

Differentiation of Invasive Weeds vs. Desirable Vegetation for Effective Vegetation Management in the Tahoe Basin

FINAL REPORT LAKE TAHOE LICENSE PLATE PROGRAM NEVADA DIVISION OF STATE LANDS

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Project Introduction

The Tahoe Basin is a unique environment at peril from the pressures of increasing recreational use and development. Lake Tahoe, famed for its clarity and beauty, is rapidly degrading due to inputs of sediment and phosphorus that foster algae growth. Invasive weeds have been shown to accelerate rates of erosion due to changes in root structure, and thus are a major threat not only to Tahoe vegetation thresholds, but also to water quality.

A basic land management goal is to maintain or improve the health of the land. To reach this goal, it is necessary to have a wide variety of healthy grasses, forbs, shrubs, and sometimes trees. The greatest negative impact to healthy plant communities is the rapid expansion of invasive weeds. For example, in 1970, there were about 32 acres of leafy spurge in the Theodore Roosevelt National Park in North Dakota. The use of herbicides was not allowed, and by 1997, leafy spurge had expanded to dominate over 4000 acres (Andrascik, 1997). There were only minor populations of spotted knapweed in Montana in 1920. Today, about 5 million acres of the state have been taken over by the weed, with another 29 million acres remaining highly susceptible to invasion (Duncan, 1997). Spotted knapweed is expanding rapidly in Idaho, Oregon, and California, and has been identified within the Tahoe Basin as well as along transportation routes to the basin. In Montana, knapweed infestations result in an estimated direct annual impact of \$14 million, with total secondary impacts of about \$42 million (Hirsch and Leitch, 1997).

Weeds often completely alter plant communities by forming monocultures, or pure stands of one invasive plant. These infestations do not have the matrix of vertical and horizontal structure or the diversity of species commonly found in healthy plant communities. Aggressive foreign plants spread quickly into natural areas, monopolize resources, and push out native flora and fauna, including endangered species (Cheater, 1992).

The Tahoe Basin is particularly vulnerable to weed spread from recreational use, development, snow removal procedures, and erosion control projects that use straw bales or mulch as stabilization methods. Weeds represent threats to attainment of vegetation, water quality, scenic resources, and recreation thresholds. We have a diminishing opportunity to find and control invasive weeds but feel that the opportunity still exists to eradicate many invasive weeds within the basin.

Weed Coordination and Management Efforts in the Tahoe Basin Prior to the Grant Period

In 1997, the first infestation of perennial pepperweed (*Lepidium latifolium*, or tall whitetop) was found on College Blvd. in Incline Village. Because this weed has the potential to destroy sensitive streamside environment zones that are essential to the protection of Lake Tahoe's clarity and water quality, an effort was begun immediately to locate and map the weed throughout the Basin.

During the summer of 1998, through a public awareness campaign mounted by the University of Nevada Cooperative Extension and the efforts of volunteers, 35 sites in the Tahoe Basin that were infested with tall whitetop were identified, confirmed and mapped. The size of these infestations ranged from one plant to about 1/3 acre dominated by tall whitetop. We brought together a group of agency representatives, scientists, and land managers to map out a strategy to control the weed. With general agreement that the threat posed by

the weed far outweighed the threat posed by the judicious use of small amounts of herbicide, the infestations have been treated by pulling or spraying since 1999, reducing the infested acreage by 80 percent or better. However, we soon realized that a number of other invasive weeds were beginning to infest the basin, and a broader collaborative effort was needed to effectively manage weeds.

In response to this need, the Tahoe Basin Weed Coordinating Group was formed in January 2002 to share information and resources to more effectively identify, map, and manage noxious and invasive weeds within the Tahoe Basin watershed. The group consists of land managers, agency representatives, regulators, residents, educators, and volunteers. A partial list of group members is provided below.

Tahoe Weed Coordinating Group Members:

- Wendy West, University of CA Cooperative Extension
- LeeAnne Mila, El Dorado County Agriculture Dept., CA
- Rene Simon, Placer County Agriculture Dept., CA
- Larry Hughes, Douglas County, NV
- Beth Brenneman, Jody Fraser & Lori Alessio, US Forest Service, LTBMU
- Dick Johnson, CA Tahoe Conservancy
- Jay Howard, NV State Parks
- Tamara Sasaki and Scott Scheibner, CA State Parks
- Steve Harcourt, CA Department of Forestry and Fire Prevention
- Lori Bells, NDOT
- Duane Scheurer, CalTrans
- Lisa O'Daly, City of South Lake Tahoe
- Rex Harold, NV Division of State Lands
- Sue Donaldson, University of Nevada Cooperative Extension
- Steve Siegel, Sierra Pacific Power Co.
- Mike Vollmer, TRPA
- Bruce Warden, Lahontan Regional Water Quality Control Board
- Jane Schmidt, Natural Resources Conservation Service
- Leslie Allen, LTEEC
- M.J. Cross and Lysa Carmody, volunteers and residents

During the first year of the group's operation, 15 weed species that represent significant risks to vegetation thresholds within the Tahoe Basin were identified:

- Thistles: bull, Canada, musk, and scotch
- Knapweeds: diffuse, Russian, spotted, and yellow starthistle
- Toadflaxes: Dalmatian, yellow
- Brooms: French, Scotch, and Spanish
- Perennial pepperweed (tall whitetop)
- Eurasian watermilfoil
- Klamathweed
- Oxeye daisy

Table 1	
Weed Species	Frequency
Perennial pepperweed (tall whitetop)	239
Bull thistle	144
Spotted knapweed	140
Yellow starthistle	134
Diffuse knapweed	71
Klamathweed	17
Oxeye daisy	10
Scotch broom	8
Dalmatian toadflax	3
Yellow toadflax	3
Eurasian watermilfoil	2
Musk thistle	1
Canada thistle	1
Purple loosestrife	1

In 2004, the list was expanded to include 21 species and restructured as follows:

