SENSITIVE PLANT INVESTIGATION

Lake Tahoe Basin Management Unit

II. *Rorippa subumbellata* Roll.

Its Status on Historical and Potentially New Sites

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INTRODUCTION

The U.S. Forest Service, Lake Tahoe Basin Management Unit, has undertaken to assess the status of five species of sensitive plants in the Lake Tahoe Basin. A previous report (Knapp, 1979) presented information on the historical records for the five species and listed potentially new locations for one of the species, Rorippa subumbellata, Roll. This report presents the results of a field survey of the historical and potentially new locations of this species. The thirty areas specified in the previous report were surveyed, and the species was found to occur in nine of those areas. Six of the fifteen high probability sites and three of the ten lower probability sites were determined to have populations of R. subumbellata, Roll. This report presents the results of a field survey of the historical and potentially new locations of this species.

This report presents a brief description of Rorippa subumbellata Roll., an evaluation of its habitat requirements, and a discussion of its sensitivity to management practices. Appended to the report is a set of site documentation forms presenting specific information gathered from each visit to the potential and historical sites.

FINDINGS

- Rorippa subumbellata Roll. was located at eleven general locations in the Lake Tahoe Basin in 1979.
- The species was located at five historical locations: near the mouth of the Upper Truckee River, Nevada Beach, Tahoma, Meeks Bay, and Emerald Bay.
- The species was not found at three historical locations: Agate Bay, Sunnyside, and D.L. Bliss State Park.
- Most populations have many small plants of seedling size.
- Many populations would be inundated in part if the lake level rises more than a few inches.
- The species does not compete well with other plants.
- The species can tolerate minor soil disturbance.
- Major soil disturbance, such as that which occurred at Nevada Beach, removes or buries plants and has a severe impact upon populations.
- Several populations are quite small and are potentially endangered by either human activities on the beaches or by a rising water level in the lake.

- Most populations, especially those at small, private beaches are not apparently endangered by human uses of the beaches.

- Populations at large public beaches are quite small, with one exception, and are all located in refuges of one type or another.

- Intensive public beach use has an apparently adverse impact upon the species ability to sprout and become established, since far fewer seedlings were found at intensely used public beaches than at little used private beaches.

- The creation and destruction of appropriate habitat by fluctuating lake level, storms, and changes in beach morphology have an apparently large influence upon distribution of the species.

RECOMMENDATIONS

- The REVD Code for ROSU-2 should be changed to 2-2-1-2, indicating that the species is confined to several populations which are endangered in part, stable or increasing (in part), and rare outside California.

- Research into the habitat requirements of the species, the longevity of the seeds, and the susceptability of the populations to innundation at various water levels should be conducted.

- Pending research results, the known and historical populations of the species should be periodically re-surveyed to provide updated knowledge of the status of this species.

- The author believes that a fluctuating lake level may provide optimum conditions for this species, and that a constantly maintained high water level may result in the loss of several populations

- Beach use should be controlled in areas of known populations on public lands. Fencing or rocks could be added to reduce the intensity of use of beaches in the vicinity of populations at the south shore (Taylor Creek, Regan Beach, El Dorado Beach, Nevada Beach) and at D.L. Bliss State Park.

- Contact should be made with property owners and the Douglas County Sewer Improvement District regarding the disturbance of this historically significant ROSU-2 population at Nevada Beach in an effort to prevent the type of disturbance which occurred in 1979.

DESCRIPTION OF RORIPPA SUBUMBELLATA

The botantical description of Rorippa subumbellata Roll. is available in Munz & Keck (1) on Page 239. It is a member of the cruciferae or mustard family, which is characterized by plants with flowers having four petals and four sepals. The plant was first discribed from a collection made at Meeks Bay, and it is only found (endemic) within the Lake Tahoe Basin. Rorippa is the Yellow Cress genus, and the California Native Plant Society refers to R. subumbellata by the "common" name Tahoe Yellow Cress.

In simple terms, R. subumbellata is a somewhat fleshy plant which lives for at least a few years. It grows close to the ground from a root stock which is slender and not branched. The above-ground portion of the plant is branched and each of the branches is from two to seven inches long and may be slightly hairy. The leaves are attached directly to the stem and are divided into shallow lobes that are either slightly hairy or not hairy. Each leaf is 1/2 to 1-1/2 inches long and from 1/4 to 1/2 inches wide. The small yellow four-petalled flowers are found in flat or slightly elongated clusters at the ends of short stems. The sepals are only 2 to 3 mm long and the petals are slightly longer so that the brighter yellow petals show distinctly outside the slightly duller yellow sepals. The fruiting body is a short, thick pod which does not have hair on it.

Similar species can be separated from R. subumbellata by the following characteristics:

- Rorippa curvisiliqua has longer, thinner, and usually curved seed pods. The petals do not extend beyond the end of the sepals and the flower is smaller, being only 1-2 mm wide, versus 3-4 mm wide in R. subumbellata. R. curvisiliqua is also found in a wider variety of habitat and is more variable in its characteristics, sometimes having a reddish or purplish tint to its leaves and stems.

- Rorippa obtusa is reported to have been collected in the Lake Tahoe Basin, but no collections have been made in the area since 1915. Although it is unlikely that one would stumble across a population, it would be distinguished from R. subumbellata by its much smaller, light brown flowers, its leaves being held away from the stems by short petioles, and its extremely small seeds.

- Nasturtium officinale is a similar plant, the imported and naturalized, cultivated water cress. It has not been collected near Lake Tahoe itself, which is a probable aid in distinguishing this plant. If one should be located near Lake Tahoe, it is recognizable by being at least four inches tall and as high as two feet tall. It usually grows in water on banks of quiet streams and it roots more abundantly than Rorippa subumbellata, which is mainly rooted with a single root which may branch somewhat. The seed pods are also much larger, and the leaflets are longer than those of R. subumbellata.

HABITAT

Although Munz & Keck (1) list Rorippa subumbellata as occurring from 6000 to 8000 feet about Lake Tahoe, the author has not seen a single reference to any collection made above the level of the Lake itself, nor has he seen any collected plant taken from a higher location, nor did this study reveal the presence of the plant on the shores of any lake other than Lake Tahoe. It is apparently found only in the habitat types described below, around the shores of Lake Tahoe.

