

# TECHNICAL SPECIALIST'S REPORT BURNED AREA EMERGENCY REHABILITATION

## Botany and Noxious Weeds

Angora Fire, June 24, 2007

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### I. Resource Condition Assessment

INTRODUCTION: This report describes the condition of botanical resources and the degree of threat from noxious weeds in the Angora Fire area for the purpose of preparing the 2500-8 Report.

#### A. Initial Concerns

- 1. Capacity of the vegetation to recover:** High intensity burns can destroy the seed bank and capability of plants to reproduce vegetatively, diminishing the capacity for native vegetation to provide rapid cover of the soil and will lead to soil erosion.
- 2. Sensitive plants:** There are no known Threatened or Endangered plants or species proposed for listing in or adjacent to the Angora Fire area. Two Forest Service sensitive non-vascular plant species occur in the area affected by the Angora Fire. These species, the three-ranked hump-moss (*Meesia triquetra* (L.) Aonstra.) and the broad-nerved hump-moss (*Meesia uliginosa* Hedwig), occur in a fen within the burn area. A Forest Service special interest moss species, *Sphagnum* sp., occurs upstream from the vicinity of the burn area and was not affected.
- 3. Noxious weeds:** Burned areas provide opportunities for invasive plants to establish quickly because of disturbed soil, release of nutrients, and lack of competition. Noxious weeds could have been introduced to the area during fire suppression activities as there were no wash stations for vehicles and equipment arriving to the fire. Additionally, there are existing noxious weed populations within the fire perimeter in the urban intermix and at areas used as drop points and safety zones. Thus, there is a potential for spread from existing noxious weed populations within the burned areas.

#### B. Findings of the on-the-ground survey

- 1. Capacity of the vegetation to recover:** Areas of low to moderate burn will most likely have a seed bank and/or perennial species that will reproduce vegetatively. However, the potential for soil erosion in these areas may diminish the seed bank. Refer to other specialist reports regarding erosion potential in these areas.

Visual observations of several low to moderate burn intensity areas adjacent to seasonal or ephemeral creeks during the week following the fire confirmed vigorous growth. New growth from deep taproots and rhizomes was observed while walking along the unmaintained trail from Nez Perce Drive to Seneca Pond along the ephemeral creek. Perennial plants such as cow parsnip (*Heracleum lanatum*), sedge (*Carex* sp.) and bracken fern (*Pteridium aquilinum* var. *pubescens*) were already several inches in stature one week after the fire. These plants are rapid colonizers and will stabilize soil along creek banks this season. During a visual survey ¼ mile upstream of Angora Creek from Lake Tahoe Blvd., regeneration of the above mentioned species as well as cinquefoil (*Potentilla* sp.) and dandelion (*Taraxicum officinale*) were observed.

A small degree of new growth was also observed in areas beyond the riparian corridors, although it was limited.

Conifers in areas of severe burn on steep slopes were observed along Angora Ridge Road. These trees are not expected to recover and are discussed in a report prepared by the Adjunct Forester.

????Within the urban intermix, only 4 out of the 131 affected urban lots experienced high soil burn severity. If only 4 experienced High, then most should not have diminished recovery, just opposite of next statement. Vegetative recovery is therefore diminished on these lots. The rest of the lots experienced low to moderate soil burn severity and ground conditions are expected to recover to 50% of pre-fire conditions within 2-5 years or 5-10 years, with a handful recovering within 2 years and a handful taking longer than 10 years for recovery. The urban lots also experienced a high degree of tree mortality, further impacting capacity for vegetative recovery. Reforestation opportunities are also discussed in the report prepared by the Adjunct Forester.

**2. Sensitive Plants:** The fen located near the intersection of Lake Tahoe Blvd. and View Circle contains a known population of two Forest Service sensitive mosses: *Meesia triquetra* and *M. uliginosa*. Both species were located and identified during BAER assessment.

The fire did not burn the fen and the fen vegetation was almost unaffected by the fire. Sedge and rush (*Juncus* sp.) mats and the upper edges of blueberry (*Vaccinium* sp.) surrounding the fen experienced slight damage from the fire. Fire did severely burn the lodgepole pines (*Pinus contorta*) within 50' of the fen. It is unlikely that the direct effects of the fire affected the hump-mosses (*Meesia* spp.) (add common name if possible??).