Group #1: Watch For, Report, Eradicate Immediately

1. Musk thistle (*Carduus nutans*)
2. Scotch thistle (*Onopordum acanthium*)
3. Canada thistle (*Cirsium arvense*)
4. Russian knapweed (*Acroptilon repens*)
5. Diffuse knapweed (*Centaurea diffusa*)
6. Squarrose knapweed (*Centaurea squarrosa*)
7. Yellow starthistle (*Centaurea solstitialis*)
8. Purple starthistle (*Centaurea calcitrapa*)
9. Scotch broom (*Cytisus scoparius*)
10. Hoary cress (*Cardaria draba*)
11. Sulfur cinquefoil (*Potentilla recta*)
12. Klamathweed (*Hypericum perforatum*)
13. Teasel (*Dipsacus fullonum*)
14. Curlyleaf pondweed (*Potamogeton crispus*)

Group #2: Manage Infestations With a Goal of Eradication

15. Bull thistle (*Cirsium vulgare*)
16. Eurasian watermilfoil (*Myriophyllum spicatum*)
17. Perennial pepperweed (*Lepidium latifolium*)
18. Spotted knapweed (*Centaurea maculosa*)
19. Dalmatian toadflax (*Linaria genistifolia* spp. *dalmatica*)
20. Yellow toadflax (*Linaria vulgaris*)
21. Oxeye daisy (*Chrysanthemum leucanthemum*)

Issues associated with these species are broad and troublesome. For examples, when taprooted perennial weeds invade riparian areas and take over, the soil-stabilizing effects of the native grasses and sedges are lost, and more erosion may occur. A study compared erosion rates of a native grass ecosystem to a monoculture of spotted knapweed, and found that at the spotted knapweed dominated sites, surface water runoff was 56 percent higher and stream sediment yield was 192 percent higher (Lacey et. al, 1989). Some priority weeds adversely affect recreational suitability by producing dense, unpleasant, and often thorny vegetation, such as the thistles and yellow starthistle. Others, such as perennial pepperweed, will invade wetland areas, displacing desirable species and decreasing the ability of the wetland to protect water quality. Numerous studies have demonstrated reduced numbers and/or diversity in birds, reptiles, small mammals, and insects in stands of nonnative plant species (Huenneke, 1996; Johnson et. al, 1994).

During the 2002 field season, more than 300 infestations of the priority invasive weeds were mapped, either within the Basin proper, or along transportation routes adjacent to the Basin. Table 1 lists the weed species and the number of reports that had been entered into the

state weed database as of December 2002. Most infestations within the basin are relatively small in size (less than ¼ acre).

As a result of coordinated efforts by the Tahoe Weed Group, during the 2002 field season, all known infestations in Douglas County were treated and all infestations on public property in Incline were treated. In El Dorado County, 67% of invasive plants were mechanically removed; 14% were hand pulled and treated with herbicide; and 19% were treated with herbicide. Mechanical controls included 26,000 Dalmatian toadflax plants that were hand-pulled in El Dorado County. The initial funding for control efforts was primarily provided by the California Dept. of Food and Agriculture (CDFA) via a grant from the United States Forest Service/State and Private Forestry program.

During the 2002 summer field season, we discovered that certain species of noxious and invasive weeds were frequently confused with desirable native plants. For example, we received numerous reports of knapweed species that had been confused with native aster species or bachelors button; musk and bull thistle were confused with the native Anderson's thistle; and perennial pepperweed was confused with native yarrow, cow parsnip, and others. In order to effectively map and manage the priority weed species, it is essential that accurate differentiation be made in the field. For this reason, we requested funding for two parts of our weed management effort: development of a field guide to invasive vs. native species to be used for mapping and tracking the priority weed species, and funding for herbicides and labor for weed control.

Objectives

1. Accurately map and differentiate infestations of the priority weed species within the Tahoe Basin.
2. Prioritize control efforts and, with guidance from Lahontan Regional Water Quality Control Board, selectively spot-apply herbicides to manage infestations of spotted knapweed, perennial pepperweed, Russian knapweed, and Canada thistle.

Accomplishments

1. Differentiation of Vegetation

In order to assist in the differentiation of vegetation, we developed a full-color field guide that includes information on the priority invasive weeds as well as descriptions of the more desirable native species with which they are often confused. Fifteen priority invasive weeds are included, and eight "look-alikes." The guide includes hand-drawn artwork indicating plant scale and key characteristics, text to help in identification, and photos of both invasive weeds and native vegetation. Many of the photos were taken within the Tahoe Basin. The book also includes two pages on quick reference identification features and information on status as noxious weeds in both Nevada and California. The book's pocket size is appropriate for use in the field. The guidebook was subjected to rigorous blind review, approved, and published as UNCE EB-04-05. A copy of the guide is included at the end of this report.

License plate grant funds were used to pay for the artist's renderings, layout, and printing of 5000 copies. Additional grant funds obtained from the Nevada Department of Agriculture allowed us to increase the number of species included and the number of books printed.

All group members received copies of the guidebook to distribute to their staff and at educational events. In 2005, the Tahoe Basin Weed Coordinating Group provided a training for staff members from several agencies at Lake Tahoe to learn how to differentiate the plant species and apply accepted mapping practices. The training for 40 people from CA State Parks, CTC, City of SLT, TRPA – Erosion and Calif. Dept of Forestry and Fire Protection was provided at no cost, sponsored by El Dorado County Agriculture Department and UC Cooperative Extension (see flyer on next page). Participants received copies of the publication.

Local nurseries were provided with 200 copies for staff use and distribution. Additionally, fifty copies of the guidebook were distributed at National Invasive Weeds Awareness Week in Washington, DC in February, and copies were given to Nevada Senators and Representatives. Fifty copies were distributed at the Western Regional Weed Awareness Summit in Boise, Idaho in June. Copies of the guidebook were also provided to participants at the 2005 Contractor's Workshop, and to members of the Washington, D.C. team reviewing the USFS Healthy Forests Initiative programs in July. Approximately 1000 copies have been distributed to date.

