

CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Rorippa subumbellata*

COMMON NAME: Tahoe yellow cress

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: January 2003

STATUS/ACTION:

New candidate

Continuing candidate

Non-petitioned

Petitioned - Date petition received: February 8, 2001

90-day positive - FR date:

12-month warranted but precluded - FR date:

Is the petition requesting a reclassification of a listed species?

Listing priority change

Former LP:

New LP:

Latest date species first became a Candidate: October 25, 1999

Candidate removal: Former LP:

A - Taxon more abundant or widespread than previously believed or not subject to a degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

F - Range is no longer a U.S. territory.

M - Taxon mistakenly included in past notice of review.

N - Taxon may not meet the Act's definition of *Aspecies*.@

X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Brassicaceae (Mustard Family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Nevada and California

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Nevada and California

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BIOLOGICAL INFORMATION:

Rorippa subumbellata is a small, perennial herb known only from the shores of Lake Tahoe, in California (El Dorado and Placer Counties) and Nevada (Carson City Rural Area, Washoe, and Douglas Counties). This species has been observed on sandy substrates, in silty soils among boulders, along lake margins, near stream mouths, in organically enriched dune slacks, and in back-beach depressions in naturally dynamic environments (Knapp 1979a; Ferreira 1987; Pavlik et al. 2002). Substrate characteristics are heavily influenced by physical processes such as wave action, lake level fluctuations, and the erosive forces of the wind. Soil moisture, an important determinant of species distribution, is strongly influenced by lake level. Moisture also influences the colonization of sites by other plant species that may compete with *R. subumbellata* for resources (California State Lands Commission (CSLC) 1998).

Occurrence and availability of suitable habitat for *R. subumbellata* are both correlated with lake level. The natural rim of Lake Tahoe is located at 6,223 feet (ft) (1,897 meters (m)) elevation. A dam constructed in 1871 at the Truckee River outflow increased lake capacity to 6,229 ft (1,899 m) in elevation, and the lake level is regulated between the two surface elevations by dam operations in response to downstream demands. In accordance with the Truckee River Agreement, the legal maximum lake elevation is 6,229.1 ft (1,898.6 m). In extended periods of drought, such as in the late 1980s and early 1990s, the lake level dropped close to or below the natural rim, exposing additional shoreline habitat. In early January 1997, following extensive regional flooding, Lake Tahoe reached an elevation of 6,229.4 ft (1,898.6 m), more than 6 ft (2 m) over the natural rim, and the highest level since 1920. At these surface elevations, very little potentially suitable habitat for *R. subumbellata* is exposed. Lake levels remained relatively high through the 1999 growing season. Many previously inundated sites were relocated during the 2001 and 2002 lake-wide surveys (Jody Fraser, Service, pers. obs. 2001, 2002).

Range-wide surveys for *R. subumbellata* populations were not conducted prior to 1979, thus information on the complete historical distribution of *R. subumbellata* is lacking. Pre-1950 records of historical occurrence included 10 sites on the Lake Tahoe shoreline. Survey efforts have been undertaken periodically since 1979 to determine range-wide distribution, status, and population trends of *R. subumbellata* (Knapp 1979a, 1979b, 1980; Ferreira 1987; Tahoe Regional Planning Agency (TRPA) unpublished data, 1994; Pavlik et al. 2002). Because counting methods varied among surveyors, and seasonal timing of surveys was found to influence plant numbers observed, comparison of numbers of individual plants observed among years is not valid. In addition, inferences regarding overall trends are questionable, because historical collectors did not visit all potential habitats.

