

BAER SPECIALIST REPORT

Resource Specialty: Botany

Fire Name: King Fire

Month and Year: September/October 2014

Prepared by: Blake Engelhardt, North Zone Botanist, Eldorado NF
Fletcher Linton, Forest Botanist, Sequoia NF

I. Potential Values at Risk

Values at risk within the King Fire are ecosystem health and integrity of native plant communities, unique habitat types, and special-designation botanical areas. The 97,717 acre King Fire, which ranged in elevation from 1,900 to 7,200 ft, affected a great variety of different plant communities and environments, from Westside Chaparral to Upper Mixed Conifer Forest. The most common vegetation types within the fire area include:

- Sierra Montane Hardwood Forest
- Ponderosa Pine Forest
- Sierra Mixed Conifer Forest
- Mixed Fir Forest
- Manzanita/Ceanothus Chaparral
- Montane Chaparral

Uncommon habitat types such as lava caps and hard slate outcrops support high densities of rare plant species and are scattered throughout the southern portion of the fire. In addition, two special-designation botanical areas occur in the King Fire. The Peavine Point Research Natural Area was designated to preserve a prime example of old-growth ponderosa pine forest. It is located on a south facing slope above the South Fork of the American River. The Leonardi Falls Botanical Special Interest Area (SIA) was designated for moist cool ravines which create hanging gardens for rare plants, such as Saw-Toothed Lewisia, Stebbins' Phacelia, and Sierra Bluegrass. It is located on the steep north-facing cliffs of the Rubicon River Canyon.

No Federally Threatened or Endangered botanical species occur within or directly adjacent to the King Fire or fire suppression disturbance. The following R5 Sensitive Plants have known occurrences and suitable habitat within the fire:

- Eldorado Manzanita, (*Arctostaphylos nissenana*)
- Pleasant Valley Mariposa Lily, (*Calochortus clavatus* var. *avius*)
- Parry's Horkelia, (*Horkelia parryi*)
- Saw-Toothed Lewisia, (*Lewisia serrata*)
- Yellow Bur Navarretia, (*Navarretia prolifera* ssp. *lutea*)
- Veined Water Lichen, (*Peltigera gowardii*)
- Stebbins' Phacelia, (*Phacelia stebbinsii*)
- Sierra Bluegrass, (*Poa sierrae*)

II. Resource Condition Assessment

A. Resource Setting

The King Fire primarily burned within the north half of the Eldorado National Forest on the Pacific and Georgetown Ranger Districts (RD). The wildfire also affected small portions of the Placerville RD near Highway 50 at Fresh Pond and the American River RD on the Tahoe National Forest near French

Meadows Reservoir. A large amount of private property owned by Sierra Pacific Industries and other minor land owners was also burned. The fire burned during the months of September and October of 2014 and affected 97,717 acres (Table 1). The fire burned in a mosaic pattern of burn severity in the southern half of the fire but much of the northern half burned at high severity, especially in the Rubicon River drainage.

Table 1. Soil burn severity across land ownership within the King Fire.

Soil Burn Severity	Acres				% within the Fire Perimeter
	Private	Eldorado NF	Tahoe NF	Grand Total	
High	7,219	14,857	11	22,087	23%
Moderate	8,117	14,542	40	22,699	23%
Low	10,108	20,327	92	30,527	31%
Unburned/Very Low	8,461	13,810	133	22,404	23%
Grand Total	33,893	63,536	276	97,717	

Fire suppression tactics implemented to manage fire related threats to natural resources, forest service facilities, communities, and hydroelectric infrastructure (Sacramento Municipal Utility District (SMUD), Placer County Water Agency (PCWA), and Pacific Gas & Electric (PG&E)) resulted in the construction of approximately 146 miles of dozer line, 56 miles of hand line, and 114 miles of road as completed line.