Weeds Included in Guidebook:

Thistles & Look-Alikes

- Bull thistle
- Canada thistle
- Musk thistle
- Scotch thistle
- Anderson's thistle
- Elk thistle

Knapweeds & Look-Alikes

- Diffuse knapweed
- Russian knapweed
- Spotted knapweed
- Yellow starthistle
- Aster
- Bachelor buttons

Mustards & Look-Alikes

- Hoary cress
- Perennial pepperweed
- White sweetclover
- Yarrow

Toadflaxes & Look-Alikes

- Dalmatian toadflax
- Yellow toadflax
- Snapdragon

Daisies

- Oxeye daisy
- Shasta daisy

Others

- Klamathweed
- Scotch broom



Invasive Weed Identification and Control Workshop

For landowners and managers, on-the-ground-crews and interested individuals

***South Lake Tahoe
Thursday, June 23, 2005
1:30 p.m.***

***US Forest Service – Lake Tahoe Basin Management Unit
Conference Room
35 College Drive (off Al Tahoe Boulevard)***

- Learn to identify the Lake Tahoe Basin's most “unwanted” invasive weeds
- Review control methods for each species
- Learn what to do if you find one of these invaders...
- Pesticide safety training presented by the El Dorado County Department of Agriculture, following the identification segment for those interested in additional training
- Presented by the Lake Tahoe Basin Weed Coordinating Group

Contact Wendy West, University of California Cooperative Extension to register for the workshop wkwest@ucdavis or call (530) 621-5533.

2. Education and Outreach

Education and public outreach has been supplemented with the hiring of an Outreach Coordinator using funds received from CA Dept. of Food and Agriculture. Funding for all outreach projects was obtained from other sources. Projects during the funding period included:

- Development and printing of a spotted knapweed brochure that was mailed to 600 Forest Service property lessees and distributed at various venues
- Incorporation of weed mapping into Snapshot Day activities
- Providing a talk on weed spread prevention at the Contractors, Architects, Engineers and Landscapers 4th Annual BMPs Workshop, 2003
- Completion of a fact sheet on weed spread prevention (see Appendix A)
- April 24, 2004, Earth Day, SLT, booth, about 250 people
- June 12, 2004, Tahoe Rim Trail volunteers, 35 people, 30 minutes, trail monitors
- June 15 & 16, 2004, Weed Warriors, 25 people, 8 hours
- June 17, 2004, general weed training in SLT, 34 people from TRCD, NTCD and Tahoe Conservancy plus two State Parks, one Master Gardener and one CA Dept of Forestry
- July 28, 2004, thistle and knapweed identification class in South Lake Tahoe, 9 people from USFS LTBMU
- April 25, 2005, Earth Day, SLT, about 100 people
- Flyer on EWMF mailed to lease holders on Fallen Leaf Lake USFS residential tracts., June 2005
- July 27, 2005, Pinewild Home Owner's Association presentation, 25 people
- July 28, 2005, North Lake Tahoe Demonstration Garden presentation, 12 people
- Homeowner Control Brochure written and printed, 6000 copies. The brochure was also mailed to USFS lease holders, 2005
- Scotch Broom Project - 'Sweep Broom Out of Your Yard'. Currently underway, three plant swaps are being held around the lake (July 30, Aug. 6, Aug. 13, 2005) to encourage residents to dig up invasive ornamentals in their yard, bring them to a designated area, and receive a free safe alternative plant to replace it. In addition, educational information will be distributed.
- Home Landscaping Guide for Lake Tahoe - An addition to the Home Landscaping Guide has been developed and will highlight invasive ornamentals with general information on invasive weeds. The Home Landscaping Guide is a great outreach tool as it is widely distributed throughout the Basin.

3. Management

Control requires a variety of integrated weed management methods. During the December 2002 meeting of the Weed Group, the following methods and priorities were developed for the 2003 field season:

Immediate control by mechanical methods:

- Musk thistle
- Scotch thistle
- Yellow starthistle
- Diffuse knapweed

Immediate control by chemical methods (mechanical means ineffective):

- Canada thistle
- Russian knapweed
- Spotted knapweed
- Tall whitetop (or perennial pepperweed)

Practice containment to prevent expansion of existing populations:

- Bull thistle
- Klamathweed
- Dalmatian toadflax (we lack an effective and acceptable chemical control)
- Yellow toadflax (we lack an effective and acceptable chemical control)
- Oxeye daisy

Public education needed to stop intentional planting or spread:

- Scotch, French, Spanish brooms
- Eurasian watermillfoil
- Oxeye daisy
- Dalmatian and yellow toadflax

We submitted a proposal to Lahontan Regional Water Quality Control Board (LRWQCB) that details criteria under which certain herbicides may be used to spot-spray small infestations of tall whitetop, Russian and spotted knapweed, and Canada thistle, as well as the best management practices to be followed during spraying. These herbicides include glyphosate (Rodeo®), which can be used adjacent to water and provides some control of tall whitetop; chlorsulfuron (Telar®), which provides excellent control of tall whitetop; and clopyralid (Transline®), which provides excellent control of knapweeds and thistles. These products offer a number of advantages. Rodeo is labeled for appropriate use adjacent to waterbodies, and has low aquatic toxicity and little potential for migration due to its large organic carbon coefficient. Transline and Telar are extremely effective on the target species at very low rates (as little as 1 to 1.5 ounces per acre), and have low toxicity to aquatic animals, birds, and mammals. The proposal was developed with assistance from Jason Churchill of LRWQCB, and duplicates the conditions for which we received permission to apply herbicides to control tall whitetop.

LRWQCB accepted our proposal and has assisted in site review, as needed, since 2003. They have renewed the agreement on an annual basis, finding that the approach works very

well. The Tahoe Basin Weed Coordinating Group follows an annual action plan (see Appendix B) that is updated each year during the winter months.

A Pulling Together Initiative grant was obtained to allow the weed group to hire seasonal staff for mapping and management. Crews performed surveys basin-wide beginning in summer 2003, mapping and pulling or clipping weeds, as appropriate. Sites are documented using GPS and photography, allowing follow-up evaluation to occur in future years. In addition, the USFS-LTBMU hired a full-time weed technician in 2003. They have actively surveyed and mapped weeds throughout the basin, and applied mechanical controls as appropriate, in the absence of an Environmental Impact Statement for herbicide use.

