
				1991	present
				1990	200
				1989	600
				1988	200
				1984	125
				1983	~1000, herbarium
19413	BLM Lakeview District	Binkey Lake / ROCO3_C	Presumed extirpated	2018	0
				1995	0
				1983	1**, herbarium
	Private / Unknown	Goose Lake Valley	Presumed extirpated	1911	herbarium
	BLM Burns District / Private	Silver Lake (Harney Co.)	Presumed extirpated	1901	herbarium

* From Kentnesse 2017a: indicates stem counts are exact counts
** From Kentnesse 2017a: indicates stem counts are estimates, at least in part
*** Plant count is for Stukel Mountain 1 and 2 combined
**** Includes both naturally occurring and outplanted plants, see Mitchel and Harris 2025

Malheur Lake

The cobbly shoreline of Malheur Lake in Harney County once supported over 20 subpopulations of Columbia yellowcress numbering perhaps more than 10,000 stems (Kaye et al. 1993, 11-14,

23, 37-38; Kaye 1996, 5; Kentnesse 2017a, 33). But after dramatic moisture reductions following floods in 1983-87 and the recession of the lakeshore nearly two miles, these populations are presumed to have been lost (Kentnesse 2017a, 33; Marshall 2024, 15-16).

Table 3. *Rorippa columbiae* plant counts at Malheur Lake by Oregon Biodiversity Information Center (ORBIC) Element Occurrence ID (EO ID). Population trend included, if known. Herbarium specimen information from OregonFlora. Adapted from Marshall 2024.

EO ID	Land ownership	Site name	Presence	Obs. year	Count
14549	BLM Burns District	Malheur Lake / Beaver Lodge North	Presumed extirpated	1997 1995 1994 1993 1991 1988	0 0 0 11-50 650 11-50
1519	BLM Burns District / Private	Malheur Lake / Beaver Lodge South	Historical	1995 1993 1988	373 164 11-50
10803	BLM Burns District / Private	Malheur Lake / "on eastern shore of Malheur Lake, about 3 mi NW of Windy Point"	Historical	1993 1991 1988	1434 1001-10000, herbarium 11-50
20623	BLM Burns District / US Fish & Wildlife Service Malheur NWR	Malheur Lake	Historical	1988	11-50, herbarium
23313	Private	Malheur Lake	Historical	1988	herbarium
2990	BLM Burns District	Malheur Lake / "near windy point, 3 miles NW of Princeton"	Historical	1991	25
6764	BLM Burns District / Private	Malheur Lake / "stump site"	Historical	1991 1988	97 101-1000, herbarium
10819	Private	Malheur Lake / "debris tree"	Historical	1991	50
6763	Private	Malheur Lake / "road" and "siding #2"	Historical	1988	present

Other Oregon Populations

Two other Oregon populations are likely extirpated. A population at Baker City in eastern Oregon has not been reported since 1875 (Marshall 2024, 8). A population at Prineville in central Oregon, has not been reported since 1894 (Marshall 2024, 8).

California

Columbia yellowcress also occurs in northern California. Records from Calflora, the Consortium of California Herbaria (CCH), the U.S. Forest Service Natural Resource Information System (NRIS), and the California Natural Diversity Database (CNDDB), list 30 occurrences in northern California (USFS 2022, 4-35; CNDDB 2025a; CCH 2025). As with the portion of the population complex occurring in southern Oregon, Columbia yellowcress populations in northern California occur in water-collecting lowlands between fault block scarps and uplands. Biological

connectivity for the species may exist within hydrological basins depending on population proximity, particularly in the Klamath region (Kentnesse 2017a, 30).

Several historical Columbia yellowcress occurrences in northern California have likely been extirpated, and of those that remain, fewer than half have information on population counts and size estimates (USFS 2022, 36). Columbia yellowcress occurrences in northern California are the least studied in the species' range, due both to infrequent surveys and a few populations that have been discovered relatively recently (Kentnesse 2017a, 35). Existing survey data suggest a mix of increasing, stable, and decreasing populations.

Butte Valley Area

The Butte Valley Area is located southwest of Lower Klamath Lake in the Klamath River Basin's Butte Valley subbasin, a closed drainage basin with a surface creek running from Mount Shasta through Bray into Butte Valley, and with groundwater flowing west to east under the Mahogany Mountains (Kentnesse 2017a, 86). Four Columbia yellowcress populations have been reported here. Another population further south in the Butte Valley subbasin is known from a historical collection.

The Meiss Lake site is located at the southeast end of Meiss Lake near Macdoel, Siskiyou County. Columbia yellowcress occurs on drying flats surrounding the southeast edge of the lake, on the edge of a transmontane alkaline marsh, including on a small. Approximately 2,200 plants were found in seven locations in 1995, and 6,076 plants were reported in 2000. The area is managed by the California Department of Fish and Game as part of the Butte Valley Wildlife Area, but the Department discontinued monitoring the population after 2000 (Cavaille 2007, 15; CNDDB 2025a, EO 10; Cavaille 2007).

Two Columbia yellowcress populations occur in intermittently flooded ditches in the Butte Valley National Grasslands. The E-W South Unit ditch had only two observed plants growing in the bottom of the ditch in sandy loam-clay soils when first discovered in 1997, but after twenty plants were transplanted from the nearby Macdoel ditch in 1999, about 400 plants were last observed in 2001. More plants may occur in similar flooded habitat outside the area (Cavaille 2007, 16; CNDDB 2025a, EO 18). By contrast, the Macdoel Ditch was first observed to have about 100 plants in 1997, but after the ditch was bulldozed, only 8 plants were found along the ditch in 2001 (Cavaille 2007, 15-16; CNDDB 2025a, EO 19).

A Columbia yellowcress occurrence was also reported in a seasonal, alkaline marsh about three miles east of Macdoel. The occurrence was reported in 1993 and has not been observed since (CCH 2025, CHSC86437).

Columbia yellowcress is also known from a 1915 historical collection further south in the Butte Valley subbasin near Bray, Siskiyou County (CNDDB 2025a, EO 6). This population has not been reported since and is likely extirpated (Kentnesse 2017a, 35).