Rorippa subumbellata was most commonly found in this study in moist backshore areas. These areas are located on the beach, but behind the small wave-action barrier beach. When the appropriate beach topography was present, this species could almost always be found. The species is not limited to moist areas, however, and in fact was found in at least six specific locations (Nevada Beach, Tahoe Meadows, Tahoe Keys, Pope/Vallahalla, Taylor Creek, and Tahoma), in micro-sites which were quite dry soils. The only nearly constant factor of the habitat was the substrate, which was, with one exception, sand or gravelly sand. The one exception was a single plant located in a large area of silty dredge tailings near Tahoe Keys Marina. This plant is considered to be an anomaly, as will be explained in the Site Documentation form for the South Shore at Tahoe Keys. The species apparently does not compete well, as it was rarely found growing with any other plants. For example, at Incline Village, Agate Bay and Tahoe City, acres of suitable habitat existed but most of the area was covered by various species of grasses, rushes and forbs. Not one single Rorippa subumbellata was located in these vegetated areas. In one location (Regan Beach) where it was found with a dense cluster of grasses and rushes, it was deriving some measure of refuge from human impact by its proximity to the dense vegetation.

SENSITIVITY TO MANAGEMENT PRACTICES

Three types of management activities may affect Rorippa subumbellata. These are beach use, water level fluctuations, and water quality changes. They are discussed individually below.

Beach Use

R. subumbellata was found on all categories of beaches around the Lake, including both little used private beaches and heavily used public beaches. The only differences noted were that the number of young plants seemed to decrease as use increased, and the plants found on heavily used beaches were in some manner protected by their microsite from the heaviest impacts. For example, the one plant found on El Dorado Beach was wedged between two 10-12 inch diameter rocks on an otherwise sandy beach. The one set of plants found at Regan Beach was situated within inches on the north side of a dense sward of rushes and grasses, and within inches to the south of a footpath leading around this thicket to the beach.

The species is not highly sensitive to human impact, however. In the course of the survey, several individuals and clusters were found which had clearly been run over or stepped upon and had substantial root exposure, and most of the evidence would suggest that this type of impact is not at all uncommon. Yet, the plants with roots thus exposed did not appear to be wilting, and subsequent spot checks showed no visually apparent decrease in the quality of the stand or the plants within the stands.

Based upon field observation of subjectively rated use categories, the following categories of human beach use are expected to have no significant impact upon Rorippa subumbellata:

- Private beach use (e.g., Glenbrook, Tahoe Meadows, Tahoe Keys, and Logan Shoals all have vigorous populations).

- Light to moderate public beach use (e.g., the beach east of the mouth of the Upper Truckee River and the northern portion of Meeks Bay.

- Intense public beach use where refuges are available or are created (e.g., plants were found on the extreme southern portion of Sand Harbor Beach in cobbles and small rocks, on El Dorado Beach between rocks, and southwest of Nevada Beach on the bluff behind the beach.

The following activities are judged to create potentially severe impacts upon Rorippa subumbellata:

- Intense public beach use in areas in which no refuges for the plants are available (e.g., no plants were found on the beaches at Pope Beach, Baldwin Beach, Timber Cove/Bijou, Skunk Harbor, Secret Harbor, Zephyr Cove, D.L. Bliss State Park, or Incline Beach).

- Beach maintenance activities. Several times around the basin the author observed people engaged in raking pine needles and other debris from the beach. Rorippa subumballata was never observed to grow in areas where there was evidence of such maintenance (e.g., at Camp Richardson and Chamber's Lodge, private parties were raking the beach. Although suitable habitat existed at Chamber's Lodge, no Rorippa was found).

- Heavy impact by earth moving equipment. Between two visits to Nevada Beach, a portion of the population near the DCSID #1 sewage lift station was destroyed by a scraper of some sort which graded a strip approximately 10 feet wide and 40-50 feet long, and deposited some loose fill material over a slightly smaller area. The operation and reason for the activity are unknown, but a substantial portion of this historically important population (possibly as much as 50 percent) was destroyed.

Water Level Fluctuations

The habitat which appears to be most favorable for Rorippa subumbellata, namely moist backshore area, is strongly dependent upon the beach morphology which is probably strongly dependent upon the water level in the Lake. As the Lake rises above its present level, large backshore areas such as those found at Logan Shoals, Tahoe Meadows and Glenbrook will be inundated and the populations will be lost. Other populations may be expected to be generated from seed in other locations, however, and the net effect upon the total population is a matter of speculation. The species is apparently adapted to fluctuations of water level, since the recent drought has exposed areas of beach which are not normally exposed, and several of these areas are inhabitated by vigorous populations. Research into the response of Rorippa subumbellata to fluctuations in water level would be informative and useful in making management decisions

Water Quality Changes

Rorippa subumbellata has been observed to grow only about the shores of Lake Tahoe, itself. Even Fallen Leaf Lake and Cascade Lake do not have populations of the species, although they are just a few feet higher than Lake Tahoe. Several hypotheses about this distribution pattern are evident. One is that this species propogates only by fragmentation of root stocks and subsequent sprouting or by water borne seed dispension since the action of wind, birds or small animals in distributing seed would be expected to disperse seed to these nearby lakes. Another is that differences in physical or chemical conditions, expecially water quality, of the surrounding lakes are sufficient to prevent establishment of the plant at these lakes. Other hypotheses could easily be stated, but either of these can be used as a point of origin for research into the distribution, and either is easily testable using field or laboratory experiments.

If this hypothesis regarding water quality conditions were to prove valid, the implications for management of the entire Basin lands tributary to the lake could be quite extensive. If water quality conditions were found not to affect the distribution of the plant, management activities could probably be limited to the immediate vicinity of the shoreline. Until such time as research results are available, management efforts should probably focus upon the management of lake level and beach use under the reasoning that the water quality concerns are certainly more complex, less identifiable, and will involve much more costly approaches, while the management of beach morphology and use will probably produce much more cost-effective results.

BIBLIOGRAPHY

1. Munz, Phillip A. and David D. Keck, A California Flora, University of California Press, Berkeley, California, 1958, 1681 pages.

