El Dorado Hydroelectric Project (FERC No. 184) A Plan for Prevention and Control of Noxious Weeds

El Dorado Irrigation District

April 2012

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INTRODUCTION

Noxious weeds are rapidly becoming one of the most pressing issues for land managers. In the vast majority of cases, the labor and cost requirements to control all the species of weeds that occur in an area are prohibitive. Thus, land managers are forced to be selective in weed species abatement.

There are two fundamental characteristics of weedy species that help explain why and where weeds become established:

- Weeds specialize in colonizing highly disturbed ground. Weeds possess a number of physical traits that allow them to arrive at disturbed sites sooner and grow faster than other plants. With these advantages they are able to out compete native species, at least initially.

- Weeds tend to invade plant communities that have been degraded by poor land management. Healthy native plant communities resist invasion. Dense, vigorous stands of perennial grasses are especially resistant to weed invasion. However, certain highly aggressive noxious weeds can invade well-managed lands that have dense, vigorous vegetation.

In recognition of the economic and ecological impacts of weeds, the U.S. Congress passed the Federal Noxious Weed Act of 1974. The Act directs the Secretary of Agriculture to develop and coordinate a management program for control of undesirable plants which are noxious, harmful, injurious, poisonous, or toxic on federal land under the Agency's jurisdiction.

The plan presented herein complies with direction contained within the U.S. Forest Service Manual (the Manual) section 2080, Noxious Weed Management (effective since November 29, 1995). Specifically, the Manual (USDA Forest Service 1995) states:

2081.03 - Policy. When any ground disturbing action or activity is proposed, determine the risk of introducing or spreading noxious weeds associated with the proposed action.

1. For projects having moderate to high risk of introducing or spreading noxious weeds, the project decision document must identify noxious weed control measures that must be

undertaken during project implementation.

2. Use contract and permit clauses to prevent the introduction or spread of noxious weeds by contractors and permittees. For example, where determined to be appropriate, use clauses requiring contractors or permittees to clean their equipment prior to entering National Forest System lands.

2081.2 - Prevention and Control Measures. Determine the factors that favor the establishment and spread of noxious weeds and design management practices or prescriptions to reduce the risk of infestation or spread of noxious weeds. Where funds and other resources do not permit undertaking all desired measures, address and schedule noxious weed prevention and control in the following order:

- First Priority: Prevent the introduction of new invaders
- Second Priority: Conduct early treatment of new infestations
- Third Priority: Contain and control established infestations

Furthermore, the Sierra Nevada Forest Plan Amendment Record of Decision (ROD) (USDA Forest Service 2001) indicates that noxious weed risk assessments will be a standard component of project planning for ground-disturbing or site-altering activities. The ROD also includes Noxious Weed Management as part of the Forest-wide Standards and Guidelines (ROD Appendix A, pp. A30-31). The Sierra Nevada Forest Plan Amendment (USDA Forest Service 2001) states:

> "When populations of invasive non-native plants dominate wildland sites, our ability to manage for healthy ecosystems is compromised or eliminated. The damage is essentially permanent when the cost of restoring the ecosystem to a healthy state is beyond our funding capacity as an agency and a society. Weed infestations have already caused permanent damage to public and private wildlands on millions of acres across the western United States.
>
> The Forest Service is the single largest public land management agency in the Sierra Nevada. The agency's policies and practices for preventing, controlling, and suppressing weeds affect surrounding communities, landowners, and other land management agencies. Forest Service efforts to conserve biological diversity and ecosystem productivity benefit from actions taken by county departments of agriculture, other Federal and State agencies, non-governmental organizations, and private individuals to control invasive weed populations."

Forest Service License Condition No. 44 (USFS 2003 and Project 184 Settlement Agreement Condition No. 14 (EID 2003) of the new license for the El Dorado Hydroelectric Project (FERC Project No. 184) requires the Licensee, El Dorado Irrigation District (EID), to provide a plan approved by the Eldorado National Forest (ENF) for the prevention and control of noxious weeds on National Forest System lands and Licensee's adjoining fee title property. The new license is for the continued operation and maintenance of the existing facilities only. No new construction or ground disturbing activities are proposed. Existing facilities include four storage reservoirs (Lake Aloha, Echo Lake, Silver Lake, and Caples Lake), the Echo Lake Conduit, the El Dorado Diversion Dam, the El Dorado Canal (including flumes, tunnels, and pipelines), the Alder Creek Diversion Dam and Feeder, the El Dorado Forebay, the El Dorado Pipeline and Penstock, and the El Dorado Powerhouse.