Lost River Area

The Lost River Area is located southeast of Klamath Falls, within the Klamath Basin's Lost River subbasin. The region has large basins, ancient lake terraces, and occasional basaltic

mountains (Kentnesse 2017a, 86). Several Columbia yellowcress populations occur near the headwaters of the Lost River in California (Clear Lake Reservoir, Clear Lake Reservoir Outlet Dam, and Willow Creek), just upstream of Oregon's Langell Valley. Another population occurs in the Tule Lake National Wildlife Refuge, the final internal drainage basin of the Lost River, just downstream of the Stukel Mountain sites in Oregon (Kentnesse 2017a, 86). Small populations have previously been reported on private land north of Tulelake, Siskiyou County (CNDDB 2025a, EO 25, EO 26). And populations may exist in the southeastern corner of the Lost River subbasin, north of Canby, Modoc County, and near Rimrock Lake (CNDDB 2025a, EO 15, EO 16).

Clear Lake Reservoir provides habitat for Columbia yellowcress along the seasonally receding edges of the east and southeast shores, below the high-water mark in moist sandy soil (Kaye 1996, 12). At least 40 plants were observed on the southeast edge of Clear Lake in 1986, and plants were observed but not counted in 1992 (Kaye 1996, 12; CNDDB 2025a, EO 2, EO 9). Otherwise, the population has not been well-documented (Kaye 1996, 12). Although the reservoir's habitat was severely degraded by cattle grazing and trampling throughout the 1980's, it was fenced to exclude cattle in the early 1990s (Kaye 1996, 12; Kentnesse 2017a, 88; CNDDB 2025a, EO 9). And although no population data has been recorded since 1992, field biologists noted that after cattle were removed from a portion of the area, Columbia yellowcress "had a small population explosion that covered the ground for yards in every direction" (Kaye 1996, 12).

Columbia yellowcress also occurs along the shore of Clear Lake Reservoir near the outlet dam, growing among volcanic boulders on the seasonally inundated lakeshore (Kaye 1996, 12; CNDDB 2025a, EO 8). Plants were estimated to be between 1,000-10,000 in 1987 and the site was fenced to exclude cattle in the mid-1990s (Kaye 1996, 12; Kentnesse 2017a, 88; CNDDB 2025a, EO 8). In 2005, 5,000 plants were observed and local botanists noted the site quality was excellent and that the plants were quite large and flowering profusely (Kentnesse 2017a, 88; CNDDB 2025a, EO 8).

Finally, 50 plants were reported on the western shore of Clear Lake Reservoir, south of Squatty Butte in 2011. Growing in the periodically flooded shoreline, the area is heavily grazed and trampled (CNDDB 2025a, EO 23).

The Clear Lake Reservoir sites are contained within the Clear Lake National Wildlife Refuge, managed by the U.S. Fish and Wildlife Service, and the Modoc National Forest, managed by the U.S. Forest Service, Doublehead Ranger District (Kaye 1996, 12; USFS 2022, 31-36; CNDDB 2025a, EO 8, EO 9, EO 23).

Willow Creek flows out of the Clear Lake Reservoir and Columbia yellowcress is found sparsely distributed on the steep dry slopes of the creek and on creek sandbars (Kaye 1996, 12; Cavaille 2007, 27; Kentnesse 2017a, 88). Fewer than 500 plants were observed in 1993, and 1,017 plants were observed in 1997 but only 100 plants were observed in 2005 (CNDDB 2025a, EO 7). The site was previously grazed by cattle, but grazing was removed in 1996, and the site now appears to be fenced (Kaye 1996, 12; CNDDB 2025a, EO 7). The site is within the Modoc National

Forest, managed by the U.S. Forest Service, Doublehead Ranger District (CNDDB 2025a, EO 7).

The Tule Lake population is represented by two subpopulations occurring on the original Tule Lake lakebed in old agricultural fields that have been returned to a seasonal flooding regime (Cavaille 2007, 16; Kentnesse 2017a, 87; CNDDB 2025a, EO 17, 1). Both subpopulations occur within the Tule Lake National Wildlife Refuge but are not monitored by the U.S. Fish and Wildlife Service (Cavaille 2007, 16; CNDDB 2025a, EO 17).

The first subpopulation, on the Frey's Island complex adjacent to the northeast corner of Tule Lake, was first discovered after the first cycle of seasonal flooding and drawdowns of agricultural fields in 1996. Although the subpopulation increased slightly in 1997 surveys, no plants were seen on the site in 1999. The eventual disappearance of this subpopulation may have been due to competition with other species because of early drawdowns and a water table maintained just below the soil surface (Cavaille 2007, 16; CNDDB 2025a, EO 17). The second subpopulation occurs near Hovey Point on the historic Tule Lake perimeter at the southwest corner of the refuge. Observed in 1997 following water drawdowns on the fields, it may be a rediscovery of a historic occurrence recorded in 1936. The number of plants increased from an unrecorded number in 1998 by an additional 180 plants in 1999 (Cavaille 2007, 16; CNDDB 2025a, EO 1).

Columbia yellowcress may also be located at sites on private land north of Tulelake, Siskiyou County. Columbia yellowcress was collected from a pasture around Havlina Road in 1964 (CNDDB 2025a, EO 26) and scattered plants were observed along the edge of a drying drainage ditch in irrigated pasture in 1979 (CNDDB 2025a, EO 25). Neither site appears to have been surveyed again.

Columbia yellowcress may also be located at Fairchild Swamp, north of Canby, Modoc County. The only source of information for this occurrence is a 1986 collection by Jokerst (CNDDB 2025a, EO 15).

Columbia yellowcress may also be located at Rimrock Lake a dry lake or vernal pool in Modoc County south of Doublehead Mountain. The only source of information for this occurrence is a 1986 collection by Jokerst (CNDDB 2025a, EO 16).

Big Sage Area

The Big Sage Area is located southeast of Goose Lake, within the Sacramento River Basin's Upper Pit River subbasin (Kentnesse 2017a, 86). One Columbia yellowcress population on the southeastern shoreline of Big Sage Reservoir, a tributary source for the Pit River, contained 700 plants observed in 2009 (Kentnesse 2017a, 86; CNDDB 2025a, EO 20). Plants at the site appeared sickly in 2010 surveys, but the population has persisted. The site is located on the Modoc National Forest, and is managed by the U.S. Forest Service, Devil's Garden Ranger District (Kentnesse 2017a, 89).