Data collected over the last 24 years suggest a relationship between lake level and site occupancy by *R. subumbellata* (Pavlik et al. 2002). The data generally indicate that species occurrence fluctuates yearly as a function of both lake level and the amount of exposed habitat. During high-water years, many sites become inundated and are therefore unavailable for that year's plant growth. During low-water years, additional habitat is exposed and becomes available for colonization. Records kept since 1900 indicate preponderance of years with high lake levels that would isolate and reduce *R. subumbellata* occurrences at higher beach elevations. Approximately 7 high-level peaks, encompassing 53 years, can be delineated from the record, including 29 years that exceeded the legal upper limit of 6,229.1 ft (1,898.6 m) (Pavlik et al. 2002). In comparison, there were about 5 low-level troughs comprised of 32 years, with only 21 years that were at or below the lake's natural rim (6,223 ft (1,897 m) (Pavlik et al. 2002)). From the species's standpoint, less favorable peak years have occurred almost twice as often as more favorable, low-level years. In addition, there has been widespread and intensive use of the

shorezone since European settlement (Pavlik et al. 2002). Historically, this use was related to logging and grazing. Today, use of the shoreline is from heavy recreational use, boating, construction of piers and boat launches, and dam operations that change the lake elevation (CSLC 1998).

In 1993, a low-water year when lake elevation averaged 6,223 ft (1,897 m), plants numbering in the thousands were documented at 35 general locations, the largest number of occurrences ever documented in one year (CSLC 1998), until 2002 (CSLC 2003). Subsequent years saw higher lake levels and the number of occupied sites declined, apparently due, in part, to habitat inundation. Factors other than inundation played a part in the decline, because populations were also absent from some higher elevation sites that were not inundated. Preliminary information indicates that habitats inundated by higher lake elevations also experience increased, concentrated recreational use that appears to negatively impact plant populations (see Threats below). In 1995, only 8 of the 35 generalized locations known from 1993 were occupied. While lake-wide surveys were not conducted in 1996, surveys of the 15 sites most likely to have populations revealed the presence of only 5 occupied sites (CSLC 1998). Results of surveys conducted between 1997 and 2000 followed similar patterns of low occupancy for years with high lake levels; an average of 38 sites were surveyed each year during this time period, and only 8 to 14 sites supported the species (Pavlik et al. 2002). Lake levels began to recede in 1999, and by the 2001 growing season, the lake elevation was near the natural rim, exposing hundreds of acres of habitat. During the 2001 surveys, of 58 sites visited, 30 sites had been colonized (CSLC 2002). In 2002, which saw the lowest recorded lake levels since 1994, survey efforts were intensified and of the 71 sites surveyed, 48 supported *R. subumbellata* (CSLC 2003). These data demonstrate the natural fluctuations of *R. subumbellata* occurrences are a function, in part, of lake elevation and available habitat (Pavlik et al. 2002).

Persistence of *R. subumbellata* over time is possible because of a metapopulation dynamic in which extirpation is countered by colonization. New unoccupied sites can be colonized, old occupied sites can be recolonized or extirpated, and the timing and probabilities of these events are influenced by many factors, such as propagule longevity, dispersal mechanisms, and site suitability (Pavlik et al. 2002).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

As previously described, *R. subumbellata* occurs in a dynamic environment controlled by both natural processes and human activities. Habitat occurrence and suitability are influenced by physical processes such as fluctuations in lake elevations, wave-induced beach erosion, or changes in stream channel orientation, all of which may eliminate or create suitable substrates for plant growth (CSLC 1998). Substrate moisture also influences the occurrence of *R. subumbellata*, as well as competition with other plant species for space, light, nutrients, and other plant requirements (Ferreira 1987). Under natural conditions, *R. subumbellata* is apparently tolerant of the dynamic nature of its habitat and adapted for survival in a disturbance regime. However, given the incidence of lake level control by damming and other human activities, habitat conditions are not natural (CSLC 1998).

Human activities affect both *R. subumbellata* and its habitat. While the species was observed at 35 general locations in 1993 (CSLC 1998), 30 locations in 2001 (CSLC 2002), and 48 locations

in 2002 (the highest recorded number of occurrences in a given year) (CSLC 2003), comparison of historical occurrence records with present-day records indicates that *R. subumbellata* has been permanently extirpated from at least 6 historic sites and is present only sporadically at 17 sites (Pavlik et al. 2002). The majority of the remaining sites are intensively used for commercial and public purposes and are subject to various activities such as erosion control, marina developments, pier construction, and recreation.