Mapping and Control Accomplishments

1. A ¼ acre tall whitetop reclamation site in South Lake Tahoe was reseeded and mulched by 27 volunteers on October 4, 2003. Seed was provided by the Nevada Department of Agriculture.
2. The seasonal crews are continuing to survey the basin for weeds and applying control methods where appropriate. Placer County received funding via California Department of Food and Agriculture and began mapping and control in 2005. A crew funded by the Truckee Meadows Weed Group's Pulling Together grant mapped weeds in Incline in 2005.
3. Weed crews had surveyed, mapped and eradicated invasive weeds on 1322 miles in the Lake Tahoe Basin by early September, 2004. We received the first report of tamarisk growing in the basin, and Placer Co. Ag. Dept. is following up.
4. Our early detection/rapid response approach is working. In 2003, three yellow starthistle plants were discovered at locations in the Basin, and promptly removed. In 2004, re-monitoring of the sites showed no sign of plants. Instead, 2 weeds were found and removed from new locations, suggesting spread via transportation routes. Currently, it appears that we are effectively excluding this dangerous species.
5. We contracted with Larry Hughes to do private spraying within the Tahoe Basin at sites lacking a management agency. Hughes is a certified applicator in both CA and NV.
6. Pat Lang of Washoe Co. Roads controlled several invasive weed species on a restoration site in Incline Village.
7. A research project testing alternative methods of application of herbicides was initiated in 2004 with approval by LRWQCB and alternative funding sources. Results will be available later in the year.

Project Evaluation

We have made significant progress on the inventory and control of invasive weed species in the Basin. In the past, each summer, we surveyed approximately equal numbers of historic sites (known infestations from previous years) and new infestations. By the end of the 2004 field season, approximately 2/3rds of the infestations were historic, and only 1/3rd represented new instances of weeds. The new infestations also tend to be smaller in size and include fewer plants.

Summary of Results From Seasonal Mapping in 2003 - 2004:

2003:

- Basin-wide, 2127.2 miles were surveyed and mapped for weeds
- 146 Infestations treated by mechanical and chemical means

2004:

- Basin-wide, 1887 miles were surveyed and mapped for weeds
- 157 historical weed Infestations were documented and treated
- 161 new weed infestations were documented and treated

The El Dorado County Agriculture Department hired a GIS specialist in 2004, who collected all weed mapping data for the entire basin. While the position is currently vacant, we anticipate that El Dorado County Ag will continue to serve as the data clearinghouse for the group.

Weeds Controlled By Certified Applicator (paid with grant funds)

Agencies lacked capacity to address weed infestations at these sites, so the group contracted with a private, certified applicator to manage weeds at these sites. Sites were mapped prior to treatment. Monitoring in 2005 indicated good control of Canada thistle and spotted knapweed at the Old Tahoe City Dump site. Additional treatment of the Dalmatian toadflax will continue during summer of 2005.

DATE	LOCATION	SPECIES	ACREAGE
10/3/04	Spooner Lake Park	Canada thistle Bull thistle	4 gross acres
10/9/04	Old Tahoe City Dump	Dalmatian toadflax Canada thistle Bull thistle Spotted knapweed	10 gross acres

Noxious Weeds Identified on USFS LTBMU, 2004

There are a total of 263 weed sites on LTBMU forestlands. These sites will receive priority for treatment and survey in 2005. There were a total of 74 new sites found in 2004. 23 of these sites were urban lots, the rest were general Forest Service land. Many sites from 2002 that were previously treated are owned by the county or other landowners and were dropped from the total site count. When an existing site was surveyed and no weeds were found, this was noted, but the site was not dropped and was included in the total site count. The site will be monitored in the future to make sure no weeds germinate from the seed bank left behind.

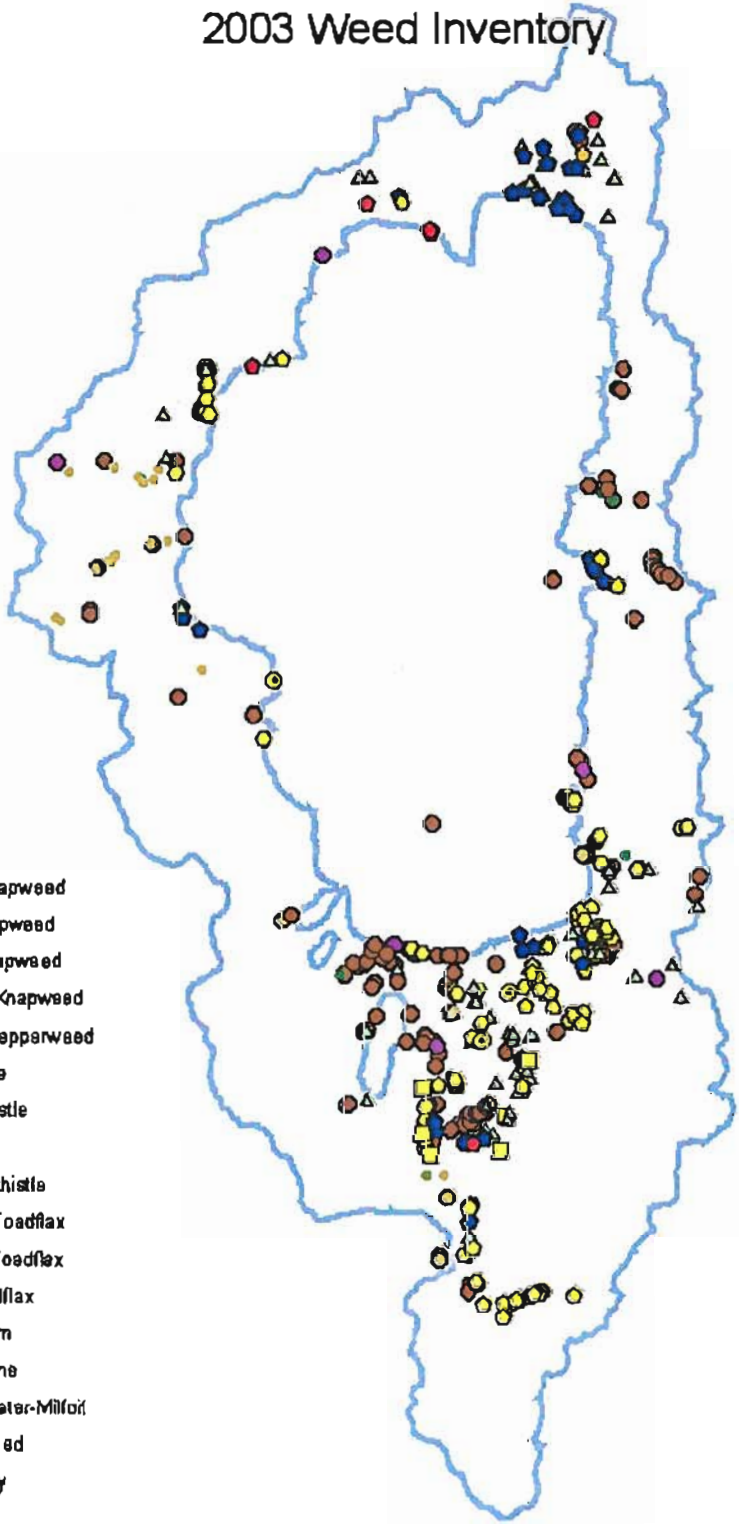
Work on an herbicide Environmental Assessment has been put on hold until a Forest Botanist is hired. After that an EA will be developed and eventually we may be able to use herbicides on select sites that are impossible to control mechanically.

