

## TERR-2 INVASIVE/EXOTIC PLANT SPECIES

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### 1.0 EXECUTIVE SUMMARY

The occurrence and abundance of invasive/exotic plant populations near Project facilities and recreational facilities was determined by reviewing information, conducting agency consultation, and completing surveys during spring and summer 2002. An exotic plant species is any species growing outside of its native range. Invasive plants are defined as those exotic species which are new to a region, persist without human intervention, and have serious impacts on their new environment (Simberloff et al. 1997; Davis and Thompson 2000). Noxious weed is a term used by government agencies to apply to invasive plants that have been defined as pests by law or regulation (California Department of Food and Agriculture (CDFA) 2000). The term invasive/exotic as used in this report, applies to those exotic plant species that have been defined as invasive or noxious weed species by the agencies concerned.

Fifteen invasive/exotic plant species in 130 populations were identified in the Study Area. This includes five California Exotic Pest Plant Council (CalEPPC) 'List A-1' invasive species (perennial pepperweed (*Lepidium latifolium*), Himalayan blackberry (*Rubus discolor*), cheatgrass (*Bromus tectorum*), Scotch broom (*Cytisus scoparius*), and French broom (*Genista monspessulana*)), one CalEPPC 'List A-2' invasive species (tree of heaven (*Ailanthus altissima*)), and eight CalEPPC 'List B' invasive species (black mustard (*Brassica nigra*), tocalote (*Centaurea melitensis*), bull thistle (*Cirsium vulgare*), Klamath weed (*Hypericum perforatum*), ox-eye daisy (*Leucanthemum vulgare*), black locust (*Robinia pseudoacacia*), Spanish broom (*Spartium junceum*), and woolly mullein (*Verbascum thapsus*)), and one species (common tansy (*Tanacetum vulgare*)) that is on the CalEPPC 'need more information' list. One of these species (perennial pepperweed) is also CDFA 'B rated' and four of these species (Scotch broom, French broom, ox-eye daisy, and Klamath weed) are CDFA 'C-rated'.

Four species (perennial pepperweed, French broom, ox-eye daisy, and common tansy) were previously unknown in the Sierra National Forest (SNF).

An infestation of perennial pepperweed was identified at Balsam Forebay, and a single French broom plant was identified on Canyon Road. Twenty populations of Himalayan blackberry were identified along Stevenson Creek, the Big Creek area, Canyon Road, and the Shaver Lake area. Populations of Himalayan blackberry tended to be in high abundance in riparian areas. Cheatgrass occurred sporadically throughout the Study Area at all elevations but infestations tended to be in low abundance. Twenty-seven populations of cheatgrass were reported, several of which were along roads and around forebays and reservoirs. One Scotch broom plant was detected in the Big Creek area. One population of tree of heaven was identified in the Big Creek area. Nineteen populations of bull thistle were identified in the Mammoth Pool area, along Canyon Road, Railroad Grade Road, Road 9S58, Balsam Forebay, Shaver Lake area, Huntington Lake area, Mono/Bear Siphon on Kaiser Pass Road, South Fork San Joaquin River, and the Florence Lake area. All populations of bull thistle, except for one

at a facility in the Shaver Lake area and one at Balsam Meadow Forebay, were in low abundance. Eight occurrences of Klamath weed were detected in the Study Area. One population in the Big Creek area was moderate in abundance. The other seven populations, located in the Big Creek Area, the road in section 26, along Canyon Road, and at Stevenson Creek, were in low abundance. Six occurrences of black mustard were identified in the Study Area in the Mammoth Pool area, Big Creek area, Canyon Road, and Shaver Lake area. All populations of black mustard were in low abundance. A population consisting of about 25 tocalote plants was discovered along the Big Creek Powerhouse No. 3-Mammoth Pool Powerhouse transmission line access road. A population of ox-eye daisy was identified along Road 8S12. This population covered approximately 2 acres and was low in abundance. Three black locust populations were identified along Canyon Road. Three populations of Spanish broom were identified in the Study Area, in the Big Creek area, and along Million Dollar Mile Road. Woolly mullein occurs in 14 populations in the Shaver Lake area, at Balsam Meadow Forebay, at Camp 62 Creek, at Chinquapin Creek, at Mono Creek Diversion, along the Mono/Bear Siphon on Kaiser Pass Road, at the South Fork San Joaquin River, and in the Florence Lake area. A population of common tansy was found at the Eastwood Powerhouse tunnel entrance. This population consisted of approximately six individuals and was low in abundance.

## **2.0 STUDY OBJECTIVES**

Document the occurrence and abundance of invasive/exotic plant populations adjacent to Project facilities, including Project-related recreational facilities.

## **3.0 STUDY IMPLEMENTATION**

### **3.1 STUDY ELEMENTS COMPLETED**

- Described and mapped known occurrences of invasive/exotic plant species near Project facilities and recreational facilities based on agency consultation and review of existing databases and literature.
- Completed invasive/exotic plant surveys near most Project facilities and all recreational facilities during spring and summer 2002 in conjunction with special-status plant surveys (see TERR-3, Special-Status Plant Populations).

### **3.2 OUTSTANDING STUDY ELEMENTS**

- Conduct invasive/exotic plant surveys in spring and summer 2003 at Project facilities not already surveyed in 2002. A list of facilities to be surveyed in 2003 is provided in Appendix A.

## 4.0 STUDY METHODOLOGY

### 4.1 REVIEW OF EXISTING INFORMATION

Information on invasive/exotic plant species in the Project vicinity, the area within a few miles of the FERC Project boundaries, was compiled, reviewed, and analyzed. This included a review of: (1) *SNF Noxious Weed and Invasive Plants List* (USDA-FS 1999); (2) the California Department of Food and Agriculture's *Noxious Weed List* (CDFA 2000); (3) California Exotic Pest Plant Council's *List of Exotic Pest Plants of Greatest Ecological Concern in California* (CalEPPC 1999); and (4) the *SNF Plan Amendment* (USDA-FS 2001). A description of each invasive/exotic plant species including their potential threats to the environment was developed. Species descriptions are adapted from Munz (1959), Hickman (1993), and Bossard et al. (2000) unless otherwise noted.

### 4.2 FIELD SURVEYS

The presence and absence of invasive/exotic plant species near Project facilities was recorded during field surveys conducted in the spring and summer of 2002 in conjunction with the special-status plant surveys (TERR-3, Special-Status Plant Populations). Levels of infestation were reported as required under Section 2083 of the *Forest Service Manual, Information and Reporting Guidelines for Noxious Weeds* (USDA-FS 1995). This included reporting the number of acres or square feet (sq. ft.) infested, or the number of individuals (when weed populations were small) of the noxious weed, by species and location. Levels of infestation were reported as follows: low (<6 percent canopy cover), moderate (6 to 25 percent canopy cover), and high (>25 percent canopy cover). Percent canopy values represent the percent of the canopy cover that was occupied by the noxious weed species at the facility where it occurred. Results are organized in order of priority with the species of greatest concern listed first.

Surveys involved walking and/or driving a 150-foot area around the following Project facilities: dams, small and moderate diversions, gaging stations, powerhouses, transmission lines, and recreational facilities (i.e., campgrounds, day-use areas, parking areas, boat launches, and trailheads). Refer to Appendix H of the Special-Status Plant Populations report (TERR-3, Special-Status Plant Populations) for a complete list of roads and facilities surveyed. A 30-foot area was surveyed around Project roads and the area visible from, but not less than, five feet on either side of Project trails, was also surveyed. Survey methods varied depending on the survey area and terrain and included zig-zag patterns, random meandering, and linear walking or driving. Locations of invasive plant populations identified during surveys were recorded in a GIS database and mapped on 7.5-minute USGS quadrangles (Figure TERR-2-1).