The King Fire area contains many known infestations of noxious weeds that the Eldorado NF is currently treating under its 2013 *Eradication and Control of Invasive Species* Project (ENF 2013). In addition, fire suppression efforts overlapped spatially with known infestations. The majority of these infestations are being maintained at very low densities by annual “search and destroy” treatments. Table 2 below displays the Eldorado NF target species which are currently being treated that occur in the fire area.

Table 2. Invasive Noxious Weeds Known in to the area around the King Fire.

Scientific Name	Common Name	CDFR Rating	ENF Treatment Strategy
<i>Aegilops triuncialis</i>	Barb Goatgrass	B	1
<i>Ailanthus altissima</i>	Tree of Heaven	C	1
<i>Centaurea maculosa</i>	Spotted Knapweed	A	1
<i>Centaurea solstitialis</i>	Yellow Starthistle	C	2
<i>Chondrilla juncea</i>	Rush Skeletonweed	A	2
<i>Cytisus scoparius</i>	Scotch Broom	C	2
<i>Lepidium latifolium</i>	Perennial Pepperweed	B	1
<i>Spartium junceum</i>	Spanish broom	C	2
<i>Taeniatherum caput-medusae</i>	Medusahead Grass	C	2

CDFR Ratings

A - A pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment.

B - A pest of known economic or environmental detriment and, if present in California, it is of limited distribution.

C - A pest of known economic or environmental detriment and, if present in California, it is usually widespread.

ENF Treatment Strategy

1 - Annually Treat and Monitor with the Goal of Eradication

2 - Annually Treat and Monitor Portion of Known Infestations with the Goal of Control

Other existing uses within the fire area that could affect native vegetation recovery include OHV recreation and livestock grazing.

B. Findings of the On-The-Ground Survey

1. Resource condition resulting from the fire

The sites used for Incident Command Posts (ICP) – El Dorado County Fairgrounds in Placerville and the old Foresthill Mill Site in Foresthill – were heavily infested with yellow starthistle and other invasive species. The risk of propagules being transported from ICP to the fire area was increased by heavy rain which created mud in unpaved areas. This mud, which likely contained yellow starthistle seeds, was transported in large quantities to the fire area on tires, undercarriages, boots, and equipment.

No equipment or vehicles were washed as they arrived at the incident or prior to working on the fire line due to the need to quickly build up resources to protect communities and critical infrastructure as well as combat extreme fire behavior. Weed washing was established for demobilizing resources only. Several impromptu weed washes were set up in the field during the second half of the fire when crews and equipment were working in close vicinity of high priority infestations (e.g. Chipmunk Creek spotted knapweed) in order to avoid spreading this high priority species further. There is a high likelihood that weeds have been introduced at the locations selected for field weed washing due to mud and water not being completely contained and filtered at these locations (French Meadows Dam, Chipmunk Creek, Mosquito Road, and Lower Brockliss Canyon).

The Chipmunk Creek knapweed site had been treated twice with herbicide in 2014 and Resource Advisors made every effort to minimize travel and disturbance in this site. However, the road that passes through the site was needed to access the active fireline and it is likely that seeds of this species were spread to Chipmunk ridge and possibly elsewhere in the north part of the fire. No brushing or blading was allowed in the site.

During fire suppression activities, 35 drop points, 11 safety zones and heli-spots, and numerous other “push-out” areas were created or improved, many in previously undisturbed areas. Three spike camps were utilized in the field and 146 miles of dozer line, 56 miles of hand line, and 114 miles of road as completed line were created. In several locations dozers were observed to have travelled through sensitive habitats such as lava caps. An additional 216 miles of roads were used for travel corridors, parking, staging, etc. These disturbed areas serve as dispersal areas and corridors for weed dispersal. Suppression equipment and crews are known to have traveled through areas of invasive plant infestations during fire suppression efforts; thus rehab and repair work post-fire also had the potential to spread noxious weeds.