NOXIOUS WEEDS	# OF SITES	GROSS AREA (ft ²)	INFESTED AREA (ft ²)	GROSS ACRES	INFESTED ACRES
Bull thistle	151	3040374	276555	69.797	6.349
St. Johnswort	35	527510	28946	12.110	0.665
Eurasian watermilfoil	3	509520	21384	11.697	0.491
Yellow toadflax	6	442452	22238	10.157	0.511
Oxeye daisy	20	241414	29570	5.542	0.679
Tall whitetop	12	54665	7147	1.255	0.164
Dalmatian toadflax	18	49609	1358	1.139	0.031
Sulphur cinquefoil	4	10100	3010	0.232	0.069
Scotch broom	3	9942	572	0.228	0.013
Canada thistle	6	2073	33	0.048	0.001
Reed canary grass	1	900	855	0.021	0.020
Spotted knapweed	1	600	12	0.014	0.000
Diffuse knapweed	1	250	25	0.006	0.001
Musk thistle	2	204	6	0.005	0.000
TOTALS	263	4,889,613	391,711	112.250	8.992

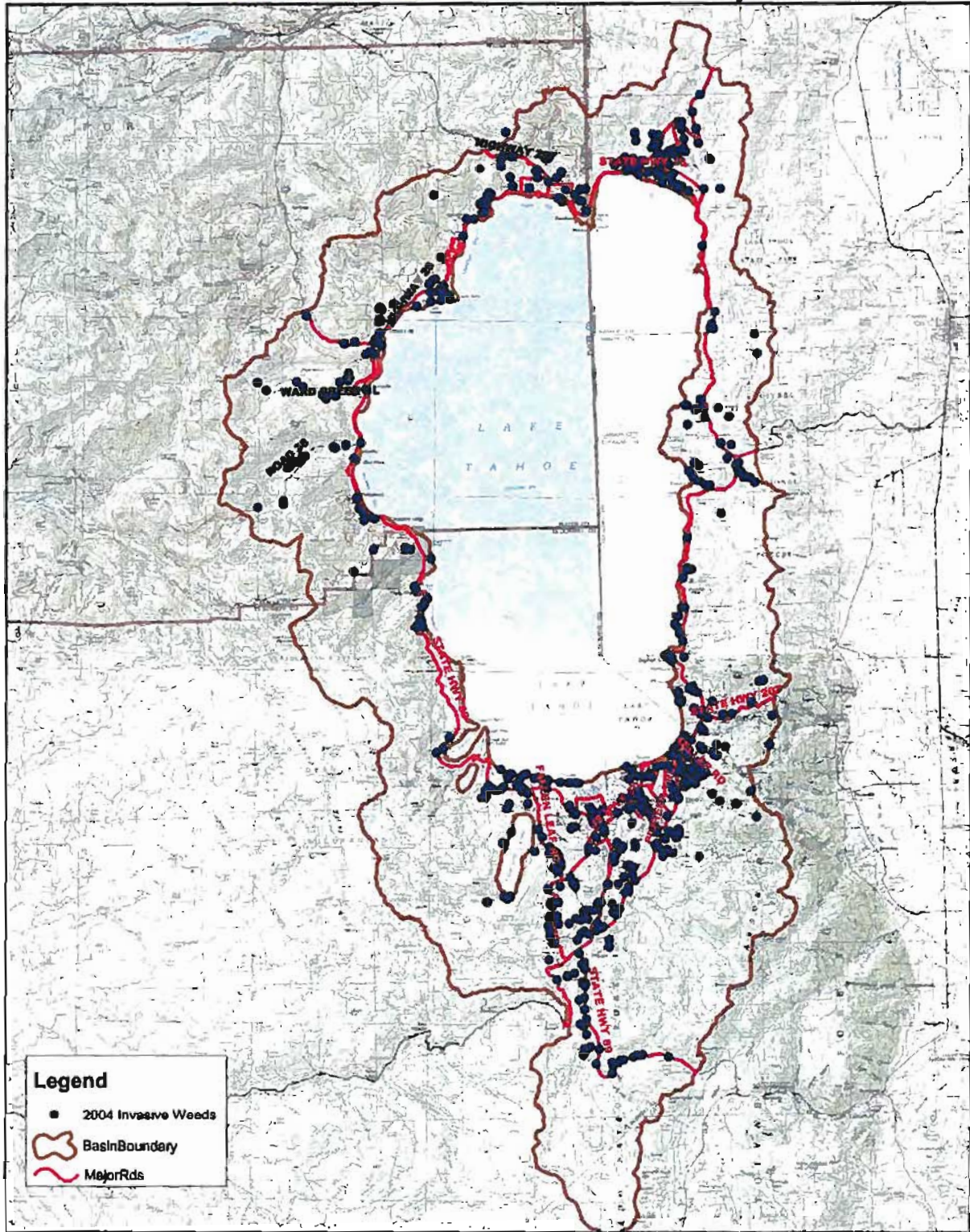
Lake Tahoe Basin 2003 Weed Inventory

Legend

- ◆ Russian Knapweed
- Diffuse Knapweed
- ◆ Spotted Knapweed
- Squarose Knapweed
- △ Perennial Pepperweed
- Musk Thistle
- Canada Thistle
- Bull Thistle
- Yellow Starthistle
- Broomleaf Toadflax
- ◆ Dalmatian Toadflax
- Yellow Toadflax
- Scotchbroom
- Puncture Vine
- Eurasian Water-Milfoil
- Klamath Weed
- Oxeye Daisy