## 5.0 STUDY RESULTS AND ANALYSIS

### 5.1 REVIEW OF EXISTING INFORMATION

The SNF Noxious Weed and Invasive Plant list includes exotic plant species identified by USDA-FS staff and cooperating agencies to pose a threat to Sierra Nevada ecosystems (USDA-FS 1999). The list indicates whether each invasive species is present, near, or not present in the SNF, but provides no designation as to their level of invasiveness or priority of concern. The CDFA designates plants as noxious weeds if they are found to be “troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species and they are difficult to control or eradicate.” Once designated as a noxious weed, the plant species is given a rating of ‘A’, ‘B’, ‘C’, ‘Q’, or ‘D’ depending on statewide importance, likelihood of successful eradication, and present distribution. ‘A-rated’ species have known economic importance and are subject to state-enforced action including eradication, quarantine, rejection, and containment. Species rated as ‘B’ have the same definition as ‘A’ but holding action is at the discretion of the individual county agricultural commissioner. A species with a ‘C’ rating is not subject to state-enforced action outside of nurseries except to reduce spread. ‘Q’ is a temporary rating equivalent to an ‘A’ rating until a permanent rating is determined. ‘D-rated’ species are those determined to have little or no economic importance and are not subject to any state action (CDFA 2000).

The CalEPPC defines ‘noxious weeds’ as “aggressive pest plants that displace native plants and natural habitats.” CalEPPC’s ‘List-A’ species are defined as the “most invasive wildland pest plants; documented as aggressive invaders that displace natives and disrupt natural habitats.” List A is divided into two sub-lists: ‘List A-1’ species are “widespread pests that are invasive in more than three Jepson regions” and ‘List A-2’ are “regional pests that are invasive in three or fewer Jepson regions.” ‘List B’ species are defined by CalEPPC as “wildland pest plants of lesser invasiveness; invasive pest plants that spread less rapidly and cause a lesser degree of habitat disruption; may be widespread or regional.” ‘Red Alert’ species are those described by CalEPPC as “species with the potential to spread explosively; infestations currently small or localized.”

A list was compiled, from the literature review and agency consultation, of the invasive/exotic species that have the potential to occur in the Project area (Table TERR-2-1). There were no existing databases with occurrences of invasive/exotic plant species mapped. Therefore, there is no map of previously known occurrences in this report. Twenty-one species of invasive/exotic plants are known to occur in or near the SNF (Table TERR-2-1). Three of the species are CDFA ‘A-rated’ species. These A-rated pests are diffuse knapweed, (*Centaurea diffusa*), spotted knapweed (*Centaurea maculosa*), and Canada thistle (*Cirsium arvense*). Seven of these 21 species are categorized by CalEPPC as the most invasive wildland pest plants (List A). Only species that were identified during the invasive/exotic plant survey in 2002 will be described further in this document. A description of the life history characteristics of the invasive/exotic plant species identified in the Study Area follows.

**Perennial pepperweed (*Lepidium latifolium*; CalEPPC List A-1, CDFA B-rated)** is a perennial herb that grows up to eight feet tall, is highly branched, and has gray-green, oblong leaves. The small, white flowers are produced June to July in the Sierra Nevada. Perennial pepperweed reproduces via seed and vegetatively by rootsprouts. A single plant can produce thousands of seeds each year. Seeds are dispersed by wind, water, and possibly waterfowl. This species is native to Eurasia and was first recorded in California in 1936 (Bossard et al. 2000). It is now widespread in saline or alkaline wetlands and meadows throughout the state. Perennial pepperweed can outcompete other wetland species and reduce forage for waterfowl.

**Himalayan blackberry (*Rubus discolor*; CalEPPC List A-1)** is a robust, sprawling, prickly shrub that forms dense banks up to 10 feet tall. It forms white flowers May to July. Himalayan blackberry has profuse seed production and also spreads vegetatively by rooting at the tips of sprawling stems and by lateral root sprouts. The seeds are dispersed by mammals and birds that eat the fruit. This species is native to western Europe and was introduced into the U.S. at the end of the nineteenth century. Himalayan blackberry is widespread in California in disturbed, moist areas; roadsides; and riparian areas below 5,000 feet. Himalayan blackberry can displace native vegetation through competition for light and other resources. It can limit wildlife access to water and can hinder human maintenance activities.

**Cheatgrass or downy brome (*Bromus tectorum*; CalEPPC List A-1).** This species is a winter or early spring annual grass that grows up to two feet tall and develops a purplish color as it ages (Carpenter and Murray 2002). The flowers, which change from green to purple as they mature, are produced in April to June in a more or less one-sided inflorescence with nodding branches. Seeds are widely dispersed by humans and mammals when the fruits get stuck in clothing or fur (Carpenter and Thomas 2002). Cheatgrass reproduces exclusively by seed. A single plant can produce up to 300 seeds, and plants as small as one inch can produce seed. Seeds can remain viable in the soil for up to three years, and it is estimated that twice as many viable seeds are present in the seed bank each year as there are established plants (Bossard et al. 2000). Cheatgrass is native to southern Europe, northern Africa, and southwestern Asia and was accidentally introduced in California in the late 1800's, probably in contaminated livestock feed. It is now widespread throughout California. Cheatgrass is very successful in competition with native vegetation for soil moisture, and it increases the frequency and intensity of wildfires, and reduces native shrub abundance.

**Scotch broom (*Cytisus scoparius*; CalEPPC List A-1, CDFA C-rated).** This species is a perennial shrub that can grow up to 10 feet tall and produces yellow, pea-type flowers in the leaf axils. The brown seed pods have hairs only along the margins, as opposed to French broom seed pods, which are hairy all over. Scotch broom flowers from late March through April in the Sierra Nevada. Scotch broom reproduces vegetatively and by seed. A single shrub can produce over 12,000 seeds per year (Bossard et al. 2000). Seeds are initially dispersed by being blasted from the seed capsule, then are further dispersed by ants, animals and humans. Scotch broom tends to develop a substantial and long-lived seedbank (Hoshovsky 1995). A native of

Europe and North Africa, Scotch broom was introduced into California in the 1850s as an ornamental plant species and was subsequently used to control soil erosion. It is now widespread in disturbed areas throughout the central and northern California coast and the Sierra Nevada foothills. Scotch broom displaces native vegetation and its own foliage is not palatable to wildlife (Bossard and Rejmanek 1994). The seeds may be toxic to deer and other ungulates. This rapidly growing species can reduce tree regeneration after harvesting by shading out tree seedlings, and it increases the intensity and frequency of fires (Parsons 1992).

**French broom (*Genista monspessulana*; CalEPPC List A-1, CDFA C-rated).** This species is an evergreen, perennial shrub that looks very similar to Scotch broom but is more leafy, has smaller flowers that are produced on lateral branchlets, and has hairy leaves and fruits. French broom flowers from March to May in the Sierra Nevada, and reproduction is vegetative and by seed. Numerous seeds are produced and they remain viable in the seedbank for up to 80 years (Hoshovsky 1995). Seeds are initially dispersed by being blasted from the seed capsule then, are further dispersed by ants, birds, animals, and flowing water. French broom can displace native forage species and has been found to be toxic to livestock (McClintock 1985, Parsons 1992). Like Scotch broom, it also inhibits reforestation by shading out tree seedlings and increases the intensity and frequency of fires.

**Tree of heaven (*Ailanthus altissima*; CalEPPC List A-2).** This species is a deciduous tree 30 to 65 feet high with pinnately compound leaves that are one to three feet long and have 10 to 40 lanceolate leaflets. This species reproduces both sexually, from a winged fruit containing a single seed and vegetatively, from root sprouts. One tree can produce up to a million seeds per year (Bossard et al. 2000). Tree of heaven is native to China and was widely planted by Chinese miners during the California gold rush (Hoshovsky 1988). It is now naturalized throughout California, mostly along the coast and in the Sierra Nevada at elevations below 6,600 feet. Tree of heaven is usually found in disturbed habitats, but it can also invade riparian areas. Tree of heaven forms large thickets that can displace native vegetation, particularly in riparian areas.

**Bull thistle (*Cirsium vulgare*; CalEPPC List B).** This species is a biennial plant that grows up to six feet tall and has large, spiny leaves that extend down the stem and are up to a foot long. It produces spiny purple flower heads starting in June and continuing until first snowfall or frost. Bull thistle reproduces by wind-borne seed, and a large individual can produce tens of thousands of seeds. Bull thistle is native to Europe, western Asia, and North Africa and was introduced in California in the late 1800's to early 1900's. It is now widely distributed over the entire California floristic province in disturbed areas up to 7,500 feet. This species can outcompete native plant species for water, nutrients, and space thereby decreasing forage for deer and other wildlife. Invasion of bull thistle in cleared areas has been shown to reduce regeneration of ponderosa pine (*Pinus ponderosa*) (Randall and Rejmanek 1993).