It is impossible for the vast majority of landowners and land managers to control every weed, noxious or otherwise, that occurs on their property or management area. Therefore, control efforts should be focused on those weed species which have the greatest impact on the resource base, and those which become more difficult to control if action is delayed. Both the California Department of Food and Agriculture (CDFA) and the California Invasive Plant Council (Cal-IPC) have developed lists of noxious weed species. According to the CDFA, if a plant is found to probably be "troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate", the Department will designate the plant as a noxious weed. The CDFA areas of concern are rangelands and agricultural weeds. The Cal-IPC defines 'noxious weeds' as, "aggressive pest plants that displace native plants and natural habitats." The Cal-IPC list highlights non-native plants that are serious problems in wildlands. Their list is based on information submitted by Cal-IPC members, land managers, botanists, and on published sources. In addition, the ENF maintains a list of noxious weed species of concern in their area. These lists were consulted in order to develop a priority list of species to target in this plan (Appendix A).

Weed control is an important aspect of land management. This plan has been formulated to encourage desired plant species and communities, rather than on simply eliminating weeds. Preventive programs are implemented to keep the management area free of species that are not yet established but which are

known to be pests elsewhere in the area. Priorities are set to reduce or eradicate weeds that are already established on the property, according to their actual and potential impacts on the natural resources of the property, and according to the ability to control them now versus later.

This document sets forth EID's plan relating to the prevention and control of noxious weeds on National Forest System Lands and Licensee's adjoining fee title property. The plan for control of noxious weeds involves four principal elements: 1. preventive measures; 2. surveying and documentation; 3. control of existing infestations; and 4. long-term monitoring. These elements are discussed in detail in the sections that follow.

PREVENTIVE MEASURES

Prevention, early detection, and eradication of newly introduced invasive weed species is the most effective and economical means of weed management. Prevention is best accomplished by ensuring that weed seed or vegetative reproductive parts are not introduced into an area. Common methods of weed introduction include:

- The use of gravel, roadfill, or top soil contaminated with noxious weed seed or vegetative reproductive parts;
- The use of contaminated seed, straw, or mulch;
- Movement of unclean equipment or machinery from a weed contaminated area;
- The introduction of animals (domestic and wildlife) that may have viable weed seed present in their digestive tract or attached to their hair or wool;

Certainly the best way to control weeds is to prevent them from taking root or becoming established in the first place. Early detection requires identifying and documenting newly introduced weed species into an area. Eradication requires employing appropriate management methods to totally remove infestations, including the reproductive potential of a weed species in an area.

Some general guidelines for preventing weeds from entering Forest Service lands and how to prevent them from spreading to new uninfested areas are listed below. These general guidelines are followed by an analysis of EID operations and maintenance activities that have the potential to introduce or spread noxious weeds. Specific measures regarding noxious weed prevention during these operations and maintenance activities are discussed.

GENERAL WEED PREVENTION BEST MANAGEMENT PRACTICES

Detect Weeds Early

- Annually inspect ditch and stream banks for noxious weeds whose seeds could be transported by running water and provide an inspection report to the USFS.

- Annually inspect high traffic areas and other heavily used sites for weed infestations and provide an inspection report to the USFS.
- Monitor for noxious weeds for up to 2 years when gravel or fill material is brought in from elsewhere; weed seeds in this material can start new infestations, and bare soil provides an ideal environment for weed establishment.

Limit Dispersal

- Avoid transporting weed seeds which are attached to clothing, gear, and pets. Place the seeds in a plastic bag or similar container and dispose of properly.
- Avoid driving in noxious weed infested areas. Inspect vehicles for weed seeds stuck in tire treads or mud on the vehicle and prevent them from being carried to unaffected areas. Don't clean infested vehicles in weed free areas.
- Inspect maintenance or heavy equipment for weed seeds before it enters the property. Require that such equipment be cleaned first to remove weed seeds before being allowed entry. Clean equipment which has been used in weed infested areas before moving it to another area.
- Always use hay, straw, or mulch that has been certified weed free.

Minimize Disturbances

- Restrict travel to established roads and trails whenever possible.
- Don't drive through sensitive areas.
- Avoid leaving piles of exposed soil in construction areas. Cover with plastic, and revegetate with native species as soon as possible.
- If disturbance cannot be avoided, re-seed or re-plant disturbed areas using native species as soon as possible after the disturbance has ceased (see Appendix B: ENF Seed, Mulch and Fertilizer Prescription).

Establish and Maintain Native Plant Communities

- Re-seed drastically disturbed areas as soon as possible after disturbance ends. Perennial native grasses are especially valuable for re-seeding.
- Limit use of fertilizers when reseeding. Their use may favor weeds over native perennial species.