McCloud Area

The McCloud Area is located about 85 miles northeast of Redding, within the Sacramento River Basin's McCloud subbasin (Kentnesse 2017a, 86). Two Columbia yellowcress populations occur in the lakebeds of Dry Lake and White Deer Lake, which are only 4 miles apart from each other (Kentnesse 2017a, 86, 89). Both sites occur within the Shasta-Trinity National Forest and are managed by the U.S. Forest Service, McCloud Ranger District (Posey 2016a, Posey 2016b).

The Dry Lake population occurs in the low depressions, hummocks and swales of the dry-meadow lakebed, often around the lakebed perimeter (Kentnesse 2017a, 89; Posey 2016a). U.S. Forest Service monitoring has frequently noted the presence of Columbia yellowcress at this site, including as recently as 2016; at least 2,500 plants were observed in 2010 (Posey 2016a, 2; CNDDB 2025a, EO 22). But because comprehensive surveys have been conducted only irregularly, the current trend of the population is unknown.

The White Deer Lake population occurs in three patch habitats on the meadow-like lakebed: a shallow stock pond dug into the lakebed for cattle access, a larger pond, and a vernal swale (Kentnesse 2017a, 89). Between 50 and 100 plants were recorded as early as 1987 (CNDDB 2025a, EO 4). The highest number of plants recorded was 505 in 2012; the number of plants has mostly declined from that high during monitoring in subsequent years and 231 plants were recorded in 2016 (CNDDB 2025a, EO 4; Posey 2016b).

Lassen Area

The Lassen Area is in the Susan River Watershed of the North Lahontan Basin (Kentnesse 2017a, 86). Two Columbia yellowcress populations occur at Windy Hollow and Feather Lake, approximately 2 miles from each other (Cavaille 2007, 13; Kentnesse 2017a, 86).

The Windy Hollow population occurs on playa habitat—open, flat, and with poorly drained sandy-clay soils and low cover (Cavaille 2007, 28; CNDDB 2025a, EO 3). The 1500 plants observed in 1994 declined to at least 800 in 2007, and while reported present in 2011, it was not counted (Cavaille 2007, 13; CNDDB 2025a, EO 3). This population is located within the Lassen National Forest and is managed by the U.S. Forest Service, Eagle Lake Ranger District (Cavaille 2007, 28; CNDDB 2025a, EO 3).

The Feather Lake population is the southernmost known population of Columbia yellowcress (Cavaille 2007, 13). The population consists of a northern and southern lakebed; one subpopulation occurs on the northern lakebed and two subpopulations occur on the southern lakebed (Kentnesse 2017a, 90). The population occurs in open, low-cover playa habitat and experiences seasonal inundation (Kentnesse 2017a, 90; Cavaille 2007, 28). In 2007, at least 15 plants were observed in northern subpopulation (EO 12) and about 500 plants were observed across the southern subpopulations (CNDDB 2025a, EO 13, EO 14). The two northernmost subpopulations occur within the Lassen National Forest and are managed by the U.S. Forest Service, Eagle Lake Ranger District. The southernmost subpopulation occurs on private land (Kentnesse 2017a, 90).

Humboldt County

One population near Orleans, Humboldt County is anomalously far away from the other populations (CNDDB 2025a, EO 11; USFS 2022, 2). The only source of information for this site is a 1956 collection by Pollard (CNDDB 2025a, EO 11). This population is likely extirpated (Kentnesse 2017a, 35).

III. Threats and Warranted ESA Protection

Under the ESA, 16 U.S.C. § 1533(a)(1), FWS is required to list Columbia yellowcress if it is in danger of extinction or likely to become endangered across all or a significant portion of its range. This species must meet at least one of the factors enumerated in section 4(a):

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;
(B) Overutilization for commercial, recreational, scientific, or educational purposes;
(C) Disease or predation;
(D) The inadequacy of existing regulatory mechanisms;
(E) Other natural or manmade factors affecting its continued existence.

16 U.S.C. § 1533(a)(1)(A)-(E); 50 C.F.R. § 421.11(c)(1)-(5).

The review and determination by FWS must be based solely on the best scientific and commercial data available.

Columbia yellowcress is threatened by four of the ESA listing factors: (A) Habitat loss and degradation due to cattle grazing and trampling, altered hydrological cycles from water management, encroachment from vegetation, off-highway vehicles, and road maintenance; (C) Disease and predation from parasites and insects; (D) A lack of federal protections and ineffective state regulations; and (E) Other natural or manmade factors, including small populations, competition from invasive species, and climate change.

A. Present or threatened destruction, curtailment, or modification of habitat

Habitat loss and degradation is a major threat to Columbia yellowcress. Columbia yellowcress is adapted to seasonally wet habitats and its lifecycle is heavily influenced by natural hydrological cycles. Human-caused hydrological alterations from dams and other sources have therefore been a major cause of a number Columbia yellowcress extirpations and continue to threaten the species, particularly at the populations along the Columbia River. Cattle are also a significant threat to Columbia yellowcress populations by directly destroying plants through grazing and trampling and by indirectly degrading habitat. Off-road vehicle use, encroachment from woody vegetation, and road maintenance activities also threaten Columbia yellowcress habitat.

Cattle grazing and trampling

Grazing and trampling by cattle pose the greatest human-caused threats to Columbia yellowcress outside of the Columbia River populations (Kentnesse 2017a, 96; Kaye 1996, 17). Cattle grazing and trampling has been observed as a threat to Columbia yellowcress for at least 40 years (See Darr 1980, 7). The habitats that support Columbia yellowcress—riparian zones along rivers and creeks and the shores of lakes, playas, and depression ponds—are also often gathering points for livestock, (Kentnesse 2017a, 96). During the past 30 years, cattle impacts have been observed in southern Oregon at Foley and Featherbed Lakes, Stukel Mountain 1 and 2, Buck Creek Tributary, Sprague River Main, Sprague River Seput Land Exchange, Sprague River Klamath Lake Land Trust, Dam's Canyon and Meadow, Paulina Marsh, and Silver Lake. In California, cattle impacts have been observed at the Meiss Lake, Butte Valley E-W and Macdoel Ditches,

Clear Lake Reservoir, Clear Lake Reservoir Outlet Dam, Willow Creek, Dry Lake, White Deer Lake, Windy Hollow, and Feather Lake sites during a similar period (Kentnesse 2017a, 96).