**Black mustard (*Brassica nigra*; CalEPPC List B).** This species is an annual plant that reaches two to eight feet in height, has a rosette of deeply divided basal leaves that are four to eight inches long, and stalked stem leaves that are reduced in size toward the top of the stem. This species has bright yellow flowers that are produced from April to July. The copiously produced seeds are dispersed by gravity and by humans. The seeds can remain viable for up to 50 years in the seedbank (Darlington 1951) and are resistant to fire (Zedler et al. 1983). Black mustard is believed to be native to Eurasia and was first recorded in California in 1870 (Wilken and Hannah 1998). Black mustard is now common in nearly every county of California in fallow fields and disturbed grasslands below 5,000 feet (Hickman 1993, Wilken and Hannah 1998, Whitson et al. 2001). Black mustard produces toxic substances that can interfere with native vegetation and increase the frequency of fire (Zedler et al. 1983).

**Tocalote (*Centaurea melitensis*; CalEPPC List B).** This species is a winter annual with spiny, yellow flower heads similar to yellow starthistle. The plants flower from April to June producing anywhere from one to 100 flowering heads that can produce up to 60 seeds each. The seeds are dispersed by humans, animals, and wind. Tocalote is native to southern Europe and was introduced in California in the late 1700's as a crop seed contaminant. Dense populations of tocalote can displace native plants and wildlife.

**Klamath weed or St. Johnswort (*Hypericum perforatum*; CalEPPC List B, CDFA C-rated).** This species is a perennial herb that is 1 to 3 feet tall; has opposite, oblong leaves covered with transparent dots; and is highly branched. Numerous bright yellow flowers with black dots along the petal margins are produced June to September. Klamath weed reproduces by seed or vegetatively through runners and may produce seed without fertilization (Hickman 1993). Each fruit produces numerous seeds. Klamath weed is native to Europe and was introduced as an ornamental and medicinal herb in the 1700's. Klamath weed is toxic to livestock and white-haired animals (Whitson et al. 2001) and can outcompete native plants.

**Ox-Eye Daisy (*Leucanthemum vulgare*; CalEPPC List B).** This species is a prostrate, creeping, perennial herb that produces erect flowering stalks that are 1 to 3 feet tall. Ox-eye daisy has pinnately lobed, dark green leaves that are 1 to 2 inches long and flowerheads consisting of numerous yellow disc flowers and about twenty white ray flowers. The flowers are produced May to August. Ox-eye daisy reproduces by seed and vegetatively by rhizomes. Each plant produces from one to 40 flowerheads and each flowerhead produces up to 200 seeds. Seeds remain viable for up to 20 years and can survive the digestive tracts of animals that eat them. Gravity, animals, and humans disperse the seeds. Ox-eye daisy is native to Europe and was introduced as an ornamental plant in the early 1900's. In California, this species is found in the North Coast Range and northern and central Sierra Nevada up to 7,000 feet. This species can displace native plant species and reduce wildlife forage.

**Black locust (*Robinia pseudoacacia*; CalEPPC List B).** This species is a tree that reaches heights up to 100 feet. The pinnately compound leaves are 8 to 14 inches long with oval leaflets. The tree produces white, pea-type flowers from May to June. Black locust reproduces from seeds, which remain viable for up to 10 years, but root and stump sprouts seem to be the predominant mode of reproduction. Seeds are dispersed by gravity and wind. Seedlings and sprouts are capable of growing over 3 feet per year (Bossard et al. 2000). Black locust is native to the eastern United States and was introduced in California as an ornamental. It is widely distributed in California along roadsides, streams, and other disturbed areas below 6,300 feet. Black locust can displace native plant species and is toxic to humans and livestock (Hickman 1993).

**Spanish broom (*Spartium junceum*; CalEPPC List B).** This species is a perennial, sparse-leaved shrub up to 15 feet tall. Yellow, pea-type flowers are produced at stem ends March to April. Reproduction is by seed, and a single plant can produce up to 10,000 seeds per year. The seeds are dispersed by rain wash and possibly by ants (Bossard et al. 2000). Seeds remain viable for up to five years in the seedbank. This species is native to the southern Mediterranean region of Europe and was introduced in California as an ornamental in the 1800's. Spanish broom was widely planted along the state's mountain highways starting in the 1930's and is now common in disturbed areas at low elevations. Spanish broom prevents establishment of native chaparral species in disturbed areas.

**Woolly mullein or common mullein (*Verbascum thapsus*; CalEPPC List B).** This species is an annual or biennial herb with a stalk that reaches up to 6 feet tall and large, oblanceolate leaves that are gradually reduced in size toward the top of the stalk. The plants are covered with woolly hair giving them a gray-green appearance and a felt-like texture. The yellow flowers are produced in dense spikes July to October in the Sierra Nevada. Woolly mullein reproduces exclusively by seed both through cross-fertilization and self-fertilization of the flowers. A single plant produces between 100,000 and 240,000 seeds in one year. Seed dispersal is by gravity and by humans. The seeds remain viable for 35 to 100 years establishing a persistent seedbank. This species is native to Asia and was first recorded in California in 1880. This species is common in open, disturbed areas of California below 7,500 feet. Dense stands of woolly mullein can interfere with reestablishment of native vegetation following clearing by forest fires or construction activities. Woolly mullein does not usually present a persistent problem in wildlands of the western Sierra Nevada because it does not compete well with native vegetation (Bossard et al. 2000).

**Common tansy (*Tanacetum vulgare*; CalEPPC 'Need More Information' List).** Common tansy is an aromatic perennial herb that can grow from 1.5 to 6 feet tall. The plants have flat-topped clusters of small, button-like, yellow discoid flowers and leaves that are divided into serrated leaflets. This species can reproduce from seeds and rootstocks (Whitson et al. 2001). Common tansy is native in Europe and was introduced to North America as an ornamental and for medicinal purposes. The dried leaves and flowers have been used medicinally and can be toxic in excess. This

species is found in disturbed, urban environments such as roadsides, waste areas, and pastures.

## 5.2 INVASIVE/ EXOTIC PLANT SURVEY RESULTS

Invasive/exotic plant surveys were conducted in conjunction with special-status plant surveys. The lower elevation surveys were conducted during the weeks of April 22 to 28, April 29 to May 5, May 13 to 19, and July 8 to 14; the middle elevation surveys were conducted during the weeks of May 13 to 19, May 20 to 26, June 3 to 9, July 15 to 21, and July 22 to 29; and the higher elevation surveys were conducted during the weeks of June 3 to 9, June 10 to 16, July 22 to 29, and August 12 to 18. The surveys were floristic and taxonomy was based on *The Jepson Manual of Higher Plants of California* (Hickman, 1993).

Fifteen invasive/exotic plant species were identified in the Study Area during surveys completed in 2002 (Table TERR-2-2, and Appendix B and C). This included five CalEPPC 'List A-1' invasive species (perennial pepperweed, Himalayan blackberry, cheatgrass, French broom, and Scotch broom), one CALEPPC 'List A-2' invasive species (tree of heaven), and eight CalEPPC 'List B' invasive species (bull thistle, Klamath weed, black mustard, tocalote, ox-eye daisy, black locust, Spanish broom, and woolly mullein), and one species (common tansy) listed by CalEPPC as "Need more information". One of these species (perennial pepperweed) is also on the CDFA 'B List' and three of these species (Scotch broom, French broom, and Klamath weed) are on the CDFA 'C-List'.

Ten of the 21 invasive/exotic species that were already known to occur in the SNF (Table TERR-2-1) were undetected in the Study Area. These undetected species included three CalEPPC 'List A-1' species (yellow starthistle, medusahead, and tamarisk), three CDFA 'A-Rated' species (spotted knapweed, diffuse knapweed, and rush skeleton weed), two CalEPPC 'Red Alert' species (spotted knapweed and purple loosestrife), two CalEPPC 'List B' species (Italian thistle and Canada thistle), and a CDFA 'C-Rated' species (puncturevine). Four invasive/exotic species, perennial pepperweed, French broom, ox-eye daisy, and common tansy, were previously unknown in the SNF but were discovered in the Study Area during surveys.

The results, including descriptions of the locations of invasive/exotic species identified in the Study Area, follow, with species arranged by CalEPPC listing status in descending order. Figure TERR-2-1 shows the location of invasive/exotic plant populations observed in the Study Area.