OPERATION, MAINTENANCE, AND CONSTRUCTION ACTIVITIES

Some routine operation, maintenance and construction activities have potential to affect the introduction or spread of noxious weeds from one location to another. Table 2.1 identifies those routine activities associated with the project, along with a risk factor rating for each activity. The risk factor is a subjective appraisal of an activity's potential to bring about an adverse effect on weed species populations in the project area through introduction or spread of plant propagules or creation of conditions favorable for the establishment of noxious weeds. The results of detailed field surveys (see Section 3) may serve to further refine the risk factor ratings presented in Table 2.1.

As seen in Table 2.1, activities with the greatest risk for promoting the spread of noxious weeds are believed to be those associated with vegetation management around facilities and structures, the maintenance of project roads, and earth-moving activities associated with new construction. Preventive measures applicable to operations, maintenance, and construction activities are discussed below.

All Operations, Maintenance, and Construction Activities

The following preventive measures are applicable to all operations, maintenance, and construction activities.

Limit Seed Source: Seed sources that could be picked up by passing vehicles should be removed. This will limit seed transport into weed-free areas. Before operations, maintenance, or construction equipment moves into a weed-free area, mow, grade, or otherwise treat all seed-bearing noxious weed plants on the travel way of existing access roads. Treated sites must be reseeded as described below. Keep active construction sites which are in weed-free areas closed to vehicles that are not involved with construction.

Minimize weed spread caused by moving infested gravel, fill material, seed, mulch, or straw to weed-free locations. Construction and maintenance materials to be placed in weed-free areas must come from weed-free sources. When constructing or maintaining roads, inspect gravel pits and fill sources to identify weed-free sources. Require mulches to be weed free. During

construction or post construction restoration, EID or designated contractor will use rice straw or certified weed free straw. Seed contaminated with noxious weed seeds can be prevented by requiring that the seed be labeled in compliance with the California Agricultural code. In addition to having the correct label, the seed should be required to be free of noxious weeds and the label should so state. Only native seed mixes approved by the Forest Service Botanist will be used for erosion control and revegetation.

Equipment Cleaning: All off-road equipment should be cleaned (power or high-pressure cleaning) of all mud, dirt, and plant parts before moving into weed-free areas. This is not meant to apply to service vehicles that will stay on the roadway traveling frequently in and out of the project area. Off-road equipment (as defined below), owned and operated by EID and stored within the project area for various routine project-related uses not requiring special permitting by the Forest Service, will not be subject to the cleaning and notification protocols discussed below.

EID or its contractor will ensure that all off-road equipment brought into the project area from outside the project area, is free of soil, seeds, vegetative material, or other debris that could contain or hold seeds of noxious weeds. "Off Road Equipment" includes all logging, construction, and brushing machinery/equipment (brush hogs, masticators, chippers) except log trucks, chip vans, service vehicles, water trucks, pickup trucks, and similar vehicles not intended for off-road use. Equipment that falls in this category (e.g., excavators, dozers, etc.) is generally rented and brought to the job site by a contractor under hire by EID. It is a standard best management practice of EID to require its equipment vendors to pressure wash ALL equipment before it is sent out into the field.

Equipment will be considered clean when a visual inspection does not disclose soil, seed, plant material, and other such debris. Disassemblies of equipment components or specialized inspection tools will not be required. In general, because of the magnitude of the yellow star thistle infestation in northern California, non-project-resident equipment is considered contaminated and cleaning/washing will be required. Prior to bringing any equipment on Forest Service land, an EID certified inspector, will verify that all equipment is clean and free of soil, seed, plant material or other debris.

Erosion Control and Revegetation Prescriptions: To ensure new infestations are not created by project activities, prevention measures will be incorporated into all maintenance and construction projects that result in significant new ground disturbance. Re-establish vegetation on all bare ground to minimize weed spread. Seed all disturbed soil (except traveled way) as soon as possible after final work completion at each site using the Forest Service revegetation prescriptions or modifications thereof otherwise approved by the Forest Service. A copy of the ENF Seed, Mulch and Fertilizer Prescription is presented in Appendix B of this plan. All elements contained within the prescription are commercially available products.

Monitor all seeded sites to ensure establishment and maintenance of vigorous, desirable vegetation to discourage weeds.

Road Maintenance

Road maintenance activities have been identified as a likely source of introductions of noxious weed seeds. Annual records will be kept on road maintenance activities performed by EID, including the location where work was performed, time of year, the type and source of resurfacing materials used, use of non-project-resident equipment brought to the project site and the type and location of equipment cleaning.

EID-owned stockpiles of gravel and soil will be kept in a weed-free state. If stockpiles are found to be infested, chemical treatment on these stockpiles may be required. Once treated, this material will be considered a source of weed seeds until annual monitoring shows no further germination of weed seed occurring.