Effects of cattle include direct herbivory and trampling resulting in damage and destruction of Columbia yellowcress plants (Kaye and Massey 1991, 48-49; Kaye et al. 1993, 36; Kaye 1996, 18). Very intense, frequent disturbances, such as overgrazing, will allow very few plants to grow (Goldenberg 1993, 8). Reports from many of the sites listed above also reference hoof punches throughout the habitat and cattle trails through Columbia yellowcress patches (Kentnesse 2017a, 96). A report from a subpopulation at Buck Creek in southern Oregon, for example, found "numerous hoof tracks resulting in the complete uprooting of at least three large plants" (Kaye 1996, 14-15). The subpopulation at this site is likely now extirpated (Kentnesse 2017a, 33). Similarly, many of the historic sites around Klamath Falls may have been extirpated by grazing (Goldenberg 1993, 10).

Cattle can also have indirect negative impacts on Columbia yellowcress through damage to the species' habitat. Cattle traffic has been shown to cause significant damage to riparian habitats and reduce biodiversity by degrading water and soil quality and altering stream channel morphology by deepening, widening, and destabilizing streambanks and channels, lowering the water table and reducing water availability (see generally, Belsky et al. 1999). These effects have already been noted at Columbia yellowcress sites, where long-term grazing has dispersed seeds of non-native weeds to invade Columbia yellowcress habitat, eroded streams and gullies, and lowered the water table (Goldenberg 1993, 10; Kaye 1996, 18-19).

Figure 6. Trampling and hoof marks in the Columbia yellowcress population at Buck Creek Tributary, Oregon in 2016. Source: Kentnesse 2017a. Credit: Laura Kentnesse.

Figure 7. Evidence of cattle trampling and hoof marks (left photo) and fecal matter (right photo) at or adjacent to Columbia yellowcress patches at Dam's Meadow, Oregon in 2016. Source: Kentnesse 2017a. Credit: Laura Kentnesse.

Figure 8. Cattle (left photo) and hoof marks (right) at Featherbed Lake, Oregon in 2016. Source: Kentnesse 2017a. Credit: Laura Kentnesse.

An exclusion experiment performed at Foley and Featherbed Lakes in southern Oregon suggests just how destructive cattle impacts can be to Columbia yellowcress. Several exclosures were established at these sites in 1990 and the plants were counted and numbered (Kaye and Massey 1991, 7-8). Data collected over the next ten years revealed that populations protected by the exclosures gradually increased in size, while unprotected populations outside the exclosure gradually decreased (Housley 2002, 7).

Observations at other sites also reveal the destructive impacts of cattle. At Clear Lake Reservoir in California, Columbia yellowcress habitat was degraded by cattle grazing and trampling and could only be found in areas that cattle could not reach conveniently (Goldenberg 1993, 10). After the site was fenced in the early 1990's, a biologist observed that after cattle had been removed Columbia yellowcress "had a small population explosion that covered the ground for yards in every direction" (Kaye 1996, 12). Similarly, at Featherbed Lake in southern Oregon, the

largest, healthiest Columbia yellowcress plants were observed among boulders, where they were protected from grazing (Goldenberg 1993, 10).

Recreation

Off-highway vehicle (OHV) use threatens several Columbia yellowcress sites. OHVs can directly destroy Columbia yellowcress by running over individual plants (Kaye 1996, 20; Kentnesse 2017a, 100). Vehicles can also reduce Columbia yellowcress recruitment by compacting and progressively devegetating larger areas of habitat each year. OHVs are popular on the open ground found in southern Oregon and northern California playas (Kentnesse 2017a, 99-100). Evidence of OHV use and habitat degradation has been observed at Emigrant Lake, Featherbed Lake, Sprague River Main, Buck Creek Tributary, and Stukel Mountain 1 and 2 in southern Oregon, and Windy Hollow, Feather Lake, Dry Lake, and White Deer Lake in northern California (Anderson 2014, 3; Posey 2016a, 1-2; Kentnesse 2017a, 59, 69, 179, 184-85; Mitchell and Harris 2023, 12; CNDDB 2025a EO 3, EO 4, EO 5, EO 21, EO 22).

Figure 10. Fresh OHV track only about a foot from a Columbia yellowcress stem at Stukel Mountain 2 site in Oregon in 2016. Source: Kentnesse 2017a. Credit: Laura Kentnesse.

Figure 11. OHV tracks in Columbia yellowcress habitat at Featherbed Lake (left photo) and Stukel Mountain 1 sites (right photo) in Oregon in 2016. Source: Kentnesse 2017a. Credit: Laura Kentnesse

Beachfront foot traffic and boating also threaten Columbia yellowcress habitat at frequently-visited reservoirs. At Emigrant Lake in southern Oregon, Columbia yellowcress grows adjacent to campground, picnic areas, and close to a water slide park, which may result in trampling of plants and soil disturbance (Kentnesse 2017a, 59, 100).

Other recreational traffic on public lands may also result in trampling of Columbia yellowcress plants. The Stukel Mountain 1 and 2 sites show evidence of target shooting and trash disposal (Kentnesse 2017a, 184-85).

Figure 12. Targets and trash at Stukel Mountain 1, Oregon in 2016. Source: Kentnesse 2017a. Credit: Laura Kentnesse.

Road maintenance

Several Columbia yellowcress populations occur in intermittently flooded roadside ditch habitat, where road maintenance activities such as surface grading and weed spraying may pose a significant threat to those populations (Kaye 1996, 19). In southern Oregon, Paulina Marsh is located along a roadside (Kaye 1996, 19; Kentnesse 2017a, 164). In California, the Butte Valley E-W and Macdoel ditches are located along similar roadsides (CNDDB 2025a, EO 18, EO 19). Two additional sites have roads routed through the site and through the Columbia yellowcress

population, Windy Hollow playa in the Lassen area and Dry Lake in the McCloud area of California. Threats to these populations are typically the vehicle traffic itself (Posey 2016a, 2; CNDDB 2025a, EO 3).