**Perennial pepperweed.** An infestation of perennial pepperweed consisting of approximately 75 individuals (<5 percent canopy cover) was discovered at Balsam Meadow Forebay below the Dam. This is a linear population approximately 50 feet long and 6 feet wide on the east bank of Balsam Creek. Perennial pepperweed was previously thought to be absent from the SNF.

**Himalayan blackberry.** Twenty populations of Himalayan blackberry were identified in the Study Area including four plants at the SCE housing community near Big Creek Powerhouse No. 3 (<1 percent canopy cover) and approximately 50 plants (>25 percent canopy cover) at the base of a waterfall where Stevenson Creek enters the San Joaquin River. Scattered patches occurred along Canyon Road between Big Creek Powerhouse No. 2 and No. 8 comprising less than 1 percent of the canopy cover along the stretch of road. Populations comprising 6 to 25 percent cover were identified at the bridge over Big Creek east of Big Creek Powerhouse No. 8 and along a fork of Big Creek that crosses Canyon Road between Big Creek Powerhouse No. 2 and No. 8. A population comprising <6 percent cover was identified at the pool around the gaging station on Big Creek, downstream from Big Creek Powerhouse No. 2; one plant (<6 percent cover) was found 150 feet from the end of the access road for the Big Creek Powerhouse No. 8 Penstocks; and a population comprising 6 to 25 percent cover was found at the bottom of a seep near a culvert along Canyon Road between Big Creek Powerhouse No. 2 and No. 8. Populations comprising >25 percent cover each were found in a 5,000 sq. ft. patch near the confluence of Ordinance Creek and Big Creek at the end of the road that goes through Big Creek Powerhouse No. 2 and at Big Creek Powerhouse No. 2 in the riparian areas. A population comprising 90 percent cover was found along Big Creek just south of the access road to Big Creek Powerhouse No. 2 and one comprising 6 to 25 percent cover was found at Big Creek Powerhouse No. 8 from Big Creek to the powerhouse. Three patches were found between Big Creek Powerhouse No. 8 and Dam 6, one with 25 percent cover, one with >25 percent cover, and one with 80 percent cover, and a population with >25 percent cover was found on the southwest end of Dam 6 Forebay across from Dam 6. A population comprising approximately 75 percent of the canopy cover was found along the banks of Big Creek just above Dam 4 and a population comprising 15 percent canopy cover was found in front of the fish hatchery near Big Creek Powerhouse No. 1. One population comprising 30 percent of the canopy cover was found on the west side of the Sierra Marina Boat Launch and parking area.

**Cheatgrass or downy brome.** This species was scattered sporadically throughout the Study Area. It is found around the entire perimeter of Mammoth Pool, Dam 4 Forebay, Shaver Lake, Balsam Meadow Forebay, Huntington Lake, Florence Lake, and Bear Creek Forebay. It also occurs at Mono, Hooper, and Tombstone Diversions; Big Creek Powerhouse No. 1, No. 2, No. 3, and No. 8; Mammoth Pool and Eastwood Powerhouses; Hooper Creek, South Fork San Joaquin River, San Joaquin River upstream from Shakeflat Creek, and North Fork Stevenson Creek gaging stations; and along transmission lines and Project roads in the Study Area. Although this species is widespread, infestations in the Study Area were generally low in abundance. Eighteen out of the 27 populations identified constitute less than 6 percent of the canopy cover of the facilities where they occur and five populations constitute 6 to 8 percent of the canopy cover. Populations with high abundance include a population that constitutes 80 percent of the canopy cover at Big Creek Powerhouse No. 2, a population that constitutes 80 percent of the canopy cover along the two old housing roads near Big Creek Powerhouse No. 2, a population that constitutes 60 percent of the canopy cover at the San Joaquin River gaging station upstream of Shakeflat Creek, and a population

that constitutes 40 percent of the canopy cover along the road to Big Creek Powerhouse No. 1 between the substation and Dam 4 Forebay.

**Scotch broom.** One Scotch broom plant (<6 percent canopy cover) was found in the Study Area in front of the fish hatchery near Big Creek Powerhouse No. 1.

**French broom.** One French broom plant (<6 percent canopy cover) was found in the Study Area on Canyon Road (8S05) heading west approximately 0.5 miles prior to the fork in the road. This species was previously considered absent from the SNF.

**Tree of heaven.** One population consisting of greater than 100 trees (80 to 90 percent canopy cover) of this species was identified in the Study Area on a knoll on the east side of the access road to Big Creek Powerhouse No. 3.

**Bull thistle.** Twenty populations of bull thistle were found in the Study Area. A population of approximately 25 plants was found at Fuller's Meadow on Mammoth Pool Reservoir. A population of five plants and a population of approximately 40 plants were found in seeps along Road 8S13 (the road between Canyon Road and Railroad Grade Road). Several populations were found in the Shaver Lake area including 20 plants on the access road to Shaver Lake Dam; eight plants at the picnic area on the west side of the second spur road off Road 9S58 on the north shore of Shaver Lake; 12 plants in a cove at the confluence of North Fork Stevenson Creek and Shaver Lake; nine plants on the east side of the road to the day use area on the north shore of Shaver Lake (second spur road off of Road 9S58); greater than 40 plants on the west side of the Sierra Marina boat launch area; greater than 50 plants (9 percent canopy cover) at an SCE facility off Tailrace Road on the northeast shore of Shaver Lake; 18 plants in a disturbed opening adjacent to a meadow between Camp Edison and Dorabelle Campground; and intermittent individuals along Road 9S58 from Sierra Marina to Eastwood Powerhouse. Fifteen plants were found on the eastern perimeter of Balsam Meadow Forebay; 50 plants on the western perimeter of Balsam Meadow Forebay; and greater than 40 plants along Balsam Creek right below Balsam Meadow Dam. Twenty plants were found below Dam 2 on Huntington Lake and 14 plants were found along Mono/Bear Siphon south of the bridge over South Fork San Joaquin River, on Kaiser Pass. Greater than 50 plants were found on the east bank of South Fork San Joaquin River at the gaging station upstream of the confluence with Hooper Creek; and seven plants were found behind Florence Lake Dam. All of these populations constitute less than 6 percent of the canopy cover (low abundance) in their respective locations except for the one population on Shaver Lake with 9 percent canopy cover.

**Black mustard.** Six populations of black mustard were found in the Study Area including a population of 10 to 15 plants at Mammoth Pool Powerhouse; approximately 25 plants on the bank between Canyon Road and Dam 6 Forebay; 10 to 15 plants at Big Creek Powerhouse No. 8; 30 to 35 plants in a culvert going under Canyon Road between Big Creek Powerhouse No. 2 and No. 8; <6 percent canopy cover at Big Creek Powerhouse No. 2; and 25 to 30 plants at Shaver Lake Dam. Each of these populations comprise <6 percent of the canopy cover (low abundance) in the facility area.

**Tocalote.** A population consisting of about 25 tocalote plants was identified along the Big Creek Powerhouse No. 3 to Mammoth Pool transmission line access road, approximately a half mile from Mammoth Pool Powerhouse. These 25 plants comprise <6 percent of the percent canopy cover of the road.

**Klamath weed or St. Johnswort.** Eight occurrences of Klamath weed were detected in the Study Area. One population at Big Creek Powerhouse No. 3 consisted of approximately 100 plants (5 to 10 percent canopy cover). The remaining seven populations included one population of 25 to 40 plants (6 to 25 percent cover) at the confluence of Ordinance Creek and Big Creek; <6 percent cover at Big Creek Powerhouse No. 2, one plant at Big Creek Powerhouse No. 8 near Big Creek; approximately 50 plants (5 percent cover) at Big Creek Powerhouse No. 8 near Dam 6; about 50 plants (<6 percent cover) along the road in section 26; a scattered population along Canyon Road between Big Creek Powerhouse No. 2 and No. 8 comprising <6 percent of the canopy cover along the stretch of road.

**Ox-Eye Daisy.** One occurrence of ox-eye daisy was detected along Road 8S12 on a north facing slope east of the elevated portion of the Huntington-Pitman-Shaver Siphon. This population covered approximately 2 acres and constituted <5 percent of canopy cover.