Angora Fire Resource Advisor and BAER Botanist Trainee Nadia Aslami observed the application of the foam fire retardant Phos-Chek WD881 during suppression on a small area of the fen and in the immediate vicinity of the fen.

She informed the engine captain to cease using foam in this area if possible and he agreed, although use had already occurred for three days.

Changes in hydrology or species composition, or the addition of a nitrogen-rich substance such as the fire retardant foam could impact these species. However, major changes in the hydrology of the fen are not expected (see Hydrologist Specialist Report) and it is not believed that the foam was applied close enough to severely impact the species of concern.

Another moss species, *Sphagnum* sp. has been recorded in the vicinity of the area affected by the fire. A survey was conducted and although the actual location of the species was not found, the general area and nearby creek were not close enough to the burn to be affected by the fire. Additionally, discussions with the BAER hydrologists indicated there was no serious threat of increased sediment loads to the nearby creek.

**3. Invasive Species and Noxious Weeds:** Weeds spread after fire due to the increased light and nutrients in the ash, reduction of competition, and increased disturbance associated with suppression activities, such as dozer line construction. Additionally, many common noxious weeds can establish within the elevation range of this fire (~6200'-7400'), including the existing known noxious weeds within the fire perimeter. The California Tahoe Conservancy is responsible for noxious weed monitoring and abatement on state lands and the University of Nevada-Reno Cooperative Extension is responsible for private lands.

All drop points and safety zones were inspected for noxious weeds, but none were found. Also, all existing noxious weed populations within or near the fire perimeter were surveyed. Five known populations of bull thistle (*Cirsium vulgare*) and five known populations of dalmatian toadflax (*Linaria dalmatica*) on ten Forest Service urban lots, as well as one known population of bull thistle and one known population of perennial pepperweed, also known as tall whitetop, (*Lepidium latifolium*) on general forest are of concern. The California Invasive Plant Council and Lake Tahoe Basin Weed Management Group have designated these weeds as Group 2 Priority Noxious Weeds for the Lake Tahoe Basin and require management of infestations with the goal of eradication.

Prior to the Angora fire, the urban lot noxious weed populations were declining due to abatement efforts within the urban lot management program (**see Appendix A**). During the BAER assessment no individual plants were found at these sites, primarily because these areas were treated in June 2007 prior to the Angora fire. These areas then experienced moderate burn severity during the fire. Impacts from the fire and potential disturbance from future reconstruction activities on adjacent private property may lead to an increase in these noxious weed populations. Bull thistle reproduces by wind-dispersed seeds and manual control is possible if individual plants are removed before flowering occurs. Dalmatian toadflax is more difficult to control as it reproduces both by seed and

vegetatively. Experience in the basin shows that hand-clipping at the base of this plant without disturbing the roots can be successful in reducing the spread of this weed. Oxeye daisy (*Leucanthemum vulgare*), another Group 2 weed, was identified on private property and street right-of-ways adjacent to burned urban lots, creating a threat of invasion.

The known bull thistle population on the general forest is located at the unburned area used as Drop Point 1 at the intersection of Tahoe Mountain Rd. and the Forest Service system road, Angora Ridge Rd. No individuals were found during the assessment. This population only consisted of 1 individual in 2006, although increased traffic and activity in this area may lead to an increase and spread of the infestation.

The perennial pepperweed population on general forest is of greatest concern as it was bulldozed to create a safety zone. Perennial pepperweed establishes by seed and root fragments. Any mechanical disturbance such as digging, tilling, or bulldozing breaks up and disperses root fragments, creating new plants (Johnson and Wilson 2003). The bulldozer used to create the safety zone was not washed before moving to other sites and therefore may have transported seeds and root fragments. Additionally, while individuals were not found during the BAER assessment, the infestation consisted of approximately 230 plants in 2006, making the potential for spread of the population high. However, an engine captain working in this division stated that there was little to no driving on the safety zone after its creation. Additionally, the dozers used to rehab the site were washed prior to moving to other sites. Nevertheless, use of herbicides is the primary effective means for perennial pepperweed eradication (Johnson and Wilson 2003). Given that there is no NEPA in place to use herbicides for noxious weed abatement in the Lake Tahoe Basin, control of this population will be difficult. Hand-clipping at the base of individual plants will prevent seed spread, but will not eradicate the population. Prickly lettuce (*Lactuca serriola*), a non-native species was also noted at this site. Prickly lettuce is not on the USDA's list of noxious weeds for the United States. The California Invasive Plant Council lists this plant as having a moderate level of invasiveness.