EDUCATION AND ENVIRONMENTAL TRAINING

Awareness of what noxious weeds are and the problems they cause will assist EID personnel to in understanding the importance of a long-term weed management program. Knowing how and where noxious weeds are spread is critical in preventing the expansion of weeds into new territories.

Education on the impacts of noxious weeds to critical flora and fauna of the area is an important facet of any long-term weed management plan. Invasive plants pose a serious threat to native vegetation and wildlife. The invasive and competitive nature of plants that define noxious weeds make it imperative that personnel working in the area are familiar with the most important noxious weed species and the damage they cause.

Environmental training will emphasize to all maintenance personnel the importance of preventing the further spread of noxious weeds. Training will include review of the identifying characteristics of the most invasive species of noxious weeds likely to occur in the project area. Training of project personnel will include noxious weed control techniques (Section 4) and the provisions of this plan.

A map of the area should be located in all field offices for the field employees and the public to document sites of noxious weeds (these sites should be verified). Encouragement and incentives should be offered to staff members and others who participate in identification and reporting of noxious weeds. Once new infestations are verified, quick response is required in order to eliminate the weed before it spreads. Locations should be entered into a Geographic Information System (GIS) if possible.

TABLE 2.1

PROJECT MAINTENANCE AND OPERATION ACTIVITIES AND ASSOCIATED WEED RISK FACTORS

MAINTENANCE	Very Low	Low to Moderate	Moderate to High	High to Very High
Vegetation Mgt.				
• Penstocks/siphons			X	
• Dams/weirs			X	
• Powerhouses/ switchyards/substations			X	
• Spill channels			X	
• Buildings			X	
• Flume			X	
• Recreation facilities			X	
Road Work				
• Grading				X
• Sanding				X
• Snow removal			X	
• Cleaning culverts			X	
Other Maintenance Activities				
Patrols/inspections	X			
Repairs (as needed)			X	
Service gates/valves/traps		X		
Debris removal		X		
Test auto systems	X			
Snow removal		X		
OPERATIONS				
Station readings	X			
Flow release adjustments	X			
Install/remove flash boards	X			
Open/close spill gates	X			
Operate low level outlets	X			
Intentional spills	X			
Reservoir fluctuations	X			
Tailrace discharge	X			
CONSTRUCTION				
Grading, trenching, or other earth-moving activities				X

SURVEYING AND DOCUMENTATION

The primary objective of weed surveying and mapping is to accurately identify and delineate land with populations of invasive plants or noxious weeds. This information establishes baseline conditions that will allow EID to evaluate the success of weed management actions and decisions.

Baseline information important to decision making includes: 1) weed species; 2) locations of infestations; 3) acreage infested; 4) density of plants; 5) general plant community; 6) environmental conditions (e.g., soil conditions, exposure, level of disturbance); and 7) current land-use activities.

DOCUMENTATION AND MAPPING

Noxious weed surveys were performed for the Application for License for Project No. 184 in August, September, and October 1998, and June and July 1999. The significant populations of the following noxious weed species were noted during surveys of the project area:

- yellow star-thistle (*Centaurea solstitialis*);
- Himalayan blackberry (*Rubus discolor*);
- bull thistle (*Cirsium vulgare*); and
- Scotch broom (*Cytisus scoparius*).

The following is brief description of these plants within the Project No. 184 area.

Yellow Star-thistle: Yellow star-thistle is an annual or biennial herbaceous species that germinates with late season rains. This species is invasive in grasslands and herbaceous communities and readily colonizes disturbed sites. This plant has been observed within the ENF at several sites, including the Cleveland Burn Area. Yellow star-thistle has been observed along the Canal within this area.

Himalayan Blackberry: This blackberry species is a perennial shrubby vine that is common throughout the riparian corridors of the Sierra foothills. Originally introduced for blackberry production, this plant has been spread by birds and can establish extensive colonies on fine stable substrates. In montane riverine environments, Himalayan blackberry occurs in scour safe sites on the floodplains.

Colonies of Himalayan blackberry occur at the El Dorado Diversion, along the El Dorado Canal, the Forebay, along the penstock, and at the Powerhouse. Himalayan blackberry also occurs along Alder Creek just downstream from the diversion. These occurrences are typically limited to a few scattered plants. At higher elevations, colonies seem to be limited by moisture availability, shorter growing season, and shaded conditions. Along the South Fork of the American River and Alder Creek, blackberries occur at scour safe sites that are protected from high flows.

Bull Thistle: Bull thistle is an annual or biennial herbaceous species that occurs throughout California. Bull thistles occur within a variety of plant communities, but are generally absent from arid sites. These plants are common within El Dorado County, and can be spread by wind and birds.