In addition to the new introductions and spread caused by the fire and fire suppression, many known infestations occurred in the fire area and were burned. Several known infestations were visited to assess fire effects. The Scotch broom on Ellicotts Bridge, which had been sprayed with herbicide during 2014, was completely consumed by fire, as was most other vegetation in this high burn severity area. Fire stimulates germination of Scotch broom seeds thus a flush of seedlings is expected in 2015, and the infestation would likely expand given the lack of competition. It is crucial to employ a control strategy post-burn so that the infestation doesn't become larger (DiTomaso et. al 2013), and the scope of the 2015 post-burn treatment will be larger than if the site had not burned.

Yellow starthistle sites along Forebay Road and Poho Ridge were visited and found to have burned at low to moderate intensity with much of the ground cover removed but leaving the taller plants intact. Yellow starthistle is a winter annual which germinates before many native perennial species and thus gains a competitive edge, which will be enhanced by the bare ground created by the fire. Burning can provide control of yellow starthistle if it occurs when the plant is in the very early flowering stage when seeds are not yet viable, but burning has little to no effect on seeds in the soil. Burning in the fall can enhance

yellow star thistle survival by removing competing species and stimulating germination (DiTomaso et. al 2013).

The Slate Mountain and Poho Ridge El Dorado Manzanita and hard slate outcrop sites were visited to assess fire effects. At Slate Mountain, previous measures (road closure, barrier rock, and interpretive sign) had been installed to prevent vehicle and OHV intrusion. At this location, barrier rock previously tied in to large shrubs, trees, and downed woody material which created an effective natural barrier around the entire site. The fire was found to have burned part of the site including some of the screening vegetation. Additional barrier rocks are needed to prevent access to the site. There are likely other locations within the fire area and at hard slate outcrops and lava caps where natural barriers may be needed to prevent travel off of designated routes.

2. Consequences of the fire on values-at-risk

Native plant communities, rare plant habitats, and special-designation botanical areas could be degraded by invasive species spread and introduction to uninfested areas within and adjacent to the King Fire. Known infestations of spotted knapweed, perennial pepperweed, Scotch broom, yellow starthistle, tree-of-heaven, medusahead, and goatgrass occur within and adjacent to the King Fire. These infestations have been treated repeatedly by the ENF invasive plants crew and have been controlled or nearly eradicated. However, they are expected to expand as a result of the fire due to seed bank stimulation and lack of competition. In addition, the introduction of propagules during fire suppression has the potential to establish new weed infestations. These new or expanded infestations would affect the structure and habitat function of native plant communities and ecosystems within the burn area and could require substantial sustained efforts to eradicate.

Native plant communities and unique habitat types are also at risk from vehicle and recreational use where natural barriers (screening vegetation) have been burned. In particular, rare habitat types such as lava caps and hard slate outcrops are unique features on the landscape. These areas are highly susceptible to damage from vehicle and recreation use because of their low-growing vegetation, ridge-top position, shallow soils, and long recovery times.

III. Emergency Determination

A BAER emergency has been determined for the King Fire for noxious weed invasion on Forest lands, due to the high risk of invasive species expansion and introduction to uninfested areas within and adjacent to the fire. This BAER emergency will be mitigated by surveying for and treating infestations to limit fire-induced population growth and geographic expansion, as well as surveying and treating newly discovered infestations before they become a serious threat to the recovery of native plant communities.

A BAER emergency has been determined for the King Fire for vehicle and OHV intrusion into native plant communities and unique habitat types where natural barriers (screening vegetation) have been burned.

IV. Treatments to Mitigate the Emergency

Treatment #1: EDRR Surveys and Treatments

A. Treatment Type

Early Detection Rapid Response (EDRR) surveys and treatments will be conducted in 2015 for Eldorado and Tahoe NF target invasive plant species. EDRR is a strategy developed to increase efficiency of weed work by combining surveying, mapping, and immediate treatment of new weed populations as they are discovered. Areas adjacent to existing infestations and areas disturbed during fire suppression (fire lines, staging areas, spike camps, transport routes, etc.) will be surveyed for new infestations and treated to prevent establishment. Existing infestations which had previously been controlled or near eradication will be treated in order to limit fire-induced expansion.