In addition to the spread of existing populations, a major threat is the introduction of more weeds into the fire area on equipment. There were no washing stations for vehicles and equipment arriving to the Angora fire, although a washing station was set up on the fourth night of the fire. All resources leaving LTBMU were washed. According to information from the LTBMU's website, there were maximums of 186 engines, 54 crews, 21 helicopters, 15 water tenders, and 4 dozers working on the Angora Fire, as well as various other trucks and support vehicles. Additionally, within the urban intermix there has been various equipment associated with utility repair, tree removal, and private property clean up.

There are at least 5.5 miles of bulldozer line, 9.2 miles of FS system roads, 7.6 miles of FS decommissioned roads, and 1.1 miles of additional roads that were used on Forest Service land during the Angora fire, for a total of 23.4 miles. There are nine drop points and three safety zones on or adjacent to Forest Service land. The one staging area was at the South Lake Tahoe High School and is a concern due to its proximity to burned areas within FS lands. All of these areas are vulnerable to introduction of noxious weeds from fire suppression vehicles and equipment. The helispot was at the South Lake Tahoe airport and is not a concern.

It was also brought to our attention that helicopters or other aircraft may have dipped into or near the Tahoe Keys area during fire suppression activities and subsequently dipped into Fallen Leaf Lake and/or Angora Lakes the same day. This is a concern because Eurasian watermilfoil (*Myriophyllum spicatum*), a Group 2 Priority Noxious Weed for the Lake Tahoe Basin, is found in the Tahoe Keys and is not yet present in Fallen Leaf or Angora Lakes. At the time of this writing we were still waiting for confirmation from Air Operations where exactly the helicopters dipped. Once these locations are known, it may be necessary to determine whether this aquatic weed exists in these locations. Additional money may therefore need to be requested for detection surveys in the lakes of concern. It should also be noted that the buckets were washed with a bleach/water mix daily.

## **II. Emergency Determination**

Noxious weeds present threats to ecosystem structure and function, plant communities and biodiversity, water quality, and post-fire vegetation recovery. An emergency exists with respect to the spread of noxious weeds from existing populations throughout the fire lines and burned area. The urban intermix is especially at risk due to the generally higher levels of disturbance and expected increased disturbance levels associated with reconstruction of infrastructure and private property.

Additionally, an emergency exists for risk of noxious weed introduction. Washing stations were not available for vehicles and equipment arriving at this fire, although they were made available to resources leaving this fire by the fourth night. Currently the Lake Tahoe Basin only has 20 different species of noxious weeds. The state of California lists 242 noxious and invasive species, while the state of Nevada lists 52 species. Resources came from all over Region 5 and Nevada from locations where noxious weeds exist that are not yet present in the Lake Tahoe Basin.

There is no emergency with respect to vegetative recovery, although long-term restoration issues should be addressed by LTBMU. There is no emergency with respect to Threatened, Endangered, or Forest sensitive species, although care should be taken in the Angora Creek fen site during any future activities.

### III. Treatments to mitigate the emergency

- A. Treatment Type:** Treat existing noxious weed populations on 10 urban lots and at 2 sites in the general forest within or near the Angora fire perimeter (total of 19.5 acres).
- B. Treatment Objective:** Ensure populations do not increase exponentially and threaten uninfested areas within the burn, especially in the highly disturbed urban areas.
- C. Treatment Description:** Monitor the known bull thistle, dalmatian toadflax, and perennial pepperweed weed sites on urban lots and in the general forest twice per year for three years. The first visit should occur in mid-June and the second visit should occur in late-August or early-September. Hand-pull bull thistle, removing as much of the root as possible. Hand-clip dalmatian toadflax and perennial pepperweed at the base without disturbing the roots. These efforts will not eradicate the perennial pepperweed infestation, but merely prevent spread into the burned area. Place plants in plastic bag, taking care not to spread any seeds, and dispose of properly. Record population information in the “Invasive Weed Field Form” and give to appropriate weed coordinator (i.e urban lot or general forest coordinator).
- D. Treatment Cost:** The infrastructure of LTBMU’s current noxious weed detection and abatement program includes using a 10-person Nevada Conservation Corps (NCC) restoration crew with a Forest Service representative (GS-5 hydro tech) for large populations on urban lots, a 4-person NCC crew for smaller populations on urban lots, and a 2-person Forest Service botany crew (GS-5 biotechs) in the general forest. The following calculations are based on the infrastructure of this aggressive noxious weed abatement program, as well as the expectation that existing populations will be significantly worse after the Angora fire (refer to Appendix A for original population sizes). Additionally, due to the close proximity of all urban lot infestations, it will be more efficient to use the 10-person NCC crew for all sites, regardless of size. It will also be more efficient to use the 10-person NCC crew on the perennial pepperweed site located at the area used as a safety zone during the Angora fire.