Recreational use of the public beaches at Lake Tahoe constitutes the greatest threat to *R. subumbellata* and its habitat. Many public beaches are filled to capacity during the summer months. Heavy recreational use of the beaches ultimately results in compaction and mixing of sandy substrates and destruction of the armor layer (CSLC 1994). Both U.S. Forest Service (Forest Service) and California Department of Parks and Recreation (CDPR) have management programs for *R. subumbellata* that include monitoring, fenced exclosures, and transplanting efforts when funds and staff are available. The major colonies of *R. subumbellata* occurring on beaches managed by these agencies have persisted over time. However, because the continued existence of this species is dependent upon a metapopulation dynamic, it is essential that occupied and suitable sites on public, as well as private lands be protected (Pavlik et al. 2002).

Prospects for continued survival of *R. subumbellata* on high-use beaches have been evaluated by examining available information on past and present recreational use of Lake Tahoe's public beaches for indications of future trends. Sites occupied by *R. subumbellata* differ greatly in their level of recreational visitation. Visitation at five Nevada State Parks ranges between 750,000 and 1 million visitors per year (1989 to 2000), with similar levels at California State Parks and Forest Service lands in the basin (Pavlik et al. 2002). Data are not available for privately owned sites, but presumably the levels of use would be substantially lower than on publicly managed sites. Activities that encourage foot traffic along heavily visited beaches have the most deleterious impacts on *R. subumbellata* and its habitat (Pavlik et al. 2002). Demands for beach recreation are expected to increase as a result of urban population growth in Nevada and on the western slope of the Sierra Nevada. Resource managers have observed upward trends in day use of the Tahoe basin and predict that use will increase over time. Local planners are investigating alternative modes of transportation (e.g. bike trails, water taxi services, etc.), to increase access to the public beaches (Jerry Dion, TRPA, pers. comm. 2001). Resultant increased access to the public beaches may increase disturbance and loss of *R. subumbellata* and its habitat.

Human-created disturbances in the shore-zone of Lake Tahoe also contribute to the decline of *R. subumbellata*. Structures that extend into the water are a possible deterrent to the natural transport of sand along the shoreline, which may decrease beach habitat. This includes boat launches, piers, and marinas. Unnaturally high lake levels seem to prevent the natural erosion process, which creates an unstable shoreline and deep-water pockets on that portion of the shoreline. *Rorippa subumbellata* is then unable to follow the receding lake level and potentially cannot recolonize those portions of shoreline. Fluctuating lake elevations create shoreline bars instead of the gently sloping terrace berms. These berms may also prevent *R. subumbellata* from using the receding lake level to recolonize sites. Previous surveys have found many occurrences of *R. subumbellata* in the depressions of berms (CSLC 1998).

Increased beach activity, combined with high lake levels, threatens *R. subumbellata* survival. It has been speculated that as lake levels receded populations would recolonize previously inundated areas. While this has been observed at many sites, it is not true for all suitable habitat

around the lake. The heavy recreational use concentrated on a small portion of the habitat is negatively affecting the plant's ability to reestablish (CSLC 1998).

Approximately half of the populations of *R. subumbellata* that have been monitored over time occur on privately owned beaches overlain by a public trust easement which permits beach use by the public where access is available. Much of the habitat on the private land sites is in good condition. However, some of these beaches are periodically raked by the property owners to provide a uniform surface for recreational activities; in the process, larger pebbles, cobbles, and boulders are removed. This practice degrades substrate structure and moisture-holding capacity, both important habitat characteristics for *R. subumbellata* (CSLC 1998).

Despite the assertion that *R. subumbellata* is well adapted to its dynamic shorezone environment and is capable of recolonizing sites after periods of inundation, the threat of human activities identified above remain during both high and low lake levels. Proposals for construction of new piers and pier extensions, marina expansions, and revetment repairs and replacements are constantly being submitted to permitting agencies. In addition, several projects for improving and increasing beach access and other recreational uses are currently under review (J. Dion, pers. comm. 2001). Future losses or degradation of potential habitat will greatly affect the metapopulation dynamic upon which this species relies for its continued survival (Pavlik et al. 2002).