B. Treatment Objective

Protect native plant communities and rare plant habitats from impacts of invasive plant species. Prevent fire-induced expansion of known infestations within the fire area. Prevent establishment of new infestations in locations where propagules were introduced or spread by fire suppression efforts.

C. Treatment Description

Priority areas will be surveyed and treated in spring or early summer of 2015 when plants are detectable but early enough to treat effectively (prior to maturation and dispersal of seed). Several annual grass infestations may be treated with a pre-emergent herbicide in the fall of 2014. There are approximately 174 acres to be surveyed and treated at known infestations and adjacent areas at high risk of new infestation. There are 152 miles of fireline (dozer, hand, and road) on national forest lands only and 216 miles of heavily used road corridors to be surveyed. An additional 80 known point locations (spike camps, safety zones, drop points, staging areas, weed washes, etc.) as well as the disturbed area around the Chipmunk Creek knapweed site (~300 acres) will be surveyed. Surveys and treatments on the Tahoe National Forest portion of the fire and fire suppression areas will be coordinated with the Tahoe Forest Botanist and botany crews.

Infestations will be inventoried using the Eldorado NF Invasive Plants Data Form, mapped with a GPS, photographed, and flagged with noxious weed tape. Where feasible, new or isolated infestations will be treated by hand or mechanically (e.g. string-trimmer) during the same visit as the surveys. Surveys and treatments will be conducted by two-person botany crews, with the goal of timing the visits appropriately so that when possible only one visit per site is needed. However, depending on phenology, infestation size, and treatment strategy, some infestations may be visited more than once. Large infestations will likely be visited twice or more- once for survey and mapping and additional visits as needed for dedicated treatment. Treatments will be conducted by manual, mechanical or chemical methods in accordance with the forest-wide Eradication and Control of Invasive Plants Environmental Assessment (ENF 2013). Herbicide treatment will be used only where manual or mechanical methods are not effective or feasible.

In addition to the two-person crews of botanists/weed specialists, funding is available for regular or overtime for additional staff (e.g. four members of a fire crew, TSI crew, or timber marking crew, etc.) to assist during the short treatment window. Emergency surveys and treatments will be for one year only per BAER regulations. Survey and treatment in subsequent years may be accomplished through a combination of Forest Service program funding, coordination with hydroelectric utilities, and collaboration with Weed Management Area volunteer groups.

D. Probability of completing treatment in first year prior to damaging storms or events

Not applicable as seeds will not germinate until after fall/winter precipitation. Surveys and treatment will occur in spring and summer of 2015, after plants have emerged but prior to seed set. Where appropriate

based on species life history and site conditions, some known infestations may be treated with a pre-emergent herbicide during the fall of 2014 prior to the first winter precipitation.

E. Probability of treatment success

It is critical to utilize the 2015 growing season for EDRR surveys and treatments of new and expanding infestations of noxious weeds in the King Fire area. New infestations of noxious weeds are most easily eradicated when infestations are small (extent and cover) and large numbers of seeds are not yet present in the soil. The probability for treatment success is high at small outlying infestations and known populations that are already near eradication. While full eradication may not be feasible for larger infestations, surveying and accurately mapping the boundary allows for implementation of a control area as needed- such as flagging the area for avoidance during future project activities or requiring additional mitigation (e.g. weed washing) when disturbance is unavoidable in the control area. Establishing control areas can reduce the risk of future spread to other areas of the forest.

V. Discussion/Summary/Recommendations

The main *value-at-risk* is intact native vegetation communities that recover rapidly after fire, and the *risk* is the high likelihood that invasive plants will spread throughout the King Fire area and outcompete native plant species. The rate of weed spread can be estimated at 10-20% per year depending on weed species and site conditions, and can be as high as 60% per year (Asher & Dewey 2005). With the presence of known infestations in the fire and the fire-induced stimulation of the existing seed bank, as well as the variety of vectors during the course of the fire, invasive plants will have ample opportunities to establish seedlings within the burned area. Careful surveying, mapping and control treatments- especially of new satellite populations- will be essential to reduce this risk. Challenges that may arise include timing of seasonal hiring and the ability to hire the required temporary staff, and balancing the large BAER workload with other priorities on the ENF, such as salvage planning, FERC license implementation, and Fire Settlement commitments. Contracting, utilization of Enterprise Teams, or utilizing crews from adjacent forests are potential options to help cover the entire workload.