Bull thistle occurs at all of the Project facilities, including the reservoirs, diversion and conveyance facilities, and Powerhouse facilities. Bull thistle occurs within the El Dorado Canal colonizing sediment deposits within the fumes and the banks of the Canals that are not lined with gunite. Bull thistle was also frequently observed on private and public lands adjacent to the Project facilities where ground disturbance has created conditions for colonization. While bull thistle occurs frequently throughout the region, these occurrences are typically limited in extent, and would not threaten to displace native plant communities.

Scotch Broom: Scotch broom is one of the many broom species that are well known throughout the Sierra Foothills for their abundance of showy yellow blossoms in late spring. These plants can become established on disturbed sites and are spread by ants that collect and store the seeds within their burrows.

One population of Scotch broom occurs at the El Dorado Forebay, at the parking lot and picnic area on Project lands under EID fee title. This population was target for removal in 2000 or 2001. Monitoring of the site is needed to evaluate treatment effectiveness.

In addition, smaller populations of the following noxious and other non-native weed species were documented from the project area:

- ripgut brome (*Bromus diandrus*);
- cheat grass (*Bromus tectorum*);
- Klamathweed (*Hypericum perforatum*);
- white sweet clover (*Meliolotus alba*);
- yellow sweet clover (*Melioltus officinalis*);
- Medusahead grass (*Taeniatherum caput-medusae*); and
- mullein (*Verbascum thapsus*).

The four noxious weed species with significant populations have been documented and mapped. This information will be incorporated into the project area GIS base map along with all other documented noxious weed locations. New populations of noxious weeds or suspected noxious weeds will be recorded using a standardized form such as the one provided in Appendix C. A copy of each new population record will be provided to the Eldorado National Forest botanist and EID for independent verification and inclusion in the project area GIS database.

NOXIOUS WEED SURVEYS

Field surveys will be performed by a professional botanist in areas where repair work, re-construction, or ground-disturbing activities are or have occurred. Field surveys and mapping will occur each year in areas where: 1) high priority (i.e. ENF List A species, Appendix A) noxious weed populations occur until infestations are eradicated and 2) ground disturbing activities occurred during the previous year. A survey of the entire project area will be conducted every five years beginning in 2016. Surveys will be focused on areas immediately surrounding EID facilities. Post-activity monitoring of construction and maintenance sites where ground disturbance has occurred will be required up to 2 years following disturbance.

WEED CONTROL TECHNIQUES

Treatments to control both new infestations and existing problem areas will be prescribed upon completion of field surveys and presented in the annual report to the ENF. Hand treatments alone or in combination with mechanical treatments can be used successfully to eradicate new or small-sized infestations. Typical vegetation management guidelines for each Project facility are discussed below.

Older or larger populations of highly invasive weeds may require an integrated weed management (IWM) approach, which should include cultural, manual, and chemical control methods to control difficult problems. A discussion of the various techniques employed in EID's program of IWM are presented below and in Appendix D.

EID's guidelines for responsible use of herbicides are presented in Appendix E. EID understands that the use of herbicides to control noxious weed infestation on National Forest System lands within the project area boundary will require appropriate environmental documentation (NEPA).

INTERGRATED WEED MANAGEMENT

No single management technique is perfect for all weed control situations. Multiple management actions are required for effective control. The strategy of using an integrated selection of management techniques has been developed for use in a variety of "pest" control situations, including plant pests, or weeds. The IWM is a process by which one selects and applies a combination of management techniques (biological, chemical, mechanical, and cultural) that, together, will control a particular weed species or infestation efficiently and effectively, with minimal adverse impacts to non-target organisms. Ideally, these management techniques should be selected and applied within the context of a complete natural resource management plan.

Most traditional weed management treats only the symptoms of weed infestation, typically by using herbicides to kill weeds. IWM differs from ordinary weed management in attempting to address the ultimate causes of weed infestation, rather than simply focusing on controlling weeds. Although

focusing on the fundamental causes of weed invasion and persistence is more demanding than simply spraying weeds, the rewards are far greater and are worth the effort. Over the long run, IWM should lead to greater success in meeting the objectives.

IWM seeks to combine two or more control actions which will interact to provide better control than any one of the actions might provide. However, even if multiple control actions do not interact, their additive effects can mean the difference between success and failure. In addition, employing multiple control actions should increase the likelihood that at least one of them will control the target weed species. IWM is species-specific, tailored to exploit the weaknesses of a particular weed species, site specific, and designed to be practical with minimal risk to the organisms and their habitats.