2. Knapp, Charles M., "Sensitive Plant Investigation - Lake Tahoe Basin Management Unit, I. Preliminary Investigations". U.S. Forest Service, South Lake Tahoe, CA. July 1, 1979

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 9-30-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll. ROSU

DATE OF SEARCH: Nine Dates between 6-4-79 and 7-13-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: South Shore of Lake Tahoe from Baldwin Beach in California to Nevada Beach in Nevada.

DESCRIPTION: The South Shore of Lake Tahoe is a continuous beach for more than seven miles from Baldwin Beach in Section 26, T.13N., R.17E., MDB&M to Nevada Beach in Sections 22 and 16, T.13N., R.18E., MDB&M. The entire length of this beach was searched; and, as a consequence, Rorippa subumbellata was found to occur in several specific locations. The sites searched and the sites at which the species was located are listed and described in the paragraphs which follow.

BALDWIN BEACH: Searched 6-19-79. No individuals of ROSU-2 were located. All beach area from the section line between Sections 25 and 26, T.13N., R17E., to the beginning of rocky shoreline on the Cascade Properties lands was searched.

TAYLOR CREEK: Searched 6-19-79. One cluster of about five (5) plants was located about 50 feet NW of the mouth of Taylor Creek in a moist depression behind a low barrier beach near the section line in Section 25, T.13N., R.17E. No other individuals were located between the section line between Sections 25 and 26 and the gravelly beach around the point NW of Kiva Beach. The population is vigorous, but endangered by its small numbers and by potential inundation by Lake Tahoe should the level of the lake rise. This population is labeled A. Taylor Creek on Map No. 1. No previous record of this population exists.

KIVA BEACH: Searched 6-19-79. One large, individual plant of ROSU-2 was found near the top of the sandy barrier beach and bluff approximately 30 feet from Lake Tahoe. This plant is vigorous and well established, but endangered by its singularity. This site is labeled B. Pope/Valhalla on Map No. 1 and Map No. 2. No previous record of this population exists.

CAMP RICHARDSON: Searched 6-19-79. No individuals of ROSU-2 were located on the beaches of the private properties between the Pope Estate and Pope Beach. The beach habitat in this area appears to be suboptimal, since no depressions behind barrier beaches occur. Many residents rake debris from the beaches in this area, and possibly also move sand to prevent the formation of small barrier beaches. Such disturbance would severely hamper the establishment of new populations of ROSU-2 on the beaches in this area. The bluff area behind the beaches was not well seached due to only sporatic access, but visual inspection from the

water revealed that lawn grasses and other disturbances have greatly modified most of the back shore area, and it is unlikely that any plants of ROSU-2 exist here but were not located.

POPE BEACH: Searched 6-19-79. No ROSU-2 individuals were located between the property fences at Camp Richardson and at Tahoe Keys. Both the beach and back shore were searched. The beach is not an ideal one for the species in that it rises continually from the water without a barrier beach and the sand grains are rather coarse.

TAHOE KEYS: Searched 6-6-79, 6-19-79, 7-13-79. Three populations of ROSU-2 were discovered in the Tahoe Keys properties. These populations are located at Lighthouse Shores (Ski Beach), just west of the mouth of the Upper Truckee River, and on the dredge trailings disposal area south of the mouth of the Upper Truckee River.

The population at Lighthouse Shores (C. Lighthouse Shores on Map No. 3) consists of about 20 plants scattered among rocks on the relatively flat beach for 100 m west of the western entrance to Tahoe Keys from Lake Tahoe in Section 5, T.12N., R.18E. This beach is relatively undisturbed. No previous record of this population exists. The population is young and apparently virorous, but potentially endnagered by a rising level of Lake Tahoe.

The population to the west of the mouth of the Upper Truckee River is contained in Section 31, T.13N., R.18E., MDB & M. The mouth of the river was located at almost precisely 120° W longitude in 1979. The population exists in scattered clusters South along the west bank of the Upper Truckee River for about 50 yards and westward along the sandy bluff along the south shore of Lake Tahoe on both the lake side and on the lagoon or pond side of the bluff for about 300 yards to the eastern entrance to Tahoe Keys and the Marina. This population is labeled D. Upper Truckee, West on Map No. 4. Approximately 35 widely scattered plants of good vigor occupy this site. Most of the plants on the south side of the bluff are quite large and presumably old for the species (one square foot or more), indicating that conditions have probably been quite stable at this site for several years. Many plants on the north side of the bluff are smaller and presumed to be younger.

This population is not immediately endangered, but could become endangered if further construction is permitted to the east of the entrance to the Tahoe Keys Marina. Opening this area to significant human access or reshaping the bluff area for beach use will undoubtedly adversely impact the older, larger plants on the south side of the bluff.

Previous record of this population or of the population to the east was made by Mason, No. 12,197, on August 2, 1939.

The population located upon the dredge trailing disposal site was located in June by chance, and could not be relocated in July. It consists of one or two plants of ROSU-2 on a dry, silty upland more than 200 m from Lake Tahoe in Section 4 of T.12N., R.18E. The habitat is totally inappropriate for the species, and the vigor of the plants is low, which leads to the assumption that seeds of the plant may have been dredged from the sediments at the mouth of the Tahoe Keys Marina during cleaning and dredging operations during the low water period in 1977, following the severe drought. These seeds may have become established in what was temporarily a desireable habitat, but which dried up and become inappropriate after the plants became established. This population will probably be eliminated in the next year or two if it has not already demised. This population is noted as E. Tahoe Keys Marina on Map No. 4.

TRUCKEE MARSH: Searched 6-4-79, 6-12-79. Widely scattered individuals and clusters of ROSU-2 were located on the eastern bank of the Upper Truckee River for about 100 m south of Lake Tahoe, and eastward along the shore of Lake Tahoe for about 400 m. This population is noted as F. Truckee Marsh on Map No. 4. The population is located within Section 31, T.13N., R.18E., MDB & M. About 50 plants of good vigor are found in this population. The population is vigorous. Many of the individuals are small and young, and are located where rising water could inundate them. Others, especially those along the eastern bank of the Upper Truckee River do not appear to be endangered. Previous record of this population or of the one to the west (D. Upper Truckee, West) was made by Mason, No. 12,197, on August 2, 1939.