**Black locust.** Three black locust populations were identified along Canyon Road between Big Creek Powerhouse No. 2 and No. 8. One population, located by the bridge over Big Creek, east of Big Creek Powerhouse No. 8, consists of 2 trees (<6 percent cover). Another population located along the two old housing roads off of Canyon road near Big Creek Powerhouse No. 2 consisting of 10 trees (6 to 25 percent cover); and the remaining population, consisting of greater than 50 trees (>25 percent cover), is located upstream of the bridge over Big Creek near Big Creek Powerhouse No. 8.

**Spanish broom.** Three populations of Spanish broom were identified in the Study Area. One population of 20 to 30 plants (6 to 25 percent canopy cover) is located along the old housing roads near Big Creek Powerhouse No. 2. Another population was identified that constitutes approximately 20 percent of the canopy cover of the roads around Big Creek Powerhouse No. 3, and a single plant (<6 percent cover) was identified along Million Dollar Mile Road.

**Woolly mullein or common mullein.** Fourteen populations of woolly mullein were found in the Study Area. Eight plants were found at Sierra Marina and 12 plants at Balsam Meadow Forebay. Approximately 100 plants (10 percent canopy cover) were found on both sides of the diversion at Camp 62 Creek and 15 plants were found along the trail to the diversion on Camp 62 Creek. Three populations were found along the trail to Chinquapin Creek Diversion including populations consisting of 10 plants, one plant, and seven plants. A population of eight plants was found at Mono Creek Diversion and a population of about 100 plants encompassing approximately a half acre was found at the exposed portion of Mono/Bear Siphon near the fork in Kaiser Pass that goes toward Mono Creek and Edison Lake. A population of four plants was found along

the exposed portion of Mono/Bear Siphon at the south side of the bridge over South Fork San Joaquin River, on the west side of Kaiser Pass; and over 500 plants (10 percent canopy cover) were found over approximately a third acre at the South Fork San Joaquin Gaging Station on the east bank. A population of approximately 100 plants scattered over approximately 1.5 acres was found at the SCE Florence Lake work camp, five to 10 plants were found at the Florence Lake Resort and Boat Launch, and a population of approximately 1,000 plants was found at the Florence Lake Dam (>25 percent canopy cover). All populations of woolly mullein constitute <6 percent of the canopy cover of the facility areas (low level infestation) except where noted.

**Common tansy.** One population was identified at the Eastwood Powerhouse tunnel entrance on the east side of the tunnel parking lot. This population consisted of approximately six individuals and comprised <6 percent of the canopy cover at the facility.

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## TABLES

**Table TERR-2-1. Invasive/Exotic Species Potentially Occurring in the Big Creek ALP Project Area**

Scientific Name	Common Name	CalEPPC	CDFA	USFS
<i>Rubus discolor</i>	Himalayan blackberry	List A-1	-	P
<i>Bromus tectorum</i>	cheatgrass	List A-1	-	P
<i>Centaurea solstitialis</i>	yellow starthistle	List A-1	C-rated	P
<i>Cytisus scoparius</i>	Scotch broom	List A-1	C-rated	P
<i>Taeniatherum caput-medusae</i>	medusahead	List A-1	-	P
<i>Tamarix chinensis</i>	tamarisk	List A-1	-	N
<i>Ailanthus altissima</i>	tree-of-heaven	List A-2	--	P
<i>Centaurea maculosa</i>	spotted knapweed	Red alert	A-rated	N
<i>Centaurea diffusa</i>	diffuse knapweed	-	A-rated	P
<i>Chondrilla juncea</i>	rush skeletonweed	-	A-rated	N
<i>Lythrum salicaria</i>	purple loosestrife	Red alert	B-rated	N
<i>Cirsium arvense</i>	Canada thistle	List B	B-rated	N
<i>Carduus pycnocephalus</i>	Italian thistle	List B	C-rated	P
<i>Cirsium vulgare</i>	bull thistle	List B	-	P
<i>Brassica nigra</i>	black mustard	List B	-	P
<i>Centaurea melitensis</i>	tochalote	List B	-	P
<i>Hypericum perforatum</i>	Klamath weed	List B	C-rated	P
<i>Leucanthemum vulgare</i>	Ox-eye daisy	List B	-	N
<i>Robinia pseudoacacia</i>	black locust	List B	-	P
<i>Spartium junceum</i>	Spanish broom	List B	-	P
<i>Verbascum thapsus</i>	woolly mullein	List B	-	P
<i>Tanacetum vulgare</i>	Common tansy	Need more information	-	N
<i>Tribulus terrestris</i>	puncturevine	-	C-rated	P

**CalEPPC List**

List A-1: Most Invasive Wildland Pest Plants; Widespread

List A-2: Most Invasive Wildland Pest Plants; Regional

B-rated: Wildland Pest Plants of Lesser Invasiveness

Red alert: Species with potential to spread explosively; infestations currently restricted

**CDFA Rating**

A-rated: Eradication, containment, rejection, or other holding action at the state-county level. Quarantine interceptions to be rejected or treated at any point in the state.

B-rated: Eradication, containment, control or other holding action at the discretion of the commissioner

C-rated: State endorsed holding action and eradication only when found in a nursery; action to retard spread outside of nurseries at the discretion of the commissioner; reject only when found in a cropseed for planting or at the discretion of the commissioner

**USFS List**

P: Present on Sierra National Forest

N: Near Sierra National Forest, reasonable to expect within next 5 years

**Table TERR-2-2. Invasive/Exotic Species Occurring in the Big Creek ALP Study Area**

Species Name	Number of Occurrences and General Locations	Number of Occurrences at Each Level of Infestation
Perennial pepperweed <i>Lepidium latifolium</i>	One occurrence at Balsam Meadow Forebay	Low: 1
Himalayan blackberry <i>Rubus discolor</i>	Twenty occurrences at: Stevenson Creek; Big Creek; Canyon Road; Big Creek Powerhouse No. 1, No. 2, No. 3 and No. 8; and Saver Lake	Low: 5 Moderate: 6 High: 9
Cheatgrass <i>Bromus tectorum</i>	Twenty-seven occurrences throughout the Project area including: Big Creek Powerhouse No. 1, No. 2 & 2A, No. 3, and No. 8; Mammoth Pool; Dam 4 Forebay; Mammoth Pool and Eastwood Powerhouses; Shaver Lake; Balsam Meadow Forebay; Huntington Lake; Florence Lake; Bear Creek Forebay; Mono Creek, Hooper, S.F. San Joaquin, MammothPool/Shakeflat Creek, and N.F. Stevenson gaging stations; transmission lines; and Project roads	Low: 18 Moderate: 5 High: 4
Scotch broom <i>Cytisus scoparius</i>	One occurrence near Big Creek Powerhouse No. 1	Low: 1
French broom <i>Genista monspessulana</i>	One occurrence on Canyon Road	Low: 1
Tree of heaven <i>Ailanthus altissima</i>	One occurrence on the access road to Big Creek Powerhouse No. 3	High: 1
Bull thistle <i>Cirsium vulgare</i>	Nineteen occurrences at: Mammoth Pool, Road 8S13, Shaver Lake area, Balsam Meadow Forebay, Huntington Lake, Mono/Bear Siphon on Kaiser Pass, S.F. San Joaquin gaging station, and Florence Lake	Low: 18 Moderate: 1
Black mustard <i>Brassica nigra</i>	Six occurrences at: Mammoth Pool Powerhouse, Big Creek Powerhouse No. 2 and No. 8, Canyon Road between Big Creek Powerhouse No. 2 and No. 8, Shaver Lake Dam	Low: 6
Tocalote <i>Centaurea melitensis</i>	One occurrence along the Mammoth Pool transmission line access road	Low: 1
Klamath weed <i>Hypericum perforatum</i>	Eight occurrences at: Big Creek Powerhouse No. 2, No. 3, and No. 8; Canyon Road, and Section 26 Road	Low: 6 Moderate: 2
Ox-eye daisy <i>Leucanthemum vulgare</i>	One occurrence along Road 8S12 east of the Huntington-Pitman-Shaver Siphon	Low: 1
Black locust <i>Robinia pseudoacacia</i>	Three occurrences along Canyon Road between Big Creek Powerhouse No. 2 and No. 8	Low: 1 Moderate: 1 High: 1
Spanish broom <i>Spartium junceum</i>	Three occurrences at: The old housing roads near Big Creek Powerhouse No. 2, Big Creek Powerhouse No. 3, and Million Dollar Mile Road	Low: 1 Moderate: 2
Common tansy <i>Tanacetum vulgare</i>	One occurrence at Eastwood Powerhouse	Low: 1
Woolly mullein <i>Verbascum thapsus</i>	Fourteen occurrences at: Shaver Lake, Balsam Meadow Forebay, Camp 62 Diversion, Chinquapin Creek Diversion, Mono Creek Diversion, Mono/Bear Siphon on Kaiser Pass, S.F. San Joaquin gaging station upstream of Hooper Creek, and Florence Lake	Low: 10 Moderate: 3 High: 1