Water management and hydrological alteration

Damming along the Columbia River likely eliminated Columbia yellowcress habitat in the past (see Part II.E), and today, management of river flows threatens Columbia yellowcress directly and indirectly. As discussed previously in Section II, Columbia yellowcress is likely adapted to the glacial and interglacial cycles of ancient Pleistocene lakes. Before the Columbia River was dammed, river levels were only influenced by topography and by meteorologic conditions: winter snowpack volume, precipitation events, and thawing temperatures. Water levels peaked with spring meltwater floods, which scoured riverbanks. Water levels gradually dropped over the summer, exposing moist substrate suitable for Columbia yellowcress to grow. The species would flower, fruit, and set seed late August through October. But dams and human-controlled water releases have created dramatically different flow regimes that threaten the Hanford Reach and Columbia Gorge Columbia yellowcress populations (Kentnesse 2017a, 100).

Using dams to attenuate spring floods

Water management practices that attenuate annual spring floods likely threaten Columbia yellowcress populations along the Lower Columbia by permitting competing vegetation to grow in its usual habitat (Habegger et al. 2001, 79; Kentnesse 2017a, 101-02). Before construction of dams on the Columbia River, water levels peaked with spring meltwater floods, which would scour the riversides (Harris 1992, 3). However, dams today regulate floods by capping maximum flow rates and regulating flow velocities. These practices contribute to attenuated spring floods, eliminating peak floods and broadening the time of water flows (Harris 1992, 5; Habegger et al. 2001, 70; Kentnesse 2017a, 101). A hydrographic analysis by Habegger et al. performed on the Lower Columbia found that peak discharge of spring floods was on average 57.6% lower from 1975 to 1995 than in the previous 116 years, and that without Columbia River dams, spring floods would have averaged 37% higher from 1972 to 1998 (Habegger et al. 2001, 74). Therefore, because riverbanks are not scoured by spring floods, depositional buildup on higher elevations along riverbanks may be allowing competing vegetation to force Columbia yellowcress out of this habitat (Gehring 1994, 11; Habegger et al. 2001, 79; Kentnesse 2017a, 102).

Shortened and delayed growth season

High river levels late in the summer may prevent Columbia yellowcress reproduction by shortening exposure to the sun (Gehring 1994, 10). Columbia yellowcress's growth season depends on water levels dropping below the elevation where it grows, ending inundation. Dam release schedules dictate the seasonal timing of this exposure, typically occurring at the earliest in late July, though more often in August or even early September (Kentnesse 2017a, 102). Columbia yellowcress's growth season has therefore been shifted into the late summer and fall at both on the Lower Columbia and in the Hanford Reach, when habitat is exposed more reliably and continuously (Exe and Johnson 2025, 3-34).

Hydroelectric peaking
Daily and hourly hydroelectric peaking may also threaten Columbia yellowcress populations along the Columbia river. Peaking is the practice of meeting changes in hydroelectric power demand by increasing the daily or hourly volume of water released (Kentnesse 2017a, 102). At the Bonneville Dam, for example, on a typical weekday in late summer, low water flows are maintained during the night (around 90 to 100 kcfs) until power demand increases in the morning. Then the release of water is increased (around 120 to 140 kcfs) to meet power demand until being reduced again in the evening. Peaking was initiated in the early 1980's (Scherer and Young 1992, 4-5). Peaking can result in river levels changing by more than a meter over a period of a few hours (Habegger et al. 2001, 70).

As a result of peaking, Columbia yellowcress experiences periodic daily resubmergence throughout its growing season, which may affect Columbia yellowcress photosynthesis, respiration, fruit maturation, and reproduction (Scherer 1991, 14-15; Kentnesse 2017a, 103). Habegger et al. 2001 found that more resumbergences negatively correlated with stem and reproductive density and frequency at experimental transects (Habegger et al. 2001, 76). Peaking may also have a more serious long-term effect by keeping the surface of low-lying cobblestone beaches wet and therefore creating a more hospitable environment for the germination and growth of competing species (Gehring 1994, 12).

"Reverse peaking," also known as "reverse load factoring," is used at the Priest Rapids Dam in the fall to aid Chinook salmon spawning, which affects the Hanford Reach (Harris 1992, 5-6; Salstrom et al. 2012, 7). Water levels are dropped in the morning and kept low until early afternoon, which exposes gravel habitat at the Vernita Bar near the Priest Rapids Dam that Chinook salmon would otherwise attempt to use for redds. If the water levels were not controlled, the salmon would lay eggs in the gravel, which would then be exposed during nighttime low flows, resulting in desiccated eggs. Lowered flows could potentially benefit Columbia yellowcress, but reverse peaking takes place outside the species' optimal growing season (Harris 1992, 5-6). In fact, it may abruptly curtail Columbia yellowcress growing season in mid-October, and shifting the growing season later into the fall may not provide enough heat/days to develop mature fruits. And because the "ripple" effect of reverse peaking takes about eight hours to reach the Hanford Reach from the Priest Rapids Dam, Columbia yellowcress habitat in the Reach may not be exposed until midday, further reducing its growing season (Salstrom 2012 et al. 13-14).

B. Overutilization

Columbia yellowcress does not currently face threats related to overutilization.

C. Disease and predation

Disease

Natural pathogens are a continual threat to Columbia yellowcress populations.

An unidentified copper-yellow rust, perhaps caused by pathogenic fungi, was found on every Columbia yellowcress plant at southern Oregon's Foley Lake in 1995 and was also observed in some subsequent years (Housley 1995, 2; Housley 2002, 7; Kentnesse 2017a, 93).

Figure 13. Purple discoloration and stunted growth possibly caused by a psyllid insect vector at Sprague River Main site in Oregon in 2016. Source: Kentnesse 2017a. Credit: Laura Kentnesse.

A small, psyllid insect vector is likely responsible for a viral (or fungal) disease affecting stems at the Sprague River Main and Williamson River Delta sites in southern Oregon. Infected Columbia yellowcress display symptoms of purple discoloration and stunted foliar growth (Kaye 1996, 19-20; Kentnesse 2017a, 72, 99, 183).

Evidence of very minor tar-like fungal infections on single leaves, leaf pockmarks, and occasional leaf predation were also observed on Foley and Featherbed Lake plants in Oregon (Kentnesse 2017a, 99).

Parasites and predation

Potential parasites and insect predation have also been observed on Columbia yellowcress plants.