AL TAHOE: Searched 6-12-79, 6-15-79. A total of less than ten individual plants of ROSU-2 were located in two sites on the beaches north of Al Tahoe. Just north of Berkeley Avenue a small cluster was located and another was located at Regan Beach. Both sites are located in Section 32, T.13N., R.18E., MDB & M. The Berkeley Ave. site was somewhat typical for the species, a somewhat moist backshore area below a steep bluff and protected by a pier. The Regan Beach population was atypical in that it was located at the margin of a dense tangle of rushes and grasses in a very wet back water area. Very little evidence of human use of this vegetated area existed at the time of visitation, and intense human uses occurred only 1 to 2 feet away. The 3 or 4 small ROSU-2 individuals were located between a well-used path circum-navigating the vegetated area and the dense margin of the vegetation, possibly indicating that the plant does not tolerate intense beach use and was seeking refuge. The portion of this population nearest to intense beach use is probably severely endangered by rising water levels and human uses, but the more isolated portion of the population is not apparently endangered. No previous record of this population exists.

EL DORADO BEACH: Searched 6-10-79, 6-15-79. This site, (H. El Dorado Beach on Map No. 6), covers that portion of the beach immediately north of the El Dorado County Campground in Section 32 of T.13N., R.18E., MDB & M. One vigorous individual was located in a favorable micro-site in a heavily used portion of the beach, near the section line between Sections 32 and 33, approximately 50 feet east of a drainage culvert discharge on the beach. The plant was wedged between two 8-12 inch diameter rocks, in an area of heavy foot traffic. The plant showed no signs of being disturbed and was quite vigorous. It is potentially endangered by its singularity, the human uses surrounding the site, and by a rising water level. No previous record of this plant exists.

BIJOU: Searched 6-10-79. No plants of ROSU-2 were found from Ski Run Marina to El Dorado Beach. All beach and backshore area was searched.

TAHOE MEADOWS: Searched 6-13-79. Scattered individuals of ROSU-2 occur all along the beach in suitable habitat (I. Tahoe Meadows on Map No. 6). This area includes portions of Sections 27, 28 and 33 of T.13N., R.18E., MDB & M. On the visitation date most of these plants were inundated by waves blown over the low barrier beach by a strong westerly wind. A check a few days later showed that when the wind died, the sites occupied by the plants were moist on the bottom, but no standing water was observed. No apparent damage was caused by the inundation. The population consists of vigorous, young, solitary plants along the beach with the exception of one vigorous cluster of older plants on a low bluff on the eastern bank of a drainage ditch at the eastern end of the property, within 25 feet of Lake Tahoe. The younger portion of the population is endangered by rising water levels, but the older portion of the bluff is not endangere in this manner. Significant growth of other vegetation nearby could endanger this portion of the population if ROSU-2 does not compete well, which is apparently the case. No previous record of this population exists.

STATELINE MARINA AND BEACH: Searched 6-13-79. No plants of ROSU-2 were located between the NE property line of Tahoe Meadows and the State line in Section 27, T.13N., R.18E., MDB & M. The beach and backshore areas were searched along this entire section of beach.

EDGEWOOD GOLF COURSE: Searched 6-13-79. Two clusters of ROSU-2 were located in the southern portion (Section 27, T.13N., R.18E., MDB & M) of the beach along the Edgewood Golf Course, and scattered individuals were located on the northern portion (Section 22) of this beach (J. Edgewood Golf Course, on Map No. 6). The southern most cluster is located 150 m south of the Edgewood Golf Course Club House on the beach. It consists of eleven vigorous and not endangered plants in a slight depression in the backshore area. The other cluster is located on the north bank of Edgewood Creek at its mouth. It is also vigorous and not endangered. Widely scattered individuals occur north of the creek to the property boundary fence. These individuals are not as vigorous as the clustered individuals, and are in some cases endangered by rising water levels. Any attempt to modify the beach or to extend the fairways, greens or other grassy areas onto the beach would also endanger these plants. No previous record of this population exists.

NEVADA BEACH: A scattered population of ROSU-2 occupies the southern bank of Burke Creek and the backshore bluff on the beach belonging to a trailer park and another belonging to the University of Nevada (4-H Club Camp) in Section 22, T.13N., R.18E., MDB & M (K. Nevada Beach on map No. 6). A small portion of this population extends about 200 feet onto the Edgewood Country Club Beach. This population is historically significant in that the first collection of ROSU-2 from it was made by Frank W. Pierson, No. 6137, on July 1, 1925. The information available indicates that this is the first collection of this species, since the type collection from Meeks Bay was not made until 1942. M. Baad verified its existence in 1978.

No individuals of ROSU-2 could be found anywhere on the beaches or backshore areas of Nevada Beach National Forest Campground.

Many plants are distributed somewhat sparsely on the trailer park property, well back from the major beach activity. A large portion (possibly as much as one-half of the northern portion of this population) was severely damaged by grading activities in the vicinity of the sewage lift station between 6-6-79 and 6-13-79. The reason for the grading was not determined. The graded area contained the greatest abundance of individuals at this site. The remainder of the population is widely scattered to the south. The portion of the population located on the Nevada Beach property mentioned by Baad in 1978 could not be located, and is presumed to also have become damaged or otherwise lost in the intervening year. The remaining plants are not particularly vigorous, with many individuals lacking the lush verdant green color which typifies the species.

This site is not a typically ideal site, but it has apparently housed the species for more than 50 years, indicating that although conditions may not have been ideal, they at least have been relatively stable. The decrease noted from 1978 to 1979 and the damage which occurred in 1979 both indicate that this population may be severely endangered due to human uses. Close observation of the site is recommended during 1980, and if the trend to decreasing vigor continues, some effort should be made to protect this historically significant population.

ELK POINT: Searched 6-23-79. Just north of Nevada Beach and south of Elk Point is a short stretch of private beach in Section 16, T.13N., R.18E., MDB & M. ROSU-2 was located in a small cluster near the SE corner of a boat ramp and small marina on this property. The population (L. Elk Point/Nevada Beach on map No. 7) includes 20-30 vigorous individuals and is not apparently endangered since it is well above water level and on minimally used private land. There is no known previous record of this population.

PREVIOUS IDENTIFICATION AT THIS SITE: Since the South Shore is broken into so many populations, the notes regarding previous sightings are included in the description of each population.