Fiscal Year 2007 (there will likely be time for just one visit at the end of the summer)

Resources	Cost Breakdown	Total
GS-5 Hydro Tech	\$150/day x 8 days	\$1200
Vehicle, mileage	\$5.00/day x 8 days	\$40
10-person NCC crew (includes vehicle and equipment costs)	\$1600/day x 8 days	\$12800
Total		\$14040*

## Fiscal Year 2008

<b>Resources</b>	<b>Cost Breakdown</b>	<b>Total</b>
GS-5 Hydro Tech	\$150/day x 8 days x 2 visits/year	\$2400
Vehicle, mileage	\$5.00/day x 8 days x 2 visits/year	\$80
10-person NCC crew (includes vehicle and equipment costs)	\$1600/day x 8 days x 2 visits/year	\$25600
Total		\$28080*

\*These costs reflect the cost of detection surveys on urban lots because lots proposed for surveys are adjacent to existing populations and can be surveyed at the same time existing populations are treated.

Costs may be less if existing populations do not increase greatly. Similar or reduced costs are expected for Fiscal Years 2009 and 2010.

- A. Treatment Type:** **Detection surveys** in areas of soil disturbance by equipment, heavy traffic from outside resources, and vulnerable locations within the urban areas.
- B. Treatment Objective:** Ensure noxious weeds have not been introduced into the burned area from outside sources or existing populations.
- C. Treatment Description:** This objective would be accomplished by surveying the approximate 24 miles of dozer lines and travel routes through FS lands used during fire suppression (i.e. FS system roads, decommissioned roads, etc.), the 2 uninfested safety zones, 9 drop points, and the staging area at the high school twice per year for three years. The first visit should occur in mid-June and the second visit should occur in late-August or early-September to ensure detection of species with different life cycles and blooming periods. Surveyors should look for all California State Noxious Weeds ([www.cdfa.ca.gov/weedhome](http://www.cdfa.ca.gov/weedhome)) and all Priority Weeds for the Lake Tahoe Basin (<http://www.fs.fed.us/r5/lbmu/about/urban-lots/nxsweeds.shtml>). A 2-person crew of GS-5 biotechs should survey dozer lines, decommissioned roads, drop points, and the staging area on foot. This crew can also survey FS system roads from the vehicle with the passenger doing the inspection. Locations of new infestations should be recorded using GPS and an "Invasive Plant Field Form" should be filled out and given to the appropriate weed coordinator. This crew should properly treat and dispose of new populations if they are small enough. If populations will require a more significant investment of resources and time, the Forest Botanist should be consulted to plan appropriate control actions.

Additionally, the 10-person NCC restoration crew should monitor urban lots adjacent to or near urban lots with existing noxious weed populations. Hand-pulling or clipping should occur when weeds are found. Coordination with the California Tahoe Conservancy and the University of Nevada-Reno Cooperative

Extension is needed to ensure state and private lands are protected from noxious weed infestations.

**D. Treatment Cost:**

Fiscal Year 2007(there will likely be time for just one visit at the end of the summer)

Resources	Cost Breakdown	Total
2-person botany crew (2 GS-5 personnel)	\$150/day x 2 people x 5 days	\$1500
GS-9 LTBMU Noxious weed coordinator	\$250/day x 1 day	\$250
Vehicle, mileage	\$5.00/day x 5 days	\$25
Total		\$1775

Fiscal Year 2008

Resources	Cost Breakdown	Total
2-person botany crew (2 GS-5 personnel)	\$150/day x 2 people x 5 days x 2 visits/year	\$3000
GS-9 LTBMU Noxious weed coordinator	\$250/day x 2 days	\$500
Vehicle, mileage	\$5.00/day x 5 days x 2 visits/year	\$50
Total		\$3550

\*The costs of detection surveys on urban lots are included in the first treatment type listed (**Treat existing noxious weed populations**), because lots proposed for surveys are adjacent to existing populations and can be surveyed at the same time existing populations are treated.