2004 Tahoe Basin Invasive Weed Survey

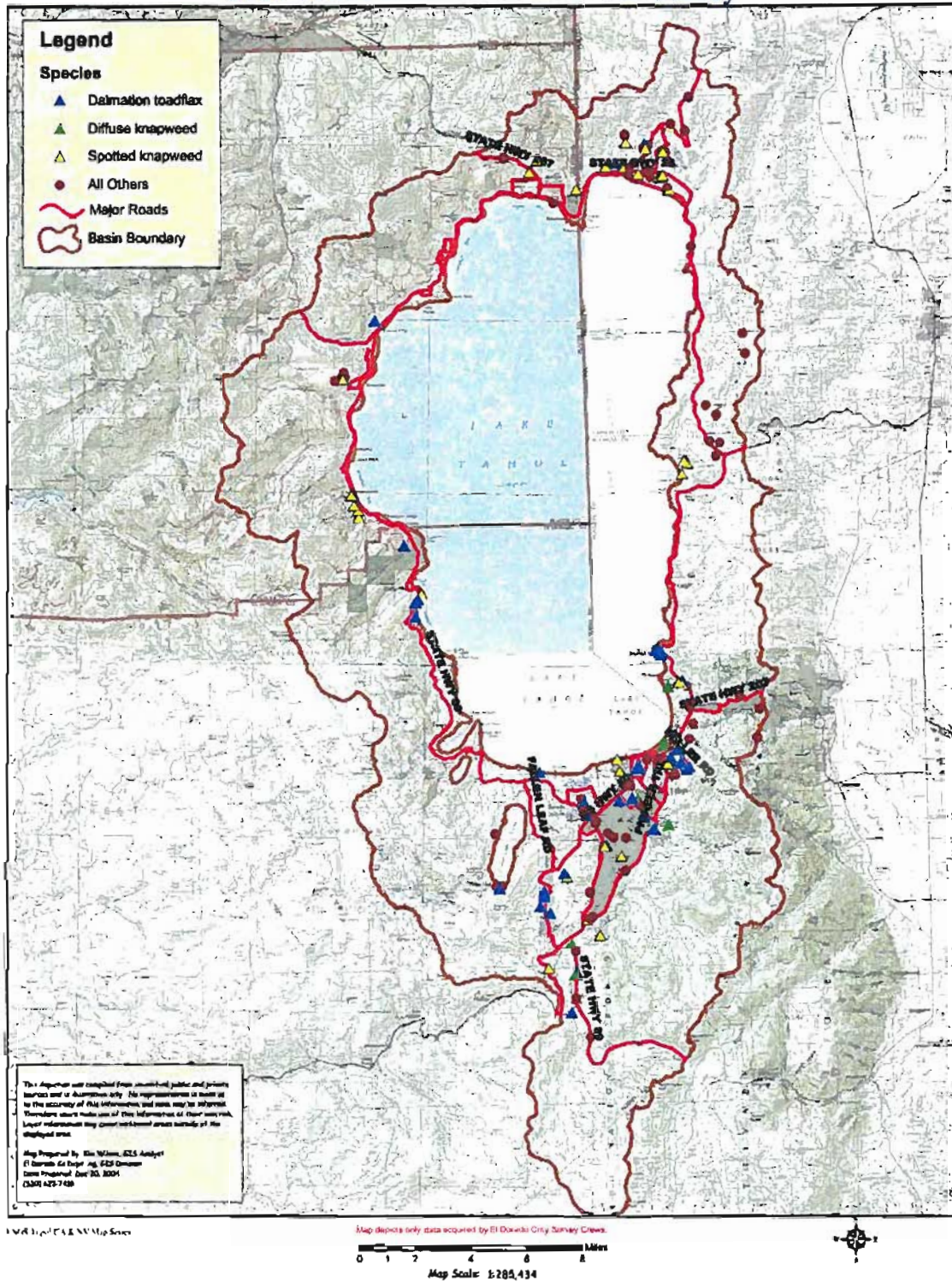


Map data provided by the U.S. Geological Survey, National Geographic, and other sources. All rights reserved.

0 1 2 4 6 8 Miles



2004 Tahoe Basin Invasive Weed Survey



Inventory shows locations of Dalmatian toadflax, spotted knapweed, and diffuse knapweed mapped in 2004. All infestations were treated by mechanical or chemical controls.

Benefit to Lake Tahoe

This project allows precise and effective management of invasive weed species in the Tahoe Basin, which is critically important to attainment of vegetation thresholds. By eliminating the target invasive weeds, we can protect and enhance vegetation communities. Healthy vegetation communities are essential to erosion control, water quality protection, scenic resources, and recreational usability.

References

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Appendix A

Annual Action Plans

Lake Tahoe Basin Weed Coordinating Group Action Plan for 2003

Mapping and Monitoring			
Where	When	Who's Responsible	Needs
Washoe County/Incline Village	Starting in May; through growing season	MJ Cross, Sue Donaldson, Washoe County Roads	Send data to WC Roads
Douglas County	Ongoing	Larry Hughes	
El Dorado County	Ongoing	El Dorado Agriculture Dept. personnel and seasonal	
Placer County	Ongoing	Placer Co. Agriculture Dept., Ellen Swensen	
USFS lands	Ongoing	USFS, including GS-7 and seasonal	
Conservancy properties	Starting in June	Tahoe Conservancy seasonal/personnel	Training for staff; brochures and maps
CA State Parks	Ongoing	CA State Parks/Scott	
Control			
Where	When	Who's Responsible	Needs
Washoe County/Incline Village	When appropriate	Pat Lang, WC Roads (public rights of way)	Need help with private landowners (Conservation District to provide education)
Douglas County	When appropriate	Larry Hughes	
El Dorado County	When appropriate	Ag Dept., CDFA, volunteers	Funding
Placer County	When appropriate	Focus on transportation routes (prevention); Ag Dept., CDFA, Ellen Swensen	Ellen needs training
USFS lands	When	USFS personnel	Mechanical only; Need NEPA so can use herbicides

	appropriate			
Conservancy profiles	When appropriate	Mechanical by Conservancy; herbicides by El Dorado Co./CDFA	Staff needs pesticide applicator training	
CA State Parks	When appropriate	CA State Parks personnel	Mechanical only; need CQWA documentation so can use herbicides	
Education				
What	Where	When		Who's Responsible
Weed ID Training	South Lake Tahoe for: <ul style="list-style-type: none"> • City of SLT, • TRPA field crews, • Parks, TRCD, • Tahoe Conservancy, • home gardeners 	June/July	Wendy, Kirk, Larry	
Weed ID Training Weed ID Training	Incline area for: <ul style="list-style-type: none"> • NV Tahoe Conservancy District • NDOT • IVGID • NV State Parks • Washoe Co. Roads and Parks 	July 3 May 28 & 29	Sue Sue	
Weed ID Training	Placer County for: <ul style="list-style-type: none"> • Landowners • Ski resorts 	June/July	Rene, Robin	