SIZE AND VIGOR OF THE POPULATION: Comments regarding the size and vigor of each population are presented under the description of each population. In general, the population of Rorippa subumbellata at the South Shore of Lake Tahoe is vigorous and not severely threatened by human activities.

ENDANGERMENT: If the South Shore continues to grow in population and the use of beach areas is increased, specific portions of the population of ROSU-2 in the area may be endangered. A larger potential threat may be the raising of the Lake level to its maximum and holding it there for several years. The seeds of ROSU-2 may be long lived and may survive such inundation, but no information exists as yet to decide whether constant lake levels would detrimentally affect the species. A constantly fluctuating water level appears to favor colonization and establishment of new populations, since as was noted at several locations, the populations were comprised of small, young plants, and this set of observations followed a prolonged drought and occurred as the water level in the lake was rising.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-23-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Marla Bay (Map No. 7)

DESCRIPTION: The northern 2/3 of Marla Bay occupies portions of Sections 9 and 16 of T.13N., R.18E., MDB & M. This area was searched from the southern outcroppings of rocks at Zephyr Point to the mouth of McFaul Creek. Both backshore areas an beach were searched, but no individuals of ROSU-2 were located. The southern 1/3 of Marla Bay is privately owned and was inaccessible at the time of searching. No ideal habitat for ROSU-2 was observed toward the south from the mouth of McFaul Creek.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known record of ROSU-2 at this site.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-23-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Zephyr Cove (Map No. 8)

DESCRIPTION: The southern portion of Zephyr Cove lies in Section 10, T.13N., R.18E., MDB & M. The beaches and backshore areas of this portion of Zephyr Cove were searched unproductively. Areas of likely habitat near the mouth of a small stream contained only a related species, Rorippa curvisiliqua. The northern portion was inaccessible at the time.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known record of ROSU-2 at this site.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-23-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endan
REVD Code: 2-2-2-3

SITE: Skyland (M. Skyland on Map No. 8)

DESCRIPTION: This site is a series of small beaches south of a major point of land in Section 3, T.13N., R.18E., MDB & M. It was not identified as a potential site by inspection of aerial photographs, and was visited because of curiosity and previous personal knowledge of its existence. About 20 plants of ROSU-2 were found to inhabit extremely small beach habitats created by breakwater groins. The beaches involved are rarely over 30 feet long and 10 feet wide. The plants seem to inhabit that portion of the beach which is most shaded by the groins and is most moist.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known previous record of ROSU-2 at this site.

SIZE AND VIGOR: The plants at this site (ca. 20) are quite vigorous. Many are seedling size, but a few are larger and possibly a few years old.

ENDANGERMENT: This population is not apparently endangered by human activities on the small, lightly used beaches. A rise in water level could inundate the population.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-23-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Lincoln Park/Cave Rock (Map No. 9)

DESCRIPTION: This site is a small beach at a Nevada State Beach at Cave Rock. The beach lies to the south of a boat landing at the southern end of Section 27, T.14N., R.18E., MDB & M. It was not previously identified as a potential site for ROSU-2 from aerial photographs, but was searched because of curiosity and previous personal knowledge of its existence. No individuals of ROSU-2 were located on this beach, which extends from the boat ramp to about the location of the boundary between Sections 27 and 34. Suitable habitat exists, but the multitude of other species present may have out-competed ROSU-2.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known record of ROSU-2 at this site.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-23-79
6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Logan Shoals (N. Logan Shoals on Map No. 9)

DESCRIPTION: Beginning about 100 m south of a marina at the south edge of Section 15, T.14N., R.18E., MDB & M and continuing to the north to a prominent point of land into Lake Tahoe near the middle of Section 15, an extensive population of ROSU-2 exists. The southern portions of this population include scattered established individuals and pockets of seedlings in moist areas behind small barrier beaches. The northern portion includes an extensive area (ca. 1 acre) of seedling plants in a broad, moist beach and a cluster of very large, well established plants on a slightly drier, more elevated site. This site is accessible from a number of private driveways or from public parking at the marina.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known previous record of ROSU-2 at this site.

SIZE AND VIGOR: This population is one of the two largest and most vigorous populations of ROSU-2 found, the other being the one at Glenbrook, just to the north. More than 100 plants occur in this population, from seedling to fully mature individuals.

ENDANGERMENT: This population could be reduced by as much as 2/3 if the Lake level rose and inundated low areas. Human activities do not pose an immediate threat.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 8-9-79

STATUS: Federal: Threatened
CNPS: Very Rare and Enda
REVD Code: 2-2-2-3

SITE: Glenbrook (O. Glenbrook on Map No. 10)

DESCRIPTION: Beginning at a pier south of the mouth of Glenbrook Creek in Section 10, T.14N., R.18E., MDB & M., and continuing northward into the southern portion of Section 3 near Slaughterhouse Creek, an extensive population of ROSU-2 was located. Several clusters of about 50 individual were located, some intermixed with other species of forbs and grasses. Several older individuals were observed to have sent out stolons or rhizomes which had rooted. Hundreds of seedlings were located throughout the site. Most of the older portion of the population is on the elevated portion of the beach, well above the area of wave action and barrier beach/depression topography. Many seedlings are also located well above the current lake level.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known previous record of ROSU-2 at this site.

SIZE AND VIGOR: This population is the largest and most vigorous of all populations located in this study. Several hundred plants of all ages occupy both the beach and backshore area. This population has clearly been established for some time and is replenishing itself.

ENDANGERMENT: This population is not endangered by current uses of the beach area. A rise in Lake level would inundate only a portion of the population. Many established plants are well above the high water beach line.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endanc
REVD Code: 2-2-2-3

SITE: Skunk Harbor (Map No. 11)

DESCRIPTION: All beach areas in the southern 1/4 of Section 27, T.15N., R.18E., MDB & M, were searched without locating ROSU-2. None of these beaches have habitat similar to that where ROSU-2 is usually found. Little backshore area exists, and the beaches slope rather smoothly into the water, leaving no barrier beaches or depressions where the species can usually be located.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known record of ROSU-2 at this site.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Secret Harbor (Map No. 11)

DESCRIPTION: The beaches from the south side of a small point of land at the northern end of Section 22, T.15N., R.18E., MDB & M to the northern end of Secret Harbor Beach about 1/4 mile south of the boundary between Sections 14 and 23 were searched unproductively. Small areas of appropriate habitat proved not to contain the species.

PREVIOUS IDENTIFICATION AT THIS SITE: No known record of ROSU-2 at this site exists.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPLIER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 7-26-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Mouth of Marlette Creek (Map No. 12)

DESCRIPTION: The rather small beach area at the mouth of Marlette Creek in Section 14, T.15N., R.18E., MDB & M, was searched unproductively.

PREVIOUS IDENTIFICATION AT THIS SITE: No known record of ROSU-2 at this site exists.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 7-26-79

STATUS: Federal: Threatened
CNPS: Very Rare and Enda
REVD Code: 2-2-2-3

SITE: Tunnel Creek Beaches (Map No. 13)

DESCRIPTION: A large beach at the mouth of Tunnel Creek and a smaller beach just northwest of it, both in Section 26, T.16N., R.18E., were searched unsuccessfully. Neither beach had been previously identified as potential habitat, but since the individual of ROSU-2 was found at Sand Harbor in cobbles similar to those found on much of this beach area, an attempt was made to locate the species here.

PREVIOUS IDENTIFICATION AT THIS SITE: No record of ROSU-2 at this site is known to exist.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Crystal Bay (Maps No. 14 & 15)

DESCRIPTION: All of the beach from 100 m southeast of the mouth of Mill Creek in Section 23, T.16N., R.18E., MDB & M to the western boundary of Incline (Public) Beach (near the center of Section 22) was searched without finding ROSU-2. Further searching was prevented by lack of access, but visual inspection from the fence at Incline Beach indicated no suitable habitat would be found for some distance westward. Further search of this area would require a boat, since multiple ownership prevents access to the beach.

PREVIOUS IDENTIFICATION AT THIS SITE: No record of ROSU-2 at Crystal Bay is known to exist.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 7-26-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Sand Harbor Beach (P. on Map No. 12)

DESCRIPTION: One plant of ROSU-2 was located in medium-sized rocks and cobbles about 50 m south of the beach south of Sand Point in Section 2, T.15N., R.18E., MDB & M. The site is surrounded by large boulders and is not heavily used, although the area just to the north has intense beach use. The plant was about 5 m from Lake Tahoe.

PREVIOUS IDENTIFICATION AT THIS SITE: No previous record of this individual is known to exist.

SIZE AND VIGOR: This is a large, vigorous plant, but is the only one located at this site.

ENDANGERMENT: The plant has refuge from human impacts because of the surrounding rocks. It is endangered by its singularity, especially in this heavily used area.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endan
REVD Code: 2-2-2-3

SITE: Agate Bay (Map No. 16)

DESCRIPTION: The beaches aroung Agate Bay were searched from a point near the entrance to Brockway Resorts about 1/4 mile northwest of the intersection of the boundary of Sections 19 and 30 of T.16N., R.18E., MDB & M, with the shoreline of Lake Tahoe to a point about 0.4 mile from the western boundary of Section 14, T.16N., R.17E., MDB & M. The entire beach was walked, and portions of the backshore were examined where habitat seemed appropriate. No individuals of ROSU-2 were located, although apparently suitable habitat exists in several places.

PREVIOUS IDENTIFICATION AT THIS SITE: Malcolm A. Nobs and S. Galen Smith collected specimen No. 1512 of a Marsh Plant Survey of California at a "marsh between sandy beach and Agate Bay" on August 21, 1949. The CNPS records this site as Kings Beach.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-3-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endangered

REVD Code: 2-2-2-3

SITE: Carnelian Bay (Map No. 17)

DESCRIPTION: Beaches on both sides of the marina at Carnelian Bay were searched (Section 22, T.16N., R17E., MDB & M). No suitable habitat existed, and no ROSU-2 was located.

PREVIOUS IDENTIFICATION AT THIS SITE: No record of ROSU-2 is known to exist for Carnelian Bay.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Chinquapin (Map No. 18)

DESCRIPTION: North of Dollar Point in Section 33, T.16N., R.17E., MDB & M, is a cobbly beach at the Chinquapin Development. Inspection of a short section of this beach (about 200 m at a point about 0.4 mile south of the mouth of Dollar Creek, near the offices of Chinquapin) revealed that the beach is very cobbly and slopes fairly steeply into the Lake. Very little backshore area exists. No ROSU-2 was found, and it is unlikely that any would be located in a more extensive search.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no record of ROSU-2 at this site.

SPECIES CODE: ROSU-2

DATE OF COMMUNICATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endan
REVD Code: 2-2-2-3

SITE: Dollar Point (Map No. 19)

DESCRIPTION: A visual inspection of the beaches west of Dollar Point in Section 33, T.16N., R.17E., MDB & M revealed no suitable habitat for ROSU-2. No close inspection was made due to lack of suitable habitat and lack of access to private beach areas.

PREVIOUS IDENTIFICATION AT THIS SITE: No record of ROSU-2 at this site exists.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Tahoe City (Map No. 20)

DESCRIPTION: Tahoe State Park Beach is a small public beach in Section 6, T.15N., R.17E., MDB & M. A brief inspection of this beach and a visual inspection of the adjacent beaches to the northeast in Section 5 and to the southwest in Section 6 revealed that all suitable habitat for ROSU-2 was heavily vegetated with grasses and forbs. No ROSU-2 was located.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known record of ROSU-2 at this site.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 7-26-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endar
REVD Code: 2-2-2-3

SITE: Sunnyside (Map No. 21)

DESCRIPTION: The beach at Sunnyside was searched from about 300 m northeast of the intersection of the boundary line between Section 18, T.15N., R.17E., and Section 13, T.15N., R.16E., MDB & M to the marina in the northern portion of Section 24, T.15N., R.16E., just south of William Kent Campground. The beach in this area is all cobbles, and no ROSU-2 was found. The beach to the south was visually inspected from the marina, and appears to be of the same character as the beach to the north which was searched unsuccessfully, and this beach was not searched.

PREVIOUS IDENTIFICATION AT THIS SITE: Eastwood is listed in Gladys Smith's "A Flora of the Tahoe Basin and Neighboring Areas" as having collected ROSU-2 at Sunnyside. No date was given for the collection, and the CNPS does not have a record of this collection. The specimen is housed at the California Academy of Sciences. A check on the identification of this specimen should be made, and either the CNPS records or Smith's publication should be updated.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endanc
REVD Code: 2-2-2-3

SITE: Mouth of Ward Creek (Q. on Map No. 21)

DESCRIPTION: ROSU-2 was found to occupy the beach on the south side of the delta of Ward Creek in Section 24, T.15N., R.16E., MDB & M. This beach is a mixture of sand and cobbles.

PREVIOUS IDENTIFICATION AT THIS SITE: No previous record of this population is known to exist. However, Eastwood's specimen from "Sunnyside" could have been made this far south.

SIZE AND VIGOR: About 50 plants exist in a vigorous population of mixed ages.

ENDANGERMENT: The habitat at this site seems to be stable, although flooding in Ward Creek and resulting sediment deposition could bury the population. Current human usage does not appear to be endangering this population. If upstream development caused increased erosion, the greater downstream sedimentation could adversely affect this population.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endan
REVD Code: 2-2-2-3

SITE: Mouth of Blackwood Creek (R. on Map No. 22)

DESCRIPTION: ROSU-2 was located on the beach for about 200 m south of the mouth of Blackwood Creek in the northern 1/2 of Section 36, T.15N., R.16E., MDB & M. The population is located upon sandy beaches with a very vew cobbles. The largest portion of the population (ca. 20 plants) inhabits a large depressed area about 150 m south of the mouth of Blackwood Creek.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known previous record of ROSU-2 at this site.

SIZE AND VIGOR: This population incudes about 35 plants of moderate vigor. Most are young and small.

ENDANGERMENT: A rise in Lake level will surely inundate the largest portion of this population. Only a few individuals are located more than 1 or 2 inches above the water level. Human uses of the beach are minimal, and do not threaten the population.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-24-79
6-25-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Homewood (Maps No. 22 & 23)

DESCRIPTION: Three sites on the beach at Homewood were searched without locating ROSU-2. First, at the southern end of Section 36, T.15N., R.16E., MDB & M, a beach section about 1/4 mile long was searched. Second, about 100 m of beach north and south of Obexers Marina in Section 1, T.14N., R.16E., was searched. Finally, about 50 m of beach about 0.4 mile NW of the McKinney Creek crossing of Hwy. 89 in Section 7, T.14N., R.17E., MDB & M was searched. Limited access made searching impossible on most of the remaining beach at Homewood. The portion with access which was not searched did not appear from the highway to have suitable habitat.

PREVIOUS IDENTIFICATION AT THIS SITE: No record of ROSU-2 at this site is known to exist.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-25-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Chambers Lodge (Map No. 23)

DESCRIPTION: A section of beach about 250 m long between a pier at Chamberlands and the mouth of McKinney Creek in Section 7, T.14N., R.17E., MDB & M was searched without finding ROSU-2. Suitable habitat existed. Either ROSU-2 is missing from this beach because of some natural condition which is not apparent, or the beach grooming which was observed at the site has eliminated the plant. This beach is raked at an apparently frequent basis, probably to remove litter.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known record of ROSU-2 at this site.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-25-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Tahoma (S. on Map No. 23)

DESCRIPTION: Two mature ROSU-2 plants were found on small private beaches about 0.1 mile northwest of the Placer/El Dorado County line intersection with the beach in Section 8, T.14N., R.17E., MDB & M. One plant was growing in the middle of a sandy beach and the other was protected by a nearby concrete walkway to a boat dock. The location shown on map No. 23 is approximate, since multiple piers and no clear landmarks in this area made precise location of the site difficult.

PREVIOUS IDENTIFICATION AT THIS SITE: Ira L. Wiggins collected specimen from "near Tahoma, Placer County" on August 21, 1933.

SIZE AND VIGOR: Only two plants were found. Each was quite healthy in appearence, and both were well established.

ENDANGERMENT: The small size of this population means that it is susceptible to extirpation. No seedling plants were observed, which may mean that this site is not well suited for the species, although it appears to offer a few small areas of suitable habitat.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-25-79

STATUS: Federal: Threatened
CNPS: Very Rare and Enda
REVD Code: 2-2-2-3

SITE: Meeks Bay (T. on Map No. 24)

DESCRIPTION: About 400 m north of the mouth of Meeks Creek in Section 29, T.14N., R.17E., MDB & M, two populations of ROSU-2 were located. These sites are located in Section 20 of the same township. The smaller population (about 10-15 plants) is located at the southern end of a gabion wall and revetment placed for erosion control, and the larger population (about 25 plants) is located about 100 m NE of the northern end of the gabion structures, in a small alcove of rocks. Both populations are on sand substrates, but the smaller population, which is also younger with mostly seedling and slightly larger plants, is on the beach area and the larger group, which has several mature individuals, occupies a backshore area. This backshore is below a bluff, and is elevated a couple of feet above the Lake level.

PREVIOUS IDENTIFICATION AT THIS SITE: This is the type locality for Rorippa subumbellata. Heller (No. 13,329a, no date available) and Collins (probably Rollins) (No. 3027, probably September 9, 1942) have each collected specimens from Meeks Bay. M. Baad searched unsuccessfully for ROSU-2 at this site in 1978.

SIZE AND VIGOR: These two populations together comprise about 35 to 40 plants. The northern population is better established and is vigorous, while the southern population, which is younger, is quite vigorous.

ENDANGERMENT: The younger, smaller population could be inundated by a one or two foot rise in Lake level. The northern, larger population is probably safe from this hazard. Current uses of the beach do not seem to be adversely affecting this species. In his report to the USFS on his search for sensitive species M Baad made specific reference to the erosion control and marina improvements as likely reasons why he was unable to locate ROSU-2 in 1978. The current study located the plant growing from a few feet away from the erosion control gabions up to, and even within, these gabions. In all probability these plants have grown in the ensuing year (most look like seedlings or very small established plants). Two possible causes are suggested:

1. The beach disturbance caused by the erosion control project re-disturbed either seeds or plant fragments which were able to root and grow. Thus, it is possible that periodic physical disturbance of an area of a declining or missing population could result in its rejuvenation.

2. Declining water levels in 1976 and 1977 resulted in a loss of some plants and a dormancy in seeds, which did not sprout until the rising water level occurred following the heavier winter in 1977-78.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-25-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Rubicon Properties to D.L. Bliss State Park (Maps No. 25 & 26)

DESCRIPTION: Beginning in the southern portion of Section 33, T.14N., R.17E., MDB & M, and continuing southeast through Section 4, T.13N., R.17E., and into Section 3, a continuous beach was searched. No ROSU-2 was found among the beach or backshore areas, even where apparently appropriate habitat existed. The entire beach was walked, and pockets of suitable habitat were searched carefully.

PREVIOUS IDENTIFICATION AT THIS SITE: Ira L. Wiggins collected ROSU-2 (No. 11,228) from "D.L. Bliss Memorial State Park" on August 13, 1946. Paul A. Mitchell collected it (No. 109) "from Lester Beach" on June 4, 1960. Lester Beach is apparently (from State Park Service signs) the southern portion of the beach which was searched.

ENDANGERMENT: ROSU-2 may have been extirpated from this site by heavy beach use. The general beach morphology is not ideal, and the combination of natural and human stresses may have eliminated the plant. However, it appears that at a higher level of the Lake, this beach may attain more typically ideal morphology, and if seeds or stolons remain, the population may be re-established.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-25-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endange
REVD Code: 2-2-2-3

SITE: Emerald Bay (U. on Map No. 27)

DESCRIPTION: Two populations of ROSU-2 were located within Emerald Bay: at the Emerald Bay Boat Camp in the NE 1/4 of Section 22, T.14N., R.17E., MDB & M, and at Vikingsholm Boat Harbor on the boundary between Sections 28 and 33. The population at the Boat Camp is in the zone of wave action from boat wakes, under a leaning snag about 25 feet NE of the boat dock. The Vikingsholm Boat Harbor population is on the west bank of a backwater area north of the mouth of Eagle Creek about 100 m south of Vikingsholm and 10 m north of the old boathouse foundations. An additional pair of sites on the south shore of Emerald Bay were searched without finding ROSU-2. These two beaches face north in the NE trending shoreline and are located in the NE 1/4 of Section 22, near Emerald Bay State Park Campground.

PREVIOUS IDENTIFICATION AT THIS SITE: Howell (No. 1376) collected this species from Emerald Bay (Smith, p. 123). F. A. MacFadden collected it from the "Emerald Bay District" on July 18, 1934 (CNPS records).

SIZE AND VIGOR: The two populations together have about 10-15 plants. A few of the plants at the Boat Camp are seedlings, but about 1/2 of the total are established plants. All are vigorous.

ENDANGERMENT: The small size of the population leaves it susceptible to extirpation, especially at the Boat Camp where many plants are already in the zone of wave action. Rising water could inundate most of the boat camp plants. The plants at Vikingsholm are not apparently endangered.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 7-13-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Cascade Property Beach (Map No. 27)

DESCRIPTION: ROSU-2 was not found at this very small association beach in the northern 1/8 of Section 26, T.14N., R.17E., MDB & M. The beach is difficult to find, but it is the only sandy area along this rocky coast. It lies about 100 m south of the mouth of Cascade Creek. No suitable habitat exists on this beach.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no known record for ROSU-2 at this site.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 7-13-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Fallen Leaf Lake (Map No. 28)

DESCRIPTION: Beaches in Section 2, T.12N., R.17E., MDB & M were searched from about 1/2 mile south of the dam at Fallen Leaf Lake to the dam. No ROSU-2 was located. The beaches at Fallen Leaf Lodge and Stanford Sierra Camp were also searched to no avail.

PREVIOUS IDENTIFICATION AT THIS SITE: ROSU-2 has not been recorded at any location not on Lake Tahoe or the Truckee River.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 7-13-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Cascade Lake (Map No. 27)

DESCRIPTION: A small beach just south of the outlet of Cascade Lake in Section 27, T.14N., R.17E., MDB & M was searched. No ROSU-2 was found. The habitat is not suitable for ROSU-2.

PREVIOUS IDENTIFICATION AT THIS SITE: ROSU-2 has not been recorded at this site.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-4-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 8-2-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Spooner Lake (Map No. 29)

DESCRIPTION: Spooner Lake lies in Section 1, T.14N., R.18E., MDB & M. Inspection of aerial photographs indicated that the northwestern side of the Lake apparently has the best potential habitat for ROSU-2. This area was searched from the outlet creek to the northern end of the reservoir. No ROSU-2 was found, and this habitat seemed inappropriate since the immediate shoreline is heavily vegetated and the backshore slopes steeply and is a silty substrate.

PREVIOUS IDENTIFICATION AT THIS SITE: There is no record of ROSU-2 anywhere other than Lake Tahoe and the Truckee River.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-5-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 6-23-79

STATUS: Federal: Threatened
CNPS: Very Rare and Enda
REVD Code: 2-2-2-3

SITE: Marlette Lake (Map No. 30)

DESCRIPTION: Isolated beaches from the eastern extreme of Marlette Lake in Section 7, T.15N., R.19E., MDB & M south to the southern end of the Lake in Section 13, T.15N., R.18E., northward to the dam at the outlet of the Lake in Section 12, and continuing north to the northern end of the Lake in Section 12 were searched. Another south facing beach on the eastern side of the Lake in Section 12 was also searched. No ROSU-2 was found. Rorippa curvisiliqua is common.

PREVIOUS IDENTIFICATION AT THIS SITE: ROSU-2 has not been recorded anywhere but on the shores of Lake Tahoe and the Truckee River.

SPECIES CODE: ROSU-2

DATE OF COMPILATION: 10-5-79

FAMILY: Cruciferae

COMPILER: Charles M. Knapp

SPECIES: Rorippa subumbellata Roll.

DATE OF SEARCH: 8-10-79

STATUS: Federal: Threatened
CNPS: Very Rare and Endang
REVD Code: 2-2-2-3

SITE: Gilmore Lake (Map No. 31)

DESCRIPTION: Gilmore Lake lies at about 8300 feet, mostly within Section 8, T.12N., R.17E., MDB & M. No suitable habitat was located, and no ROSU-2 was found.

PREVIOUS IDENTIFICATION AT THIS SITE: ROSU-2 has been found only at Lake Tahoe and the Truckee River.