B. Overutilization for commercial, recreational, scientific, or educational purposes.

No known threats.

C. Disease or predation.

No known threats.

D. The inadequacy of existing regulatory mechanisms.

Activities in the Lake Tahoe basin, including the shorezone, on both public and private lands, are regulated under various agency policies and management directions, many of which include provisions for protection of *R. subumbellata*. However, despite the myriad of potential protective mechanisms, current protection is not adequate.

Rorippa subumbellata is listed as an endangered species under the California Endangered Species Act (CESA). Lead State agencies are required to consult with California Department of Fish and Game (CDFG) to determine whether projects under their purview would jeopardize the continued existence of any listed species. If detrimental effects on the species are determined likely to occur, CDFG is responsible for developing project alternatives consistent with conservation of the species. However, State law requires only that the landowner notify the agency at least 10 days in advance of changing the land use to allow salvage of listed plants. Salvage and transplanting of this species has not been successful to date.

The Tahoe Regional Planning Compact of 1969 (P.L. 96-551), as revised, established the TRPA, a bi-state entity authorized to develop environmental threshold carrying capacities for the Tahoe

basin, which are to be achieved through development of a regional plan and implementing ordinances. All applications for shorezone development are reviewed by TRPA to ensure that *R. subumbellata* populations and habitats are not disturbed. Shorezone activities regulated by TRPA include construction of new structures (e.g. piers, jetties, breakwaters, boat ramps, boat houses, fences, buoys, shoreline protective structures, and marinas); modifications (e.g. major structural repair, reconfiguration, and expansions) and other activities, including salvage operations, tour boat operations, water borne transit, and seaplane operations. The TRPA also has developed beach-raking guidelines, which discourage beach raking within known habitats of *R. subumbellata*. TRPA's regulation of shorezone activity is intended to ensure that projects on all lands requiring permits do not have deleterious impacts on *R. subumbellata* and its habitat. However, TRPA apparently lacks sufficient permit compliance and enforcement personnel to ensure that permit conditions are adhered to, or personnel to work with land managers and landowners to ensure adherence to the beach raking policy.

The CSLC administers the state's fee ownership to the bed of Lake Tahoe from 6,223 ft (1,897 m) elevation lakeward and a public trust easement between 6,223 ft (1,897 m) and 6,228.75 ft (1,898.52 m) elevation. Public and private entities must apply to the CSLC for permits to construct marinas and other structures on state lands or waters. In consultation with CDFG, CSLC provides review under the California Environmental Quality Act (CEQA) and CESA for discretionary projects in the shorezone and requires mitigative measures for all projects under their jurisdiction. Again, CESA does not ensure the continued survival of individual populations.

The CDPR is also required, under CEQA and CESA, to manage populations of *R. subumbellata* on State Park lands so as to ensure that their actions do not jeopardize the species. Ongoing management for *R. subumbellata* at Emerald Bay and D. L. Bliss State Parks includes annual monitoring of all populations and habitats. Past efforts have included reestablishment of an extirpated population on Lester Beach at Bliss State Park through a program of transplanting, fencing, and monitoring.

Rorippa subumbellata is designated as a critically endangered species by the State of Nevada, and under Nevada Revised Statutes 527.270 et seq., it may not be removed or destroyed except under special permit issued by the Nevada Division of Forestry. In the course of issuing permits, efforts are typically made to minimize or eliminate deleterious effects on State-listed species through project modifications. The adequacy of this law depends on informed and cooperative landowners, or on deterrent enforcement. However, there are no State protocols in place informing landowners of the presence of critically endangered species on their lands, and deterrent enforcement does not currently exist.