Uncommon habitat types such as lava caps and hard slate outcrops were affected both by the fire and by fire suppression. Where El Dorado Manzanita occurrences burned, regeneration by seed should be monitored by the ENF botany crew. Fire suppression impacts (dozer line) occurred in several lava caps (Peavine Ridge Road) and in the El Dorado Manzanita occurrence on Poho Ridge. The effectiveness of suppression repair at these sites should be monitored regularly for the first several seasons to ensure that erosion/intrusion is not an issue, and request additional funding from the fire P-code if needed. Barrier rock installation at the Slate Mountain outcrop should be monitored for effectiveness in preventing incursion into the site.

While no threatened or endangered botanical species occurred in the fire, approximately 160 occurrences of eight Forest Service Sensitive species are located within the fire perimeter. When possible, these sites should be monitored to assess fire effects. Mariposa lily sites that burned may see a benefit from reduced shrub cover and population numbers may increase in the years following the fire. Long-term monitoring plots at burned lava caps could be revisited if resources are available. Annual species such as yellow-bur navarretia and Stebbins' phacelia are expected to persist and even thrive in the open ground created by fire. Veined water lichen occurred in Soldier Creek in the Peavine Point RNA. Pre-fire flows were estimated at 370-440 cfs, while post-fire flows are estimated to increase by 60-80% to 580-820 cfs for a five-year-12-hour-3.34" storm. This essentially means that a five year storm will respond more like a 10-15 year storm. Bulking from sediment input is expected to produce an additional 25% increase in flow. The veined water lichen occurrence should be monitored to assess impacts from the fire and following any large storm events. The increase in flow and sediment has the potential to scour or bury this occurrence. Other species that should be monitored to better understand fire effects include Sierra

Bluegrass and Saw-Toothed Lewisia at Leonardi Springs, Sierra Blue Grass at Ellicotts Bridge and other locations, and Parry's Horkelia sites that may have been back-burned off Mosquito Rd.

Two active cattle grazing allotments overlap with the King Fire burned area- the Chipmunk and Old Pino allotments. On the 36,809 acre Chipmunk allotment 6,377 acres were burned, and on the 79,202 acre Old Pino allotment 43,021 acres were burned. Grazing in the first year after fire can increase the potential for conversion from native to non-native species composition, due to native species higher nutritional content and lack of highly unpalatable features (i.e., spines or compounds with bad taste) such as those exhibited by many weed species. Livestock grazing can contribute to soil compaction, erosion, and altered hydrologic function which precludes or reduces vegetation re-establishment post-fire. Cattle and the vehicles they are transported in are also vectors for weeds- seeds can attach to fur, hooves, and vehicles, and can remain viable in manure. Based on consultation with soils, hydrology, and botany BAER specialists, it is generally recommended that burned areas be closed to grazing for one to three years post-fire to allow for native plant recovery. ENF resource specialists will discuss the changed conditions and further refine the recommendations for temporary grazing allotment closure prior to the spring of 2015.

Other Long Term Treatment Recommendations: Protective Barriers

A. Treatment Type

Install barrier rock where natural barriers (screening vegetation) have been burned adjacent to native plant communities and unique habitat types. Treatment will be targeted in strategic locations where previous incursions have been documented and/or there has been previous investment in education/prevention measures. Recreation patrols will also be conducted to assess the effectiveness of signs and barriers. Luckily, the existing educational sign at the treatment site, Slate Mountain, survived the fire.

B. Treatment Objective

Promote the recovery of native plant communities and unique habitat types by preventing new incursions by vehicle or recreational use after the fire.