	<ul style="list-style-type: none"> GID Placer Co. Roads/DW P CA State Parks 			
Displays/Information Handouts	<ul style="list-style-type: none"> 4th Day North Lake Tahoe, 4th Day South Lake Tahoe, Park and Dig, SLT rest Stewardship Days, Sept. 20 (Judy) 	<ul style="list-style-type: none"> April 17 April 27 June 7 & 8 Sept 20 	Rene Judy Mike Plansky Judy	
Spotted Knapweed Brochure	Tahoe Basin	Target printing date mid-May	Sue	
List of Preferred Control Methods	One version for LTBWCG; another version for homeowners	May/June	Sue	
Media	Basin-wide	June/July/August	All	
Homeowner Association notification	Basin-wide	June/July/August	Ellen; call Lee Anna Russell, USFS, for database of email addresses at 530-573-2600	
Contractor's BMP workshop	King's Beach	March 19	Sue	
Invasive Ornamentals Campaign	Basin-wide	Ongoing	Ellen	
Invasive vs. native ID field guide	Basin-wide	Start development June 2003	Sue	
Speakers	Basin-wide	Ongoing	Sue, Ellen, Larry, MJ	

Lake Tahoe Basin Weed Coordinating Group Action Plan for 2004

Mapping and Monitoring			
Where	When	Who's Responsible	Needs
Washoe County/Incline Village	Starting in May; through growing season	MJ Cross, Sue Donaldson, Washoe County Roads, seasonals from PTI grant	Send data to WC Roads
Douglas County	Ongoing	Larry Hughes	
El Dorado County	Ongoing	El Dorado Agriculture Dept. personnel and seasonals	
Placer County	Ongoing	Placer Co. Agriculture Dept.	
USFS lands	Ongoing	USFS, including Beth and 2 seasonals	
Conservancy properties	Starting in June	Tahoe Conservancy seasonals/personnel	Kirk will provide mapping protocol to Judy
CA State Parks	Ongoing	CA State Parks/Scott	
Control			
Where	When	Who's Responsible	Needs
Washoe County/Incline Village	When appropriate	Pat Lang, WC Roads (public rights of way); grant-funded applicator as needed	Need help with private landowners (Conservation District to provide education)
Douglas County	When appropriate	Larry Hughes	
El Dorado County	When appropriate	Ag Dept., CDFA, volunteers	Funding
Placer County	When appropriate	Focus on transportation routes (prevention);	Will do whatever they can; limited staff etc.

USFS lands	When appropriate	Ag Dept., CDFA USFS personnel – waiting on NEPA; project initiation letter has been sent out within USFS (first step)	Mechanical only. Need NEPA so can use herbicides – hopefully will move forward this winter.
Conservancy properties	When appropriate	Manual removal (pulling and clipping, etc.) by Conservancy; herbicides by El Dorado Co./CDFA; training by Wendy and Kirk; need CEQA	Staff needs pesticide applicator training
CA State Parks	When appropriate	CA State Parks personnel	Mechanical only; need CEQA documentation so can use herbicides (underway); need pest control advisor
Revegetation			
Where	When	Who's Responsible	Needs
Glenbrook	When appropriate; after control applied	Larry	Already have seed mix
Behind Meeks Lumber	Seeded Oct. 2003	Sue	Need to monitor site for grasses and TWT sprouts
Education			
What	Where	When	Who's Responsible
Weed ID Training	South Lake Tahoe for: <ul style="list-style-type: none"> • City of SLT • TRPA • field crews • Parks 	Mid-June	Wendy, Kirk, Larry

	<ul style="list-style-type: none"> • TRCD • Tahoe Conservancy • Home gardeners • NV Tahoe Conservation District • IVGID • Placer Co. • CA State Parks • Ski resorts 			
Weed ID & Control Training (Weed Warriors)	Reno for NV State Parks, Lassen Co. Dept. Ag., Washoe Co., NDOT, Master Gardeners, etc.	June 15 & 16	Sue	
Thistle & Knapweed ID Training	Location TBD; everyone; will need flowering samples of all plants	Early to mid-August	Sue and Dawn Rafferty (possibly Lori Bellis)	
Displays/Information Handouts	4th Day North Lake Tahoe, 4th Day South Lake Tahoe,	April 17 - April 24	Judy Beth & MJ	
Spotted Knapweed Brochure	Tahoe Basin	Available now	Sue	
List of Preferred Control Methods	One version for LTBWCC; another	May/June	Sue & Kirk	

	version for homeowners; Kirk & Sue to add new species			
Media	Basin-wide	June/July/August	All	
Homeowner Association notification	Basin-wide	June/July/August	Group	
Forest Service Permit Holders	USFS	Brochures mailed in June; meetings in July	Lori	
Homeowners	Jamison Beach (Dalmatian loadflax)	On-going	Wendy	
Homeowners	Glenbrook (spotted knapweed)	August	Larry	
Invasive Ornaments Campaign	Basin-wide	Ongoing	Need funding for brochure	
Invasive vs. native ID field guide	Basin-wide	Start development June 2003	Sue	
Speakers	Basin-wide	Ongoing	Sue, Larry, MJ	

Appendix B

Weed Spread Prevention Fact Sheet



COOPERATIVE EXTENSION

Bringing the University to You

Fact Sheet FS-03-59

Measures to Prevent the Spread of Noxious and Invasive Weeds During Construction Activities

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Invasive weeds are plants that have been introduced into an environment outside of their native range, where they have few or no natural enemies to limit their spread. Invasive weeds affect us all—as homeowners, taxpayers, consumers, tourists, and land managers. Some invasive weeds are designated as noxious in Nevada state law, requiring control by the property owner or manager.