Rorippa subumbellata is also included on the list of Forest Service sensitive species. The Forest Service develops and implements management practices that ensure species do not become threatened or endangered as a result of their actions. Management activities for *R. subumbellata* on Forest Service lands have included annual surveys, construction of exclosures around major populations, and transplanting programs. The commitment to such programs by the Forest Service is highly dependent upon annual staffing and other priorities in the Tahoe basin. Forest Service efforts to manage the species have improved over the past 3 years; a permanent botanist position was filled and the program has consistently been funded. Projects have included the construction of a number of enclosures to protect the species and placement of informative signs on the enclosures and elsewhere to educate the public.

E. Other natural or manmade factors affecting its continued existence.

Lake level fluctuations between elevations of approximately 6,223 and 6,229 ft (1,897 and 1,899 m) result from operation of the Truckee River dam at the outflow of Lake Tahoe at Tahoe City. The dam is operated in accordance with procedures negotiated in the Truckee River Agreement, which provides releases to meet downstream demands. In periods of drought, the lake may drop below its natural rim of 6,223 ft (1,897 m) elevation during the non-runoff portions of the year. Holding lake surface elevations at unnaturally high levels during the growing season appears to negatively affect *R. subumbellata* by inundating habitats (Ferreira 1987; Pavlik et al. 2002). Recolonization after inundation has been documented in several instances. During the drought of the late 1980s and early 1990s, lake elevations remained at or below the natural rim. During that time, many newly exposed shoreline habitats were colonized by *R. subumbellata* (CSLC 1998). The duration of inundation of the low and mid-elevation sites was most extensive during the 1990s. The region subsequently experienced relatively dry winters between 1999 and 2002, and lake elevations dropped to near the natural rim, exposing previously inundated known and potentially suitable habitat. Many of these sites were colonized during the 2001 and 2002 seasons (CSLC 2002; CSLC 2003).

A proposed Federal action to modify operations of the Truckee River reservoirs through implementation of the Truckee River Operating Agreement (TROA) is presently being negotiated by the Secretary of the Interior in accordance with subsection 205(a) of the Truckee-Carson-Pyramid Lake Water Rights Settlement Act (P.L. 101-618). Analysis of potential effects by implementation of TROA is in progress, including an analysis of potential changes in the levels of Lake Tahoe, and possible effects on *R. subumbellata*. Preliminary models indicate that, during most years, lake surface may reach levels 1 to 2 inches (in) (2.5 to 5 centimeters (cm)) higher or lower than occur normally for that year. If the lake level is high, then TROA will only change that level by 1 to 2 in (2.5 to 5 cm) (Bair 1996). Minor changes in the actual lake level are not expected to significantly influence occurrence or distribution of *R. subumbellata*. However, in a few years, lake levels may average up to one-half foot higher. Under these scenarios, TROA would likely include mitigation measures to reduce the potential for impact on the *R. subumbellata* (Bair 1996).

FOR RESUBMITTED PETITIONS:

- a. Is listing still warranted? YES
- b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? YES
- c. Is a proposal to list the species as threatened or endangered in preparation? NO
- d. If the answer to c. above is no, provide an explanation of why the action is still precluded.

The petition received December 2000 to list *R. subumbellata* as an endangered species under the Endangered Species Act was largely based on the restricted distribution of the species, a declining trend in the numbers of sites and individuals observed, and the inadequacy of existing regulatory mechanisms (League to Save Lake Tahoe and Center for Biological Diversity 2000). We considered the information provided in the petition in making our previous findings for this species. An effort to draft and implement a conservation strategy designed to preclude the need to list the species is currently underway and is expected to be completed this fiscal year.

Since publication of the 2002 CNOR, the publication of a proposed rule to list this species has been precluded by other higher priority listing actions, and based on work scheduled we expect that will remain the case for the remainder of Fiscal Year 2004. Almost the entire national listing budget has been consumed by work on various listing actions taken to comply with court orders and court-approved settlement agreements, emergency listing, and essential litigation-related, administrative, and program management functions. We will continue to monitor the status of *R. subumbellata* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

LAND OWNERSHIP:

Populations occur on lands under management by a variety of agencies and entities, including Forest Service (25 percent), State, county, and city parks (25 percent), and private landowners (50 percent). These agencies and entities were described above Factor D.