APPROPRIATE CONTROL ACTIONS

Selecting appropriate control actions requires a detailed knowledge of the biology and ecology of the target weed species. The selected control actions should ideally be ones that are:

Applied at the most effective time

Most control actions are effective only during certain periods of the target species' life cycle. Treatments should be applied at the point in the life-cycle of the weed when it is most vulnerable, *and* at a time when the least damage will be done to its natural predators and other non-target species.

Least damaging to non-target organisms, including natural weed control organisms

Consider the likely effects of available control techniques on both target and non-target species before deciding which combination of control measures to use. Non-target organisms may include sensitive species, native plant communities, wildlife, areas revegetated to control weeds, insect pollinators, insects that feed on target weed species, and plant species that compete with the weeds you are trying to control. The selected control actions must not significantly damage these non-target organisms or lead to the creation of further problems.

Least hazardous to human health

Herbicides can be injurious to human health if not used correctly. In fact, one of the driving

forces behind IWM is the reduction of unnecessary pesticide use. Chemicals should be carefully chosen to minimize their potential toxicity to humans. Successful weed management involves more than just spraying weeds.

Least damaging to the general environment

Using herbicides judiciously is important to avoid environmental contamination, especially around water. Certain formulations of herbicides cannot be used in aquatic situations or where ground water is close to the ground surface. In addition, timing of herbicide application is important to maximize the effectiveness of the chemical on the target weed, as well as to reduce the possibility of adverse side effects.

Most likely to reduce the need for weed control actions over the long-term

Control techniques fall into two general categories: those that seek to prevent weeds from establishing, and those that deal with weeds which are already present. Preventive and cultural measures to reduce soil disturbances or to reduce the input of weed seeds to an area, re-seeding existing disturbed lands, and altering grazing practices to promote more vigorous stands of perennial plants are actions which work to prevent weed establishment. Actions which address existing weeds include pulling, mowing, applying herbicide, prescribed burning, grazing or releasing biological control insects. Any combination of these management actions which addresses the underlying causes of weed infestation and spread is likely to be the most beneficial for controlling weeds over the long run.

Most easily implemented

Control techniques which are easier to apply are more likely to be completed, and therefore most likely to have an effect on weeds.

MONITORING AND REPORTING

MONITORING

Monitoring is an essential component of a weed control program. Monitoring is the repeated collection and analysis of information to evaluate progress in meeting resource management objectives. Periodic observation of the weeds being managed is necessary to evaluate the effectiveness of a weed control program. If management objectives are not being met, weed control actions need to be modified. Without some type of monitoring, there is uncertainty regarding the efficacy of control actions in contributing to the fulfillment of management objectives. If control actions are not effective, their use may be halted. Monitoring also prevents reinvasion by returning to treatment sites to determine if new plants have established. Monitoring of weed-free areas prevents new infestations from becoming established. Monitoring information should be collected on treatment sites to determine effectiveness, the effects on nontarget species, and subsequent species that invade the treated site. Established infestation sites not currently being treated should be monitored for growth rates, rates of spread, population structure, and the environmental conditions that support the noxious weed invasion. When new populations are observed, EID will make a good faith effort to inform the Forest Service of the species and location as soon as possible, as well as in the annual inspection report.

EID's plan for noxious weed monitoring will consist of annual field surveys and mapping in areas where 1) high priority (i.e. ENF List A species, Appendix A) noxious weed populations are known to occur until those infestations are eradicated and 2) ground disturbing activities occurred during the previous year. A survey of the entire project area will be conducted every five years beginning in 2016. Monitoring will also include reporting of any new populations encountered during the previous year, and monitoring of any treatment activities conducted by EID during the year. Copies of survey results and monitoring reports will be sent to the ENF on an annual basis. As surveys will likely extend into August of each year, reports will be submitted to the Forest Service by January 15th. EID will document weed populations identified during field monitoring work using a standardized form to be provided by the ENF (Appendix C), and will include all such findings in the project area GIS base map.

ANNUAL REPORTING

Following the initial field surveys scheduled for spring and summer of 2003, EID will prepare a report of findings. This report will present the results of pre-field research; a candidate species list for the project area, background and discussion of each species identified in the field and will document all previously known and new noxious weed populations. Standardized forms will be included in the report appendix describing each population and its location. The report will include a copy of the project area GIS base map with noxious weed populations clearly shown.

Beyond the initial year of study, EID will produce an annual report of noxious weed monitoring. Annual monitoring reports will be scheduled for submittal to the Forest Service by January 15th of each year. These reports will document the results of follow-up inspections of previously identified noxious weed populations (both treated and untreated) and will also present any new population findings from the project area. New populations will be documented as described above with a combination of standardized forms, GPS coordinates, and/or other map references. The project GIS base map will be continuously updated with the results of on-going monitoring.