Ants have caused notable damage at the Paulina Marsh and Sprague River Klamath Lake Land Trust sites in southern Oregon. Ants were observed covering a few *Artemisia tridentata* (big sagebrush) plants, and adjacent Columbia yellowcress appeared to be dead or dying, with ants frequently crawling on stems, leaves, and inflorescences (Kentnesse 2017a, 93-94, 175).

Figure 14. Discolored Columbia yellowcress next to an ant-covered *Artemesia tridentata* (big sagebrush) at Paulina Marsh, Oregon in 2016. Source: Kentnesse 2017a. Credit: Laura Kentnesse.

Predation from unidentified tiny caterpillars has been observed at the Foley Lake and Featherbed Lake sites in southern Oregon (Housley 1995, 2; Housley 2002, 7). Orange insect eggs have also been observed on Columbia yellowcress leaves at these sites, as well as frass and potential insect herbivory (Kentnesse 1972, 179-80).

Insect damage has also been observed at the Dam's Canyon site in southern Oregon (Anderson 2014, 3).

D. Inadequacy of existing regulatory mechanisms

Most Columbia yellowcress populations occur on either federal or state public land, which only highlights the inadequacy of previous regulatory or management efforts to halt the species' decline (Marshall 2024, 19). The U.S. Bureau of Land Management, U.S. Department of Energy, and U.S. Forest Service have all invested in monitoring and conservation strategies for Columbia yellowcress populations occurring on their land, with little to show for it. And although the states of California, Oregon, and Washington all recognize various levels of protection for Columbia yellowcress, their impact is limited by the weakness of their legal protections and the lack of occurrences within their control compared to the federal government.

Federal Protections

U.S. Department of Energy (DOE)

The Department of Energy manages large portions of the land where Columbia yellowcress occurs within the Hanford Reach National Monument, and therefore the species falls within the purview of the Hanford Site Biological Resources Management Plan (DOE 2017). But the Plan says only that the Department of Energy will monitor rare plants and that some site projects affecting rare plants may require an "ecological compliance review," which may recommend mitigation strategies (DOE 2017, 5.33, 6.1-6.9). No specific strategy for any rare plant is laid out anywhere in the Plan. A separate Central Hanford Rare Plant Management Plan outlines general methods for monitoring rare plants in the Hanford Reach National Monument but explicitly states that monitoring every rare plant consistently is neither expected nor necessary (DOE 2022, 22-33). The Rare Plant Management Plan also says that management actions "may be needed" for rare plants but only outlines general principles instead of committing to any specific actions for rare plants that are not federally listed (DOE 2022, 33-38).

Bureau of Land Management (BLM)

Columbia yellowcress occurs at multiple locations under BLM management: on BLM land within the Lakeview District in southern Oregon (see Table 2) and on two islands in the lower Hanford Reach in Washington state managed by BLM (Salstrom et al. 2012, 8). The species is managed as a sensitive species for BLM Region 6, which covers the Oregon and Washington BLM occurrences (BLM 2021, 21). Although the BLM must consider sensitive species in National Environmental Policy Act documents when evaluating proposed actions, the responsible official may still authorize impacts to occur, as they are not obligated to conserve the species as would be required under Section 7 of the ESA (BLM 2008, 37). BLM sensitive species regulations also do nothing to protect against environmental or climate impacts, impacts on private land, invasive species, OHV use, or many of the other threats faced by Columbia yellowcress. A BLM sensitive species designation alone is not enough to prevent impacts to the species or even sufficient to preclude Endangered Species Act listing. For instance, Tiehm's buckwheat (*Eriogonum tiehmii*) was recently listed under the Endangered Species Act, despite being designated a BLM sensitive species (87 Fed. Reg. 77368).

BLM has already shown that its management activities are inadequate to protect the species. At least one large population of Columbia yellowcress that occurred partly on BLM-managed land near Malheur Lake has already been extirpated (See Table 3). And although some of the extant BLM occurrences have been fenced off to cattle to prevent trampling and grazing as described in

Part III.A above, some of these exclosures have been only partial or experimental. The success of some of these exclosures in protecting Columbia yellowcress only highlights BLM's continuing failure to prevent cattle impacts more broadly.

BLM's attempts to propagate Columbia yellowcress only underline management difficulties. In 2022, BLM partnered with the Institute for Applied Ecology ("IAE"), a non-profit conservation organization, to experiment with outplanting Columbia yellowcress (Mitchell and Harris 2023, 1). IAE collected seed from five different sites in Oregon and outplanted plugs at Stukel Mountain in 2023 and at Foley Lake, Featherbed Lake, Paulina Marsh, and Stukel Mountain sites 1 in 2024 (Marshall 2024, 17; Mitchell and Harris 2025, 7-9). IAE also outplanted plugs to establish two new sites at Stukel Mountain, Stukel Mountain 3 and 4 (Mitchell and Harris 2025, 7-9). But estimates of those plants later in 2024 revealed that only two sites appeared to have a greater than 50% rate of survival; the other four had a survival rate of 20% or less (Mitchell and Harris 2025, 12). As part of this project, IAE hosted a working group meeting in 2024 and 2025 with representatives from state and federal agencies in the Columbia yellowcress's range to discuss ongoing work with the species and to maintain collaboration and communication about the species (Mitchell and Harris 2025, 3, 14; Mitchell, personal communication, June 20, 2025). But the future of the project and the working groups depends on funding which is uncertain (Mitchell and Harris 2025, 14; Mitchell, personal communication, June 20, 2025).

U.S. Forest Service (USFS)

The United States Forest Service also lists Columbia yellowcress as a sensitive species in Region 5 and Region 6 (USFS 2019; USFS 2022, 2). The species occurs at locations on USFS land in Northern California and southern Oregon (see Part II.E). But just as with BLM, USFS's sensitive species designation does not provide adequate protection to prevent harm to the species. Impacts to sensitive species are permitted under USFS policy at the discretion of officers with project approval authority as long as such decisions do not "result in loss of species viability or create significant trends toward federal listing" (USFS 2005, 5). Also like BLM, USFS has tried to fence out cattle at only a few sites, and some of those sites' fences are in desperate need of maintenance (Kentnesse 2017a, 97). Any OHV regulations and enforcement have been insufficient to prevent OHV use; for example, one botanist noted that at the Dry Lake site in the Shasta-Trinity National Forest, California, OHV use was a "major problem" even though the site's road was supposedly closed (Posey 2016a, 2). Several USFS sites in both California and Oregon are threatened by conifer encroachment, but USFS has only attempted to remove the encroaching conifers at White Deer Lake and Dry Lake in California (Kentnesse 2017a, 99).