PRELISTING:

The CSLC and TRPA, in conjunction with various other Federal, State, and local partners, developed a stewardship plan which was intended to provide protection for *R. subumbellata* so that shorezone development would not be detrimental to species survival. Funds for this plan were to be derived from mitigation fees assessed on permitted development projects located within the shorezone. The effort to develop the plan and fund its implementation was underway for a period of years, and various versions of a draft plan were produced. However, acquisition of funds to complete the plan, begin implementation, and identify management actions to protect the plant was never realized.

In 1997, CSLC formed a multi-agency survey team to perform annual lake-wide surveys for the presence or absence of *R. subumbellata*. Agencies involved in the effort contribute various in-kind services (i.e., watercraft, Global Positioning System units, aerial photographs, etc.) or post-survey data compilation (Pavlik et al. 2002). These surveys are ongoing; the data collected continue to be refined so as to inform the conservation efforts.

Both the Forest Service and CDPR have management programs for *R. subumbellata* includes monitoring, fenced enclosures, and transplanting efforts when funds and staff are available. Also, TRPA has developed beach-raking guidelines, which discourage beach raking within known habitats of *R. subumbellata*. TRPA's regulation of shorezone activity is intended to ensure that projects on all lands requiring permits do not have deleterious impacts on *R. subumbellata* and its habitat.

A collaborative effort among public agencies (including the Service), private landowners, and environmental groups to develop a conservation strategy coupled with a Memorandum of Understanding/Conservation Agreement has been completed (Pavlik et al. 2002). Through the participation of academicians and scientists with expertise in rare plant conservation, this effort combined all of the data previously collected on *R. subumbellata* through the 2000 annual

survey. This information has been translated into goals and objectives for the strategy, a research and monitoring agenda, and will serve as the foundation for an adaptive management program. If successfully implemented, this strategy and associated agreement will preclude the need for the Service to list the species under the Endangered Species Act. The draft conservation strategy and agreement are available online at <http://www.trpa.org/Documents.htm>.

Because *Rorippa subumbellata* was designated a candidate species for listing in 1999 (64 FR 57533), and the Service was under a listing moratorium at the time the petition was received, no action was taken. The Service responded to the petitioners on February 15, 2001.

REFERENCES:

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- League to Save Lake Tahoe and Center for Biological Diversity. 2000. Petition to list the Tahoe yellow cress (*Rorippa subumbellata*) as a federally endangered species. Submitted to the Secretary of Interior, December 11, 2000.
- Pavlik, B., D. Murphy, and Tahoe Yellow Cress Technical Advisory Group. 2002. Draft Conservation Strategy for Tahoe Yellow Cress (*Rorippa subumbellata*). Tahoe Regional Planning Agency, Zephyr Cove, Nevada.

LISTING PRIORITY (* after number)

THREAT

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: Despite the relatively high number of populations observed during the 2001 and 2002 surveys, concern over increasing and intense recreational use and further development of the shorezone at Lake Tahoe has prompted the Service to maintain the current LPN for *R. subumbellata* at 2. Efforts to minimize or eliminate impacts to this species and its habitat are ongoing. However, at this time, there is no evidence to suggest that the threats to the species have been adequately addressed. Implementation of the conservation strategy is in its early stages, and should the outcome of ongoing and future management and conservation activities show that the threats to the species are actively being reduced, the LPN will be reevaluated.

Imminence: Threats to *R. subumbellata* from recreation remain imminent and continue to increase as the number of visitors to the beaches of Lake Tahoe increases. In addition, regulatory agencies that oversee activities in the basin continuously receive permit applications for the construction, repair, and maintenance of boat launches, piers, and revetments and other development that alters the shorezone. These and other ongoing activities in the shorezone result in varying levels of impacts to the species and its habitat. Successful implementation of the conservation strategy is necessary to keep the threats from recreation and development in check and allow the Service to reassess the LPN for *R. subumbellata*.