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APPENDIX A
ELDORADO NATIONAL FOREST NOXIOUS WEED SPECIES

APPENDIX A

Eldorado National Forest Noxious Weed Species

Should this list be revised in the future, this Noxious Weed Plan shall be amended to be consistent with the revised list.

List A. A list of highly invasive weed species known or suspected to occur on the Eldorado National Forest (2/15/2007).

Aegilops triuncialis	goat grass
*Cardus nutans**	musk thistle
Carduus pycnocephalus	Italian thistle
Centaurea maculata	spotted knapweed
Centaurea solstitialis	yellow starthistle
Cirsium arvense	Canada thistle
Chondrilla juncea	rush skeletonweed
Cytisus scoparius	Scotch broom
Linaria genistifolia ssp. *dalmatica**	dalmation toadflax
*Lythyrum salicaria**	purple loosestrife
Genistia monspellensus	French broom
Lepidium latifolium	tall whitetop
Spartium junceum	Spanish broom
Taienatherum caput-medusae	medusahead grass

List B. A list of other exotic or noxious weeds that may occur on the Eldorado National Forest that currently are not believed to be as aggressive as those in list A

Acroptilon repens [*Centaurea repens*]	Russian knapweed
Ailanthus altissima	Chinese tree of heaven
Bromus diandrus	ripgut brome
Bromus tectorum	cheat grass
Cardaria chalapense	whitetop
Cardaria draba	heart-podded white top
*Centaurea. diffusa**	diffuse knapweed
Centaurea melitonensis	tocalote
Circium vulgare	bull thistle
*Conium maculatum**	poison hemlock
*Euphorbia esula**	leafy spurge
Euphorbia oblongata	oblong spurge
Festuca arundinaceae	tall fescue
Foeniculum vulgare	fennel
Hirschfeldia incana	Jim Hill mustard
Hypericum perforatum	Klamathweed
Leucanthemum vulgare	ox-eye daisy
Lathyrus latifolius	perennial sweet pea
Lychinus coronaria	rose campion/mullein pink

Meliolotus alba	white sweet clover
Meliolotus officianalis	yellow sweet clover
Rubus discolor	Himalayan blackberry
Salsola tragus	Russian thistle
Silybum marianum	milk thistle
*Tamarix chinensis**	tamarisk
Torilis nodosa	hedge parsley
Verbascum thapsus	woolly mullein

* species that are presently not known from the ENF but are known from nearby National Forests
A complete list of known exotic plants on the Eldorado National Forest is available from the Forest Botanist.

APPENDIX B
ELDORADO FOREST SEED, MULCH, AND FERTILIZER PRESCRIPTION

APPENDIX B

Eldorado Forest Seed, Mulch and Fertilizer Prescription

File Code 2500, 2670, 7100 **Date:** March 21, 2000
RouteTo: Forest Leadership Team
Subject: Seed, Mulch and Fertilizer Prescription

Enclosed are the new Eldorado National Forest Seed, Mulch and Fertilizer Prescriptions. These prescriptions supercede any previous recommendations. Please note one of the primary changes is the replacement of non-native species in the standard seed mix for special projects with native species found in the Sierra Nevada. The reason for changing the seed mix is due to increasing evidence of the importance of native species in ecosystems and the need to preserve and restore native bio-diversity. To reflect this new information Region 5 adopted a policy in June 1994 regarding the use of native plant material in restoration and revegetation projects.

This policy states that on the use of native vegetative materials on National Forests: "To the extent practical, seeds and plants used in erosion control, fire rehabilitation, riparian restoration, forage enhancement, and other vegetation projects shall originate from genetically local sources of native plants."

1. Prescriptions for use of plant materials for revegetation must be developed by knowledgable plant resource specialists prior to implementation to ensure that the project is feasible and suitable plant material is used.

2. All revegetation facets must be evaluated early in the planning process for Forest projects.

3. Plant materials (seed, cuttings, and whole plants) used in all revegetation projects shall originate from genetically local sources of native species, to the extent practical.

4. Do not use plant materials of species sold as natives if the genetic origin is not known.

5. Plant materials collected or purchased for Forest projects must be carefully evaluated to ensure that these materials are healthy, free of pests, and that they are properly handled, stored, and conditioned for successful use.

Efforts to protect native species and restore bio-diversity also include measures to reduce the risk of introducing noxious weeds. Forest Service Manual, 2080 Noxious Weed Management, states: Make every effort to ensure that all seed, feed, hay, and straw used on National Forest System lands is free of noxious weed seeds. (FSH 6309.12, sec. 42 and 42.1). To this end straw used for erosion control on the Eldorado National Forest will be certified weed-free. A state-wide certification program is being developed. Implementation of a weed-free forage and muIch program by the California Agricultural Commissioners and Sealers Association (CACASA) is

scheduled for 2002. Pending implementation of that program, rice straw, (local) native grass straw, or pine needle mulch may be substituted for weed-free certified mulch.