The spread of invasive and noxious weeds is a significant issue in construction projects that involve land disturbance. Earth moving activities contribute to the spread of weeds, as does the use of contaminated construction fill, seed, or erosion-control products. Permits for construction projects may now require that measures be incorporated to identify and manage these weeds.

Experience has demonstrated that prevention is the least expensive and most effective way to halt the spread of noxious and invasive weeds. Preventing the establishment or spread of weeds relies upon:

- Educating workers about the importance of managing weeds on an ongoing basis;
- Properly identifying weed species;
- Avoiding or treating existing weed populations; and
- Incorporating measures into projects that prevent weed seeds or other plant parts from establishing new or bigger populations such as certification of weed-free products.

A search was conducted of Internet sites and published permit requirements that incorporate weed prevention measures to determine appropriate practices to prevent weed spread during projects involving land disturbance. These measures may not be applicable or appropriate for all projects, but the list below should contain at least a few useful measures for any project. The weed management process should include education, weed identification, avoidance or treatment and reclamation of bare or disturbed areas. Following the list of management practices, we have provided sample suggested language for inclusion in contracts for projects that may be impacted by weed invasion.

Construction and Property Maintenance

1. Incorporate a strategy of integrated weed management into construction layout, design, and project alternatives evaluation.
2. Remove or treat seed sources and other viable reproducing plant parts that could be spread by construction disturbance or by passing vehicles or foot traffic.
3. Avoid moving weed-infested gravel, rock and other fill materials to relatively weed-free locations. Gravel and fill should come from weed-free sources. Inspect gravel pits and fill sources to identify weed-free sources.
4. Identify existing noxious weeds along access roads and control them before construction equipment moves into a relatively weed-free areas.
5. Clean off-road equipment (power or high-pressure cleaning) of all mud, dirt, and plant parts before moving into relatively weed-free areas.
6. Minimize the removal of roadside vegetation during construction, maintenance and other ground-disturbing activities.
7. Use only certified weed-free straw and mulch for erosion control projects. Consider the use of weed-free fiber roll barriers or sediment logs.
8. Minimize contact with roadside sources of weed seed that could be transported to other areas.
9. Keep active road construction sites that are in relatively weed-free areas closed to vehicles that are not involved with construction.
10. Road maintenance programs should include monitoring and treatment for noxious weeds.
11. Provide training to management and workers on the identification of noxious weeds, the importance of noxious weed control and measures to minimize their spread.
12. Quickly treat individual plants or small infestations before they become established, produce seed or are able to spread.

Seeding and Planting

1. Obtain soil components and mulches from weed-free sources.
2. Purchase and use only certified weed-free seed.
3. Reestablish vegetation on all bare ground (including areas denuded by fire) to minimize weed spread.
4. Ensure establishment and maintenance of vigorous, desirable vegetation to discourage weeds.
5. Minimize contact with sources of weed seed in areas not yet revegetated.
6. Monitor all seeded sites for weed infestation. Treat all weeds adjacent to newly seeded areas prior to planting and treat planted areas for weeds in the first growing season.
7. Mulch to minimize the amount of noxious weed seeds that will reach the soil surface and subsequently germinate.

Grazing and Livestock Management

1. Refrain from grazing or moving cattle through populations of noxious weeds while they are setting seed or when fruit is ripened.
2. Purchase only weed-free hay and other feed.
3. Keep cattle and other livestock out of newly planted areas.
4. Employ rotational grazing and other management strategies that minimize soil disturbance.
5. Purge animals with weed-free feed for five days before moving them from infested to non-infested areas

General

1. Identify and map noxious weed populations on lands that you own or manage. Provide mapping information using the protocol for your state's weed mapping efforts. Contact the Natural Resources Conservation Service, 775-784-5863 ext. 118, for Nevada's protocol.
2. Suppress fires that may impact native plant populations. Clean vehicles that may contribute to the spread of weeds during fire fighting activities.
3. Minimize soil disturbances caused by water, vehicle, and animal traffic in weed infested areas.
4. Minimize transport of weed seeds or reproductive weed parts by irrigation water.

Suggested Construction Contract Wording for Weed Prevention

Note: This section is provided as an example of language that can be included in construction contracts when appropriate to help prevent the spread of weeds. Nevada Revised Statutes Chapter 555 advises that the control of noxious weeds is the responsibility of every landowner or occupant. This suggested contract wording can be modified as needed to fit individual projects.

Prior to any construction disturbance you will:

- Identify and map all noxious and invasive weed populations present in the project area
- Treat or contain any weed populations that may be impacted or disturbed by construction activity
- Flag all weed populations to be avoided
- Provide training to construction workers and equipment operators on the identification of weeds to be avoided
- Certify that all construction material sources used for supplies of sand, gravel, rock and mulch are weed-free prior to obtaining or transporting any material from them
- Obtain and use only certified weed-free straw or use fiber roll logs for sediment containment
- Wash and inspect all vehicles for weed seeds and plant parts prior to bringing them onto the job site

- Install stormwater Best Management Practices to prevent erosion of the job site and the potential transport of weedy material onto or off of the job site

During construction you will:

- Minimize ground disturbance and vegetation removal as much as possible and practical
- Wash, or using an air compressor, blow clean all vehicles (including tires and undercarriage) that may have entered weed-infested areas prior to entering uninfested areas of the job site
- Restrict vehicles or other traffic that may transport weed seeds or plant material from entering the job site unless they are first washed and inspected

After construction is complete you or the property owner will:

- Revegetate or otherwise prevent the establishment of weeds in all areas of the job site through a program of monitoring and post-construction weed treatment for the life of the project
- Revegetate using soil components and mulches obtained from non-weed infested sources
- Utilize seed and other plant materials that has been checked and certified as noxious weed-free and that has a weed content of 0.05 percent or less
- Revegetate using plant materials that have a high likelihood of survival
- Maintain all planted material and native vegetation located on the project site for the life of the project

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