U.S. Fish and Wildlife Service (FWS)

Columbia yellowcress occurs on at least three National Wildlife Refuges managed by FWS: Pierce NWR (WA), Tule Lake NWR (CA), and Clear Lake NWR (CA) (see Part II.E). But FWS does not formally protect Columbia yellowcress it is unclear if FWS monitor its occurrences on the Refuges (Cavaille 2007, 16).

Columbia yellowcress was first considered for listing under the ESA in 1975 (40 Fed. Reg. 27824, 27839, 27869, 27885). The U.S. Fish and Wildlife Service ("the Service") found that ESA protections were "not warranted" in 1993, but only because the Service claimed it lacked information to determine the species' status (58 Fed. Reg. 64828, 64829-30, 64843). The

Service's determination also acknowledged that the species may require specific habitat that is vulnerable to alteration and that it may be threatened from man-caused changes to environment (58 Fed. Reg. 64828, 64829-30). Scientific understanding of Columbia yellowcress and the threats it faces has increased significantly in the over 30 years since the Service's determination, and the best available science is clear that the species is imperiled.

State Protections

State of Oregon

Under the Oregon Endangered Species Act ("Oregon ESA"), the state of Oregon has listed Columbia yellowcress as an endangered species (ODA 2024). But the Oregon ESA's protections for plants are very limited because it does not protect plants on private lands (ORS § 564.135; OAR 603-073-0010) and even for public entities it does not regulate benign neglect of species (see ORS § 495.182). In any case, only a handful of Columbia yellowcress occurrences in Oregon are on state-owned land where the species would be protected (see Table 2).

State of Washington

Washington's State Endangered Species Act does not contain provisions for plants at all (WAC 220-610). Columbia yellowcress is listed as threatened on the Washington Natural Heritage Program's rare plant list, but this does not create any legal protections for the species (Miller et al. 2024, 42). Columbia yellowcress occurred at Washington state's Beacon Rock State Park, but it is unclear whether the Park provides any protection for the areas where the species would occur, which would likely be at shorelines and near boat docks susceptible to pedestrian traffic. In any case, any protections the state park did provide appear to have been inadequate because the species has not been observed since 2000 (Kentnesse 2017a, 32).

State of California

The California Native Plant Society's Rare Plant Program ranks Columbia yellowcress at 1B.2, meaning it is at least moderately threatened in California and elsewhere (CNPS 2025). But this designation does not provide protection on its own. Columbia yellowcress may meet the definition of Rare or Endangered species under guidelines established for the California Environmental Quality Act ("CEQA") (Cal. Code Regs. tit. 14, § 15380), which may in turn require the species to be analyzed in relevant environmental reviews under CEQA (Cal. Code Regs. tit. 14 §15125(c)). But CEQA reviews do not provide any substantive protections for the species. Additionally, despite the species' rankings in the Rare Plant Program and the California Natural Diversity Database, California has not listed Columbia yellowcress under the California Endangered Species Act (CNDDB 2025b, 138).

E. Other natural or anthropogenic factors

Small population size

Small population size is a threat to many, if not most, Columbia yellowcress populations (Marshall 2024, 19; see Part II.E). Small populations face greater risk of extinction due to numerous factors, including declines in number of reproductive individuals, genetic diversity, seed production and viability, and potential increase in negative impacts from demographic and environmental stochasticity (Ellstrand and Elam 1993; Lande 1993; Oostermeijer 2003, Matthies et al. 2004). Reduced genetic diversity and inbreeding may be a particular concern for small

populations that are not successfully reproducing by seed because pollinators may merely be moving pollen between stems that represent one genetic individual (Kentnesse 2017a, 12, 14). Columbia yellowcress, which is known to propagate in large clonal clusters, may be particularly susceptible to these challenges (see Part II.C), especially considering the effects of water management practices that may delay and inhibit seed growth (see Part III.A above).

Vegetation encroachment and shading

Woody vegetation encroachment can threaten Columbia yellowcress by reducing the availability of quality habitat. Most Columbia yellowcress populations occur in open, high light habitat and are commonly found within an herbaceous vegetative community. Encroachment by woody vegetation such as trees and shrubs reduces these open, sunny habitats such as lakebeds, riverbanks, and meadow swales by shading out sun-loving species. Large, woody species also use moisture and nutrient resources that were previously used by the herbaceous community (Kentnesse 2017a, 99).

Figure 9. Shading and vegetative encroachment from *Pinus ponderosa* (ponderosa pine) at Buck Creek, Oregon in 2016. Source: Kentnesse 2017a. Credit: Laura Kentnesse.

Trees and shrubs are typically found upslope at the edges of Columbia yellowcress sites, and have encroached at some sites. *Juniperus occidentalis* (western juniper) and *Pinus ponderosa* (ponderosa pine) are growing close to Buck Creek Tributary and Dam's Canyon populations in southern Oregon and cause shading during the day (Kentnesse 2017a, 61, 63, 99). Some populations at Buck Creek Tributary experienced as much as 70% shading from junipers (Kentnesse 2017a, 43). *Juniper occidentalis* is also present at Willow Creek, California, where it is threatening clusters of Columbia yellowcress plants (Kentnesse 2017a, 99). *Pinus contorta* encroached on Columbia yellowcress populations at Dry Lake and White Deer Lake in

California until tree removal (Posey 2016a, 1; Kentnesse 2017a, 89, 99; CNDDB 2025A, EO 4, 22). Invasive *Morus alba* (white mulberry) may also pose a threat to Columbia yellowcress populations along the Hanford Reach (Salstrom and Gehring 1994, 16).