When a fertilizer application is necessary the use of quick release, inorganic materials should be avoided. Beneficial effects from these types of fertilizers are short term and tend to favor the initial establishment of exotic grasses and weeds. A slow release organic product that provides a slow release of nutrients over multiple seasons, will be used.

Although this change in the ENF standard seed mix for special projects does not entirely meet the intent of Region 5 policy, it is a step in the right direction. Please ensure that this new prescription is accepted as quickly as possible and that the original seed mix is no longer used. The recommended seed and fertilizer are commercially available. If there are any questions or concerns regarding these changes please contact Mike Taylor, at 530-621-5219 or Dave Jones, at 530-621-5248.

/s/ *Judie L. Tartaglia*
JUDIE L. TARTAGLIA
Acting Forest Supervisor

APPENDIX C
STANDARD FIELD SURVEY FORM FOR NOXIOUS WEED DOCUMENTATION

APPENDIX C

EID Weed Observation and Monitoring Form

General Information	
Collection date (mm/dd/yyyy)	
Observer name	
Site Information	
Site or facility name	
Site address or other description	
Ownership	
Quad name	
Land use type	□ Water Transport Facility □ Water Storage Facility □ Transportation Corridor □ Power
Invaded vegetation type	□ Forest □ Woodland □ Chap/Scrub □ Grassland
Gross Area	Area: □ sq. ft. □ sq. m □ sq. mi. □ acres □ ha
Disturbances & impacts	
Associated species	
Environmental Conditions (e.g. soil conditions, exposure, etc.)	
Weed Information	
Weed Identification	
Weed genus and species	
Weed common name(s)	
Weed Description	
Presence or Absence	(P (A
Infested area	Area: (sq. ft. (sq. meters (sq. mi. (acres (ha
Canopy Cover	Circle one: <1% 1-5% 5-25% 25-50% 50-75% 75-95% 95-100%
Appearance/phenology	Circle any: Germ'g./early growth New growth Flowering Seeding Senesc. Dead
Distribution pattern	Circle any: Clumpy Scattered patchy Scattered even Linear
Photo documentation	Use table on back to log photos
Weed Location	
Geographic location	GPS waypoint or feature ID:
	Coords. (if point): X: Y:
Coordinate system	□ UTM Zone: □ Lat/Long dec. degs □ Other (specify):
Datum	WGS 84/NAD83 Other (specify):
Location data accuracy	Choose one: □ < 1m □ 1-5m (5-15m (15-100m (100m-1km (1km-10km (>10km
Location description	

APPENDIX C

EID Weed Observation and Monitoring Form

Photo Log					
Photo #	**GPS Waypoint or feature #**	**X Coordinate**	**Y Coordinate**	**Bearing or Direction**	**Feature/Notes**

Notes

Attach this form to hand-drawn map and write the date, observer name, and the site and/or facility name on the map for easy cross-referencing.

APPENDIX D
INTEGRATED WEED MANAGEMENT

APPENDIX D

INTEGRATED WEED MANAGEMENT GUIDELINES

Use the following guidelines to implement and determine the best methods for an IWM approach:

Cultural - Cultural controls seek to control weed problems by establishing desired plant species. Cultural techniques manipulate the plant community through cultivating (cutting through and turning over the soil), re-seeding, fertilizing and irrigating.

- Develop available preventive measures, such as quarantine and closure, to reduce the spread of the infestation.
- Revegetate all bare soil following disturbance.
- Limit, restrict, or modify recreational uses such as ORVs, bicycling, rafting, and hiking to reduce spreading weeds. In some cases, recreational sites may have to be quarantined.
- Defer or reduce soil disturbance, if possible, until weeds are controlled or under management.
- Obtain rock from uncontaminated sources.
- Determine if exclusion of various uses would reduce weed spread.

Mechanical Control

- Determine if hoeing or grubbing will reduce (or increase) the infestation.
- Determine if hand-pulling weeds will reduce the seed source.
- Evaluate the terrain to allow for mowing and determine whether it is an acceptable option for controlling the spread of seeds.
- Evaluate whether a controlled-burning program will reduce the infestation without long-term deleterious effects upon desirable native vegetation.
- Monitor heavy recreational use sites seasonally for early detection of new weeds. Mark and hand- pull when found, especially before seed ripe.

Biological Controls

- Determine whether there are naturally-occurring