## FIGURES

## **Placeholder for Figures**

### **Non-Internet Public Information**

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## **APPENDIX A**

### **List of Facilities to be Surveyed in 2003**

**Appendix A. List of Project Facilities, Project-Related Recreational Facilities, Project Roads, and Project Trails Surveyed for Special-Status Plant Populations, Invasive/Exotic Plant Species, Native American Plants, and Valley Elderberry Longhorn Beetle in 2003<sup>1</sup>**

<b>Lower Elevations ( &lt; 4500 feet)</b>
Logan Meadow Trailhead
Horseshoe Bend/Longridge Trailhead
Saginaw Distribution Line
Gaging Station #137, Willow Creek above San Joaquin River
Gaging Station #125, San Joaquin River above Willow Creek
Gaging Station #144, Rock Creek near Cold Spring Meadow
<b>Middle Elevation (4500-6600 feet)</b>
Scot Lake Domestic Diversion and Trail
Pitman Creek Domestic Diversion and Trail
Snowslide Creek Domestic Diversion and Trail
Tunnel 2
Adit 1
Adit 2
Adit 3
Adit 4
Adit 5
Adit 6
Adit 7
Adit 7 1/2
Adit 8
Tunnel 5
Adit 1
Huntington-Pitman-Shaver Siphon
Adit 72
East Incline Distribution Line (up to PS0111)
Grouse Distribution Line
Jumbo Distribution Line (from Big Creek Powerhouse #8 to Eastwood School site)
Musick Distribution Line
Three segments of Railroad Grade Road between the town of Big Creek and Camp High Sierra
Powerhouse No. 1
Tunnel No. 1
Incline Adit
Upper 60" and 84" Valve House below Huntington Lake
60" and 84" Flowlines below Huntington Lake
Lower 60" and 84" Valve House at the top of Powerhouse No. 1 penstock
42 " Valve House at the top of Powerhouse No. 1 penstock
Vent Stack at the top of Powerhouse No. 1 penstock
Propane tank at Huntington Lake sherriff cabin
Eastwood Power Station Tailings Pile
<b>Higher Elevation ( &gt; 6600 feet)</b>
Crater Creek Open Diversion Channel
Bear Creek Trailhead
Bear Creek Adit (caved-in)
Bear Tailings Pile

**Appendix A. List of Project Facilities, Project-Related Recreational Facilities, Project Roads, and Project Trails Surveyed for Special-Status Plant Populations, Invasive/Exotic Plant Species, Native American Plants, and Valley Elderberry Longhorn Beetle in 2003<sup>1</sup> (continued)**

<b>Higher Elevation ( &gt; 6600 feet) (continued)</b>
Mono Tunnel
Camp 62 Adit
Camp 62 Adit Valving
Camp 62 Storage Yard
Camp 62 Tailings Pile
Camp 62 Cabin
Camp 62 above ground storage tank
Camp 62 emergency cabin heating (propane)
Dutch Flat Campground
High Sierra Ranger Station
East Fork Camp 61 Diversion and Gaging Station #107
West Fork Camp 61 Diversion and Gaging Station #108
East and West Fork Camp 61 Creek Diversion Borehole
Portal Tailings Pile
Huntington Weather Station
Kaiser Meadow Weather Station (Sac Store)
Kaiser Ridge/ Mt. Givens Weather Station

<sup>1</sup>Only Project Facilities, Project-Related Recreational Facilities, Project Roads, and Project Trails located lower than 3,000 feet in elevation were surveyed for TERR - 6, Valley Elderberry Longhorn Beetle

## **APPENDIX B**

### **Location of Invasive/Exotic Plant Species in the Big Creek ALP Study Area**

**Appendix B. Location of Invasive/Exotic Plant Species in the Big Creek ALP Study Area**

Scientific Name/ Common Name	Location	Level of Infestation	Map Label	CalEPPC List	CDFA Rating	USFS List
<i>Lepidium latifolium</i> perennial pepperweed	North side of Balsam Forebay Dam along the east bank of Balsam Creek where the steps come down from the dam.	Low - 300 sq. ft. area (75+ plants)	9-1	A-1	B	P
<i>Rubus discolor</i> Himalayan blackberry	SCE housing community.	Low (3-4 large plants)	11-1	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	At the base of the waterfall where Stevenson Creek enters the San Joaquin River and along the edge of the road.	High (approximately 50 plants)	11-2	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	Intermittently along the road from Powerhouse 8 to Powerhouse 2, abundant in wet areas.	Low	11-3	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	On the road from Powerhouse 8 to Powerhouse 2 and along the creek at the bridge.	Low for entire road but very dense in moist areas	11-4	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	Along the creek that crosses the road from Powerhouse 8 to Powerhouse 2.	Moderate cover along the stream	11-5	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	On the road at the asphalt edge adjacent to the creek between Powerhouse 8 and Powerhouse 2.	Low	11-6	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	Around the pool at the gaging station on Big Creek, downstream from Powerhouse 2.	Low	11-7	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	150 feet from the end of the access road for Powerhouse 8 penstocks.	Low (1 plant)	11-8	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	On the road between Powerhouse 8 and Powerhouse 2, growing at the bottom of a seep near a culvert.	Moderate	11-9	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	Thick along banks of a creek coming into Big Creek, just above Dam 4.	High (75% cover)	11-10	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	Along a creek going into Big Creek on a south-facing slope in front of the fish hatchery near Powerhouse 1.	Moderate (15% cover)	11-11	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	End of the road that goes through PH2, near the confluence of Ordinance Creek and Big Creek.	High (5,000 sq. ft. of coverage)	11-12	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	Powerhouse 2.	High in riparian areas	11-13	A-1	NA	P

**Appendix B. Location of Invasive/Exotic Plant Species in the Big Creek ALP Study Area (continued)**

Scientific Name/ Common Name	Location	Level of Infestation	Map Label	CalEPPC List	CDFA Rating	USFS List
<i>Rubus discolor</i> Himalayan blackberry	Along the creek coming in, just south of the access road to Powerhouse 2.	High in riparian areas (90% cover)	11-14	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	Near Powerhouse 8, from Big Creek to the powerhouse.	Moderate	11-15	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	In a patch near powerhouse 8 and Dam 6.	Moderate (25% cover)	11-16	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	In a patch near powerhouse 8 and Dam 6.	High (80% cover)	11-17	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	In a patch across the forebay from Powerhouse 8, near Dam 6.	High in a small patch	11-18	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	In a patch near powerhouse 8 and Dam 6.	High in a small patch	11-19	A-1	NA	P
<i>Rubus discolor</i> Himalayan blackberry	West of Sierra Marina boat launch and east side of large parking lot.	High (30% cover)	11-20	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	San Joaquin River Gaging Station upstream of Shakeflat Creek.	High (60% cover)	3-1	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Intermittently in disturbed areas around Mammoth Pool Campground.	Moderate	3-2	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Intermittent along Mammoth Pool Reservoir shoreline in openings.	Low	P3-3	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Mammoth Pool Dam access road from Windy Point to the dam.	Moderate	P3-4	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	A few plants intermittently along the transmission line access road between Mammoth Pool Powerhouse and Powerhouse 8.	Low (<1% cover)	P3-5	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Intermittently on a road heading to the switchyard at Powerhouse 3.	Low (1% cover)	3-6	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Powerhouse 2.	High (80% cover)	3-7	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Two old housing roads off of the Canyon road near Powerhouse 2.	High (80% cover)	3-8	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Along the road to Powerhouse 1 from the substation to the powerhouse and around the forebay	High (40% cover)	P3-9	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	In Dorabelle campground growing on the side of a trail at the base of a granite outcrop in sandy soil.	Low (approximately 15% cover in a 50 sq. ft. patch)	3-10	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Intermittently scattered in openings along the entire perimeter of Shaver Lake.	Low	P3-11	A-1	NA	P