C. Treatment Description

Natural barriers (screening vegetation) have been burned adjacent to the Slate Mountain site where previous incursions have been documented. Where existing rock barriers were tied into screening vegetation that burned, additional barrier rocks will be strategically placed to make the existing barrier effective. Required equipment includes a dump truck and a rubber-tired backhoe with a bucket with a thumb. Personnel needs are one Forest Botanist for layout and monitoring of the work.

General Botany Mitigations:

The following standard mitigations shall be followed during BAER treatment implementation:

- If any new occurrences of sensitive plants are discovered at treatment locations prior to or during implementation, notify the Forest Botanist and coordinate as necessary to minimize impacts to botanical resources.
- All materials used for construction, such as gravel, fill, mulch, etc., shall be certified weed-free.
- All equipment and vehicles used during implementation must be free of invasive plant material before moving into the project area. Equipment will be considered clean when visual inspection does not reveal soil, seeds, plant material or other such debris on the equipment.
- Do not stage vehicles, equipment, materials or crews in invasive plant-infested areas.

- As feasible, workers should check clothing and shoes for invasive plant seeds and remove them before moving from one site to another.
- If any new infestations are discovered at treatment locations prior to or during implementation, notify the Forest Botanist and coordinate as necessary to minimize impacts from invasive plants.

VII. References

Asher, J.; Dewey, S. 2005. Estimated annual rates of weed spread on western Federal wildlands, white paper. 4p. Unpublished document.

DiTomaso, J.M. G.B. Kyser et al. 2013. Weed control in Natural Areas in the Western United States. Weed Research and Information Center, University of California. 544 pp.

Eldorado National Forest (ENF). 2013. Eradication and Control of Invasive Plants Environmental Assessment. USDA Forest Service. Placerville, CA.

APPENDIX A
Invasive Noxious Weed Profiles

Aegilops triuncialis- Barbed Goatgrass

Aegilops triuncialis (barbed goatgrass) is an annual grass that grows in rangelands, grasslands, and oak woodlands. It is becoming a dominant grass in foothill grasslands of central California. This weed can directly injure livestock by lodging in their eyes or mouths, and is unpalatable to cattle.



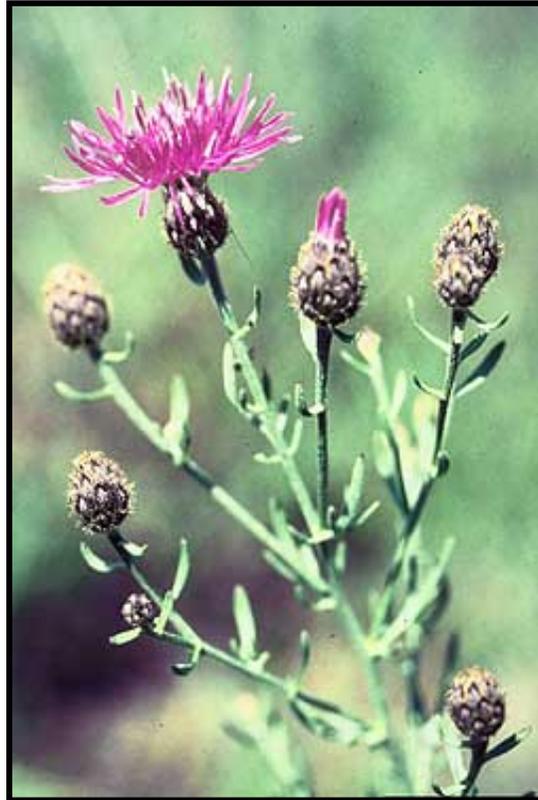
Ailanthus altissima - Tree of Heaven

Tree of Heaven is a deciduous tree that is native to Taiwan and central China. It grows in wastelands and disturbed areas, particularly with moisture. It can reproduce by seed as well as vegetatively from roots. Its seeds are mostly spread by wind, and form no persistent seed bank. It potentially produces allelopathic chemicals. Manual treatment is only effective if the entire root system is killed or removed.