Invasive species competition

All Columbia yellowcress sites host non-native species, and many are threatened by the proliferation of weedy species. Habitat degradation by non-native species is a particularly acute threat in lotic environments such as the Sprague River and Paulina Marsh sites in southern Oregon. The most common invasive species at these sites include (in order of abundance) *Alopecurus pratensis* (meadow foxtail), *Phalaris arundinacea* (reed canarygrass), *Elymus repens* (quackgrass), *Bromus tectorum* (cheatgrass), *Poa pratensis* (Kentucky bluegrass), and *Agrostis stolonifera* (creeping bentgrass) (Kentnesse 2017a, 98, 181). Other non-natives at Sprague River sites include *Carduus nutans* (nodding plumeless thistle), *Circium arvense* (Canada thistle), *Linaria dalmatica* (Dalmatian toadflax), *Onopordum acanthium* (Scotch cottonthistle), and *Tripleurospermum perforatum* (scentless false mayweed) (Anderson 2014, 3). Invasive *Ventenata dubia* (North Africa grass) has also been observed at the Stukel Mountain sites in southern Oregon (Mitchell and Harris 2023, 12).

These species have similar habitat requirements to Columbia yellowcress and have aggressive strategies to out-compete Columbia yellowcress for water, nutrients, light, and space. Below-ground, invasive perennial grasses can quickly occupy available space with their prolific rhizome growth. Columbia yellowcress's slender rhizome-root tissue simply does not compare to the mass, size and aggressive growth patterns of the non-natives' below-ground systems. Many invasive perennial grasses form characteristically thick mats, sod layers, and/or tufts, which function to exclude all other herbaceous plants. The early timing of rhizome growth also enables these species to outcompete many natives. As cool season grasses, these invasives experience vigorous growth during late season autumn temperatures, pause during freezing temperatures, and have a ready supply of energy for rapid growth in early spring, giving them competitive advantage over Columbia yellowcress (and other forbs) starting from seed. Similarly, non-native winter annuals such as *Bromus tectorum* germinate as early as fall, develop roots during winter, and have a growth jumpstart in early spring due to root and photosynthetic systems already being established. Introduced winter annuals produce above-ground biomass sooner and in greater bulk than most native forbs that emerge from dormancy later and experience slower growth (Kentnesse 2017a, 98).

Above-ground, some introduced non-native grass shoots grow to significant heights, shading out low-growing Columbia yellowcress plants, which cannot effectively compete for light despite some habit plasticity. Many non-natives are known to flower quickly and early, producing abundant seeds with dormancy mechanisms, and long-term seedbank viability in some cases. While Columbia yellowcress also possesses multiple modes of reproduction and can produce abundant seed, its seed bank success may be of lesser magnitude than that of competing vegetation (Kentnesse 2017a, 98).

Figure 15. Competition from non-natives at Sprague River KLLT, Oregon in 2016. Left Photo: *Elynus repens* (quackgrass), *Phalaris arundinacea* (reed canarygrass) and *Alopecurus pratensis* (meadow foxtail) Right photo: many weedy grasses with *Cirsium arvense* (Canada thistle) evident in the background, *Rumex crispus* (curly dock) in the foreground. Source: Kentnesse 2017a. Credit: Laura Kentnesse.

Climate change

Climate change threatens Columbia yellowcress by altering the hydrological cycles and availability of water that the species depends on. The species likely evolved to adapt to the habitat of ancient Pleistocene lakes and the cycles of glacial and interglacial floods (Kentnesse 2017a, 48-49). Although it may be adapted to tolerate periods of low moisture availability, it nonetheless needs periodic moisture for its survival (Kentnesse 2017a, 104). Hence the apparent correlation at some Columbia yellowcress sites between precipitation patterns and swings in population size (Kaye et al. 1993, 32, 38-39, 41). Water availability may also be important to generate the forceful flow volumes that create the kinds of habitat disturbance the species is adapted to (Kentnesse 2017a, 104; see Part II.B).

Snowpack, snowmelt, rain, surface, and groundwater all influence the availability of water at Columbia yellowcress sites and each of these in turn will be altered by climate change. Annual average temperatures have increased in the Northwest by 1.54°F compared to the first half of the twentieth century (Vose et al. 2017, 187). Annual average temperatures are projected to increase by another 3.66°F to 4.61°F by 2065, and 4.99°F to 8.51°F by 2100 (Vose et al. 2017, 197). Climate change may result in slightly wetter winters and slightly drier summers, and by the latter half of the 21st century may cause precipitation to fall as rain rather than snow (CIRC 2025; Easterling et al. 2017, 217-18). Habitat preferred by Columbia yellowcress is particularly

vulnerable to altered hydrological regimes associated with climate change scenarios, which project changes in precipitation, evaporative demand, and aridity (USFS 2022, 38).

Sites with particularly high threats include shallow lakes and playas that will likely experience significant evaporation and evapotranspiration, such as Foley Lake, Featherbed Lake, and Stukel Mountain 1 and 2 in southern Oregon. Small, ephemeral creeks and cutbanks such as those at Buck Creek Tributary, Dam's Canyon, and Dam's Meadow are also highly threatened by potential reductions in water flow. Nonetheless, climate change will affect all Columbia yellowcress populations (Kentnesse 2017a, 105).

IV. Request for Critical Habitat Designation

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 this title, 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 this title, upon a determination by the Secretary that such areas are essential for the conservation of the species." (16 U.S.C. § 1532(5)(A)).

Congress recognized that the 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, 3 (1976)).

The Center requests that the Service propose to designate critical habitat concurrently with the proposed listing for Columbia yellowcress. Given the narrow habitat requirements of the species and the continued threats it faces at each site where it occurs, we recommend designating all occupied habitat as critical habitat.

V. Conclusion

Columbia yellowcress is a rare, imperiled plant that needs Endangered Species Act protections. Columbia yellowcress once thrived in wet environments of Washington, Oregon, and California, and it is adapted to and depends on the natural hydrological cycles of rivers, lakes, playas, and streams. But many of the species' historical populations have been extirpated, and greater scientific understanding over the past three decades has documented that Columbia yellowcress continues to experience significant declines.

Damming of rivers and associated negative impacts from water management such as water diversion have destroyed many historical Columbia yellowcress populations and continue to threaten populations on the Columbia River. Cattle grazing and trampling and off-highway vehicles destroy plants and degrade habitat. And the species faces a host of other threats, including competition from invasive weeds, small population sizes, and continued alteration of hydrological cycles from climate change. State and federal regulatory efforts have been insufficient to prevent the species' decline. The Columbia yellowcress needs Endangered Species Act protections to ensure its continued existence.

Figure 16. Columbia yellowcress at Meiss Lake, California, in 2021. Credit: Donald Burk.

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