**Appendix B. Location of Invasive/Exotic Plant Species in the Big Creek ALP Study Area (continued)**

Scientific Name/ Common Name	Location	Level of Infestation	Map Label	CalEPPC List	CDFA Rating	USFS List
<i>Bromus tectorum</i> cheatgrass	Along the access roads to Shaver Lake Dam and around the whole area of the dam.	Moderate (7% cover)	3-12	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	At the trailhead that leads to the gaging station on Stevenson Creek.	Low (2% cover)	3-13	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Near the picnic area on the second spur road off of Road 9S24 (north shore Shaver Lake).	Low for the whole Picnic area but approximately 30% cover in a 25 sq. ft. patch	3-14	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Intermittently all along roads 9S58 and 9S24 (Sierra Marina to Eastwood Powerhouse) in disturbed patches on both shoulders.	Low	P3-15	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Intermittently along the Eastwood Transmission Line from Eastwood Powerhouse to point in Section 4 of map where lines are angled 120°.	Low	P3-16	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Intermittently scattered in openings along the entire perimeter of Balsam Meadow Forebay.	Low	P3-17	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Scattered throughout the Balsam Meadow Picnic Area.	Moderate	P3-18	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Intermittently scattered in openings along the entire perimeter of Huntington Lake.	Low	P3-19	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Along stream on a south-facing slope of granite near Mono Creek Diversion.	Low (2% cover)	3-20	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Around the perimeter of Bear Creek Forebay and diversion dam	Low	P3-21	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Along access road to Hooper diversion dam and scattered along the banks of the creek.	Low - 50 square-foot section	3-22	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	In the cracks of a granite outcrop at Tombstone Diversion.	Low - 100 square-foot section	3-23	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Intermittently scattered along the entire perimeter of Florence Lake.	Low (2% cover)	3-25	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	In cracks and crevices of the granite on Tombstone Pipe Trail.	Low to moderate in a quarter-mile section	3-24	A-1	NA	P

**Appendix B. Location of Invasive/Exotic Plant Species in the Big Creek ALP Study Area (continued)**

Scientific Name/ Common Name	Location	Level of Infestation	Map Label	CalEPPC List	CDFA Rating	USFS List
<i>Bromus tectorum</i> cheatgrass	SFSJ RiverGaging Station	Low	3-26	A-1	NA	P
<i>Bromus tectorum</i> cheatgrass	Million Dollar Mile Road - In patches and intermittently along the entire road.	Low	P3-27	A-1	NA	P
<i>Cytisus scoparius</i> Scotch broom	One plant along a creek going into Big Creek on a south-facing slope in front of the fish hatchery near Powerhouse 1.	Low (1 plant)	6-1	A-1	C	P
<i>Genista monspessulana</i> French broom	One plant on the Canyon Road - 8S05.	Low (1 plant)	7-1	A-1	C	
<i>Ailanthus altissima</i> tree of heaven	Up on a knoll on the east side of the access road going into Powerhouse 3.	High (80%-90% canopy cover, 100+ trees in approximately .25 acres)	1-1	A-2	NA	P
<i>Cirsium vulgare</i> bull thistle	Fuller's Meadow at Mammoth Pool	Low (25+ plants)	5-1	B	NA	P
<i>Cirsium vulgare</i> bull thistle	Roadside seep on 8S13 Road; the road between the Canyon Road and Railroad Grade.	Low (5 plants)	5-2	B	NA	P
<i>Cirsium vulgare</i> bull thistle	Along the access road to Shaver Lake Dam.	Low (approximately 20 plants)	5-3	B	NA	P
<i>Cirsium vulgare</i> bull thistle	Near the picnic area on the second spur road off of Sierra Marina road (road 9S58).	Low (2% cover, 8 plants)	5-4	B	NA	P
<i>Cirsium vulgare</i> bull thistle	On Shaver Lake, northeast shore in cove where North Fork Stevenson empties into Shaver Lake.	Low (1% cover, 12 plants)	5-5	B	NA	P
<i>Cirsium vulgare</i> bull thistle	On Shaver Lake, north shore near the day use area, east side of the day use road, the second spur road off of Sierra Marina Road (Road 9S24).	Low (9 plants)	5-6	B	NA	P
<i>Cirsium vulgare</i> bull thistle	On the west side of the Sierra Marina boat launch area.	Low (40+ plants)	5-7	B	NA	P
<i>Cirsium vulgare</i> bull thistle	North side of Shaver Lake, near a facility on Tailrace road.	Moderate (9% cover)	5-8	B	NA	P
<i>Cirsium vulgare</i> bull thistle	In a disturbed opening adjacent to a meadow on Shaver Lake perimeter between Camp Edison and Dorabelle Campground.	Low (18 plants)	5-9	B	NA	P

**Appendix B. Location of Invasive/Exotic Plant Species in the Big Creek ALP Study Area (continued)**

Scientific Name/ Common Name	Location	Level of Infestation	Map Label	CalEPPC List	CDFA Rating	USFS List
<i>Cirsium vulgare</i> bull thistle	Intermittent along the north side of the paved road that leads to Eastwood Powerhouse (road 9558).	Low	5-10	B	NA	P
<i>Cirsium vulgare</i> bull thistle	West side of Balsam Forebay, adjacent to and on the dam.	Low (5 plants)	5-11	B	NA	P
<i>Cirsium vulgare</i> bull thistle	All along the road on the east side of Balsam Forebay, east side of the road.	Low	5-12	B	NA	P
<i>Cirsium vulgare</i> bull thistle	Balsam Meadow Forebay perimeter.	Low (approximately 15 plants)	5-13	B	NA	P
<i>Cirsium vulgare</i> bull thistle	Along the stream below the dam at Balsam Meadow Forebay.	Low - 40+ plants in a 30 ft. section	5-14	B	NA	P
<i>Cirsium vulgare</i> bull thistle	In a wet area along a stream below Dam 2 on Huntington Lake.	Low (20+ plants)	5-15	B	NA	P
<i>Cirsium vulgare</i> bull thistle	Near the Mono/Bear Siphon, just south of the bridge over the South Fork of the San Joaquin River, on the west side of Kaiser Pass Road.	Low (14 plants)	5-16	B	NA	P
<i>Cirsium vulgare</i> bull thistle	On the east bank above SFSJ Gauging Station	Low - 50+ plants in a 300 square-foot area	5-17	B	NA	P
<i>Cirsium vulgare</i> bull thistle	Behind Florence Lake Dam.	Low (7 plants)	5-18	B	NA	P
<i>Cirsium vulgare</i> bull thistle	On the perimeter of Balsam Meadow Forebay.	Moderate (25% cover) in this area	5-19	B	NA	P
<i>Cirsium vulgare</i> bull thistle	Along Camp 6 Road (8S13); open access section at a drainage approximately 500 ft. West of the locked gate.	Low (30 individuals in 140 X 20 ft area)	5-20	B	NA	P
<i>Hypericum perforatum</i> Klamath weed	At the end of the road going down to the waters edge from Powerhouse 3, along the disturbed riparian stretch. Also 1 plant at the bottom of stairs to the switch yard.	Moderate - 5-10% canopy cover in this disturbed riparian stretch (200+ plants)	8-1	B	C	P
<i>Hypericum perforatum</i> Klamath weed	End of the road that goes through Powerhouse 2, near the confluence of Ordinance Creek and Big Creek.	Low (25-40 plants)	8-2	B	C	P
<i>Hypericum perforatum</i> Klamath weed	Powerhouse 2.	Low	8-3	B	C	P
<i>Hypericum perforatum</i> Klamath weed	Near Powerhouse 8, from Big Creek to the powerhouse.	Low (1 plant)	8-4	B	C	P