Centaurea maculosa- Spotted Knapweed

Spotted knapweed is an aggressive, introduced weed species that rapidly invades pasture and rangeland. The weed is a prolific seed producer with 1000 or more seeds per plant. Seed remains viable in the soil five years or more, so infestations may occur a number of years after vegetative plants have been eliminated. Spotted knapweed has few natural enemies and is consumed by livestock only when other vegetation is unavailable. The plant releases a toxin that reduces growth of other species. Areas heavily infested with spotted knapweed often must be reseeded once the plant is controlled.





***Centaurea solstitialis* - Yellow Starthistle**

Yellow Starthistle is a winter annual that can form dense impenetrable stands that displace desirable vegetation in natural areas, rangelands, and other places. It is best adapted to open grasslands with deep well-drained soils. Yellow Starthistle originated from southern Europe but was introduced from Chile to California during the gold rush. It has spread rapidly since the mid-1900s and is now estimated to infest 15-20 million acres in California and a couple of additional million acres in other western states.





Chondrilla juncea- Rush Skeletonweed

Rush skeletonweed is a perennial forb that can grow up to 4 ft. tall. Coarse-looking, multiple stems appear leafless due to inconspicuous leaves and arise from a basal rosette of sharply lobed leaves. The lower portion of stem is covered with coarse brown retrose hairs. Both stem and leaves produce a milky sap when broken. Flowers are small and yellow and develop in the mid-summer to fall. Mature, healthy plants can produce 1,500 flower heads and up to 20,000 seeds. Rush skeletonweed invades dry rangelands in the Western United States, displaces native species, and reduces forage for livestock and wildlife. Rush skeletonweed is native to regions of Europe, Asia, and Africa and was accidentally brought to the United States as a contaminant of fodder in 1914.





Cytisus scoparius- Scotch Broom

Scotch broom is a perennial shrub in the Pea Family, which grows in sunny sites with dry sandy soil, and spreads rapidly through pastures, borders of forests, and roadsides. It can be found from the coast to the Sierra foothills. This weed crowds out native species, diminishes habitat for grazing animals, and increases risk for wildland fires. The seedbank that can remain dormant for up to 80 years.



Lepidium latifolium- Perennial Pepperweed

Perennial Pepperweed is perennial and is native to southern Europe and western Asia. It spreads by mostly by creeping roots and seed under many different environmental conditions. The plant grows up to six feet tall forming dense thickets that crowd out native plants. Mature plants have numerous erect, semi-woody stems that originate from large, interconnected roots. Roots are long, minimally branched, and enlarged at the soil surface forming a semi-woody crown. The flowers are small white and form dense

clusters at the end of the branches. It grows in waste areas, wet areas, ditches, roadsides, cropland, along waterways, and dry habitats such as road cuts and fills. Robust, deep-seated spreading roots and numerous seeds make this weed very difficult to control. Mechanical removal can actually cause the spread of the plant and an increase in numbers.



Spartium junceum - Spanish broom

Spanish broom is a deciduous shrub in the Pea Family found throughout the western part of California. Spanish broom was introduced as a landscape ornamental and was planted along highways to prevent soil erosion. It can grow into monospecific stands, excluding all native species. Broom is unpalatable to most livestock except goats, so it decreases rangeland value, while increasing fire hazards. These leguminous plants produce copious amounts of seed, and may resprout from the root crown if cut or grazed.



Taeniatherum caput-medusae- Medusahead Grass

Medusahead is a winter annual grass and noxious rangeland weed spreading throughout the western United States. Medusahead seeds germinate after the first rain in October or November in California. Medusahead crowds out other annuals and generally out-competes perennial grass seedlings. Where it is allowed to establish, it can form exclusive stands that effectively shut out

other vegetation. Hand-pulling is an option for very small infestations. Mowing with or without grazing can be an effective control. Several herbicides are effective on medusahead, and herbicide treatment is a key tool for treating larger infestations.