**A. Treatment Type:** **Seed** with native grasses (or LTBMU mixed???) the 10 urban lots that have existing noxious weed populations in order to restore soil cover for erosion control, and suppress and prevent the expansion of noxious weeds (total of 17.3 acres).

**B. Treatment Objective:** The urban lots are especially vulnerable to disturbance in the face of extensive reconstruction on private property. These lots also experienced moderate burn severity and are not expected to reestablish ground cover to 50% pre-fire density for another 2-5 years. In managing dalmatian toadflax, it has been recommended to seed the infested area to prevent re-establishment of the weed (Profiles of CO State-Listed Noxious Weeds). It is possible to conjecture that this technique would be useful in the case of bull thistle as well and perennial pepperweed. Therefore, this treatment is recommended in order to establish native vegetation on urban lots within the first year after the fire to introduce competitive forces that may prevent or reduce the degree of noxious weed re-establishment.

**C. Treatment Description:** For urban lots with existing noxious weed populations seed with LTBMU's native seed mix. Cover with mulch or chip. If populations are detected on new urban lots, seed and mulch as well if possible.

**D. Treatment Cost:**

Fiscal Year 2007

Resources	Cost Breakdown	Total
GS-5 Hydro Tech	\$150/day x 2.5 days	\$375
Vehicle, mileage	\$5.00/day x 2.5 days	\$12.50
10-person NCC crew	\$1600/day x 2.5 days	\$4000
Native seed mix	\$200/acre x 20 acres	\$4000
Total		\$8387.50

**Summary of treatments and costs:**

Treatment	Cost FY07	Cost FY08
Treat existing noxious weed populations	\$14040*	\$28080*
Detection surveys	\$1775	\$3550
Seeding existing urban lot populations	\$8387.50	
Total	\$24202.50	\$31630

\*includes cost of detection surveys on urban lots

**IV. Discussion/Summary/Recommendations**

High priority and lower priority areas for detection surveys were identified. However, lower priority areas are en route to higher priority areas, so we feel that all areas should be surveyed.

One alternative to the proposed treatments includes using resources other than the Nevada Conservation Corps. However, it is important to note that stewardship agreements are already in place to monitor and abate noxious weeds on urban lots with the Nevada Conservation Corps/Great Basin Institute. Additionally, these partners are already familiar with the noxious weed species and populations and the urban lot sites. It is also important to maintain the partnerships LTBMU has already established.

Another alternative would include not seeding urban lots with existing weed populations. However, given that each bull thistle can produce from 5,000 to 50,000 seeds annually (Johnson and Strom 2006) and dalmatian toadflax can produce up to 500,000 seeds annually that can remain viable for up to ten years (Kadrmaz and Johnson 2002), it is important to establish competitive native vegetation to suppress noxious weeds as soon as possible.

Based on the exponential reproductive capacity of bull thistle and dalmatian toadflax, and the fact that root fragments of perennial pepperweed can live for two years in the

soil without photosynthesizing (DiTomaso, pers. comm.. 2007), it is important to ensure detection surveys continue for at least three years.

Finally, this aggressive approach is necessary for preventing the introduction and spread of noxious weeds. It has already proven to be effective within the Urban Lot Management Program and general forest and, if properly conducted, could reduce potential future costs associated with noxious weed abatement if existing populations are allowed to grow and spread or new weeds are introduced to the Lake Tahoe Basin.

## References:

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- Profiles of Colorado state-listed noxious weeds: Dalmatian toadflax (*Linaria dalmatica*). 2006. University of Nevada-Reno Cooperative Extension "Weed Warrior" training compilation, June 1-2, 2006.
- Willits, Margaret. 2001. BAER Technical specialist's report: Botany and noxious weeds, Darby Fire, September 25, 2001.

## Personal communications:

DiTomaso, Joe. July 5, 2007. University of California-Davis, Weed Specialist.

## Appendices:

- Appendix A – Data for existing noxious weed populations
- Map – Fire suppression routes/areas for detection surveys
- Map – Noxious weeds and sensitive plants