**Appendix B. Location of Invasive/Exotic Plant Species in the Big Creek ALP Study Area (continued)**

Scientific Name/ Common Name	Location	Level of Infestation	Map Label	CalEPPC List	CDFA Rating	USFS List
<i>Hypericum perforatum</i> Klamath weed	One patch at Powerhouse 8, near Dam 6.	Low (approximately 50 plants)	8-5	B	C	P
<i>Hypericum perforatum</i> Klamath weed	Road in section 26.	Low (approximately 50 plants)	8-6	B	C	P
<i>Hypericum perforatum</i> Klamath weed	Intermittently along the road from Powerhouse 8 to Powerhouse 2.	Low	8-7	B	C	P
<i>Hypericum perforatum</i> Klamath weed	Trail to gaging station on Stevenson Creek, across from Shaver Lake Dam.	Low (1 plant)	8-8	B	C	P
<i>Brassica nigra</i> black mustard	Mammoth Pool Powerhouse. Eastern side between the powerhouse and the river, on the bank.	Low (10-15 plants)	2-1	B	NA	P
<i>Brassica nigra</i> black mustard	On the road between Mammoth Pool Powerhouse and Powerhouse 8, on the bank between the road and Dam 6 Forebay.	Low (approximately 25 plants)	2-2	B	NA	P
<i>Brassica nigra</i> black mustard	Powerhouse 8.	Low (10-15 plants)	2-3	B	NA	P
<i>Brassica nigra</i> black mustard	On the north side of the road going from Powerhouse 8 to Powerhouse 2 there is a patch near the culvert going under the road.	Low (30-35 plants)	2-4	B	NA	P
<i>Brassica nigra</i> black mustard	Powerhouse 2	Low	2-5	B	NA	P
<i>Brassica nigra</i> black mustard	Shaver Lake Dam area.	Low (25-30 plants)	2-6	B	NA	P
<i>Centaurea melitensis</i> tocalote	Along the Mammoth Pool Powerhouse Transmission Line Access Road.	Low (approximately 25 plants)	4-1	B	NA	P
<i>Leucanthemum vulgare</i> ox-eye daisy	Along Road 8S12 east of the Huntington-Pitman-Shaver Siphon	Low (approximately 2% cover over 2 acres)	15-1	B	NA	N
<i>Robinia pseudoacacia</i> black locust	On the road from Powerhouse 8 to Powerhouse 2, just before bridge.	Low (2 trees)	10-1	B	NA	P
<i>Robinia pseudoacacia</i> black locust	Two old housing roads off of the Canyon road near Powerhouse 2.	Moderate (10 plants)	10-2	B	NA	P
<i>Robinia pseudoacacia</i> black locust	On the bridge and farther upstream on the creek near Powerhouse 8.	High (50+ trees on approximately .25 acres)	10-3	B	NA	P
<i>Spartium junceum</i> Spanish broom	Two old housing roads off of the Canyon road near Powerhouse 2.	Moderate (20-30 plants)	12-1	B	NA	P

**Appendix B. Location of Invasive/Exotic Plant Species in the Big Creek ALP Study Area (continued)**

Scientific Name/ Common Name	Location	Level of Infestation	Map Label	CalEPPC List	CDFA Rating	USFS List
<i>Spartium junceum</i> Spanish broom	One plant next to firehouse #12. Also interspersed along both sides of the road and starting to encroach on the oak woodland near Powerhouse 3, heading toward the gaging station.	Moderate (approximately 20% cover)	12-2	B	NA	P
<i>Spartium junceum</i> Spanish broom	Million Dollar Mile Road.	Low (1 plant)	12-3	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	East side of Sierra Marina boat launch area.	Low (8 plants)	13-1	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	A patch in the beginning of the road leading to Balsam Meadow Forebay snow park.	Low (approximately 12 plants)	13-2	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	Both sides of Camp 62 Creek within fifty feet of the diversion.	Moderate (10% cover, approximately 100 plants)	13-3	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	Trail leading to Camp 62 Diversion.	Low (approximately 15 plants)	13-4	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	Trail leading to Chinquapin Diversion.	Low (approximately 10 plants)	13-5	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	Trail leading to Chinquapin Diversion	Low (1 plant)	13-6	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	Trail leading to Chinquapin Diversion	Low (7 plants)	13-7	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	Along the south bank of Mono Creek in front of the diversion and along the chain link fence on the south side of the diversion.	Low (8 plants)	13-8	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	Just south of the bridge going over the South Fork of the San Joaquin River, on the west side Kaiser Pass Road near the Mono/Bear Siphon.	Low (4 plants)	13-9	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	Both sides of Kaiser Pass Road along exposed portions of the Mono/Bear Siphon furthest from the bridge that goes over the South Fork of the San Joaquin River.	Moderate (7% cover) 100+ plants in a 1/2 acre	13-10	B	NA	P

**Appendix B. Location of Invasive/Exotic Plant Species in the Big Creek ALP Study Area (continued)**

Scientific Name/ Common Name	Location	Level of Infestation	Map Label	CalEPPC List	CDFA Rating	USFS List
<i>Verbascum thapsus</i> woolly mullein	Throughout the east bank of SFSJ approximately 100 feet above the gaging station on the east side.	Moderate (10% cover) 500+ plants in approximately .30 acres	13-11	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	SCE Florence work camp.	Low (100 plants scattered over approximately 1.5 acres)	13-12	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	Florence Lake Boat Launch and Florence Lake Resort.	Low (5-10 plants)	13-13	B	NA	P
<i>Verbascum thapsus</i> woolly mullein	Along the base of Florence Lake Dam.	High (approximately 1,000 plants on approximately .33 acres)	13-14	B	NA	P
<i>Tanacetum vulgare</i> common tansy	Eastwood Powerhouse tunnel entrance.	Low (approximately 6 plants)	14-1	Need more information	NA	N

CalEPPC List

List A-1: Most Invasive Wildland Pest Plants; Widespread

List A-2: Most Invasive Wildland Pest Plants; Regional

List B: Wildland Pest Plants of Lesser Invasiveness

Red alert: Species with potential to spread explosively; infestations currently restricted

CDFA Rating

A-rated: Eradication, containment, rejection, or other holding action at the state-county level.

B-rated: Eradication, containment, control or other holding action at the discretion of the commissioner.

C-rated: State endorsed holding action and eradication only when found in a nursery.

USFS List

P: Present on Sierra National Forest

N: Near Sierra National Forest, reasonable to expect within next 5 years

% cover Cover Classes:

Low (<6% cover cover)

Moderate (6-25% cover cover)

High (>25% cover)

## **APPENDIX C**

### **Photographs of Invasive/Exotic Plant Species Detected in the Big Creek ALP Study Area**

**Appendix C. Photographs of Invasive/Exotic Plant Species Detected in the Big Creek ALP Study Area**

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Cheatgrass (*Bromus tectorum*)



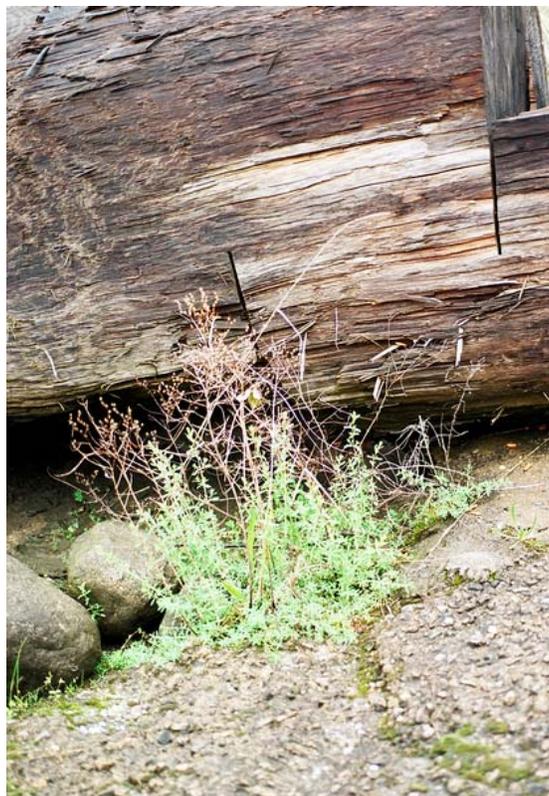
Bull thistle (*Cirsium vulgare*)

**Appendix C. Photographs of Invasive/Exotic Plant Species Detected in the Big Creek ALP Study Area**

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Klamath weed (*Hypericum perforatum*)



Klamath weed (*Hypericum perforatum*)

Appendix C. Photographs of Invasive/Exotic Plant Species Detected in the Big Creek ALP Study Area

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Himalayan blackberry (*Rubus discolor*)



French broom (*Genista monspessulana*)

**Appendix C. Photographs of Invasive/Exotic Plant Species Detected in the Big Creek ALP Study Area**

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Woolly mullein (*Verbascum thapsus*) at Mono/Bear Siphon.



Woolly mullein (*Verbascum thapsus*) at Mono/Bear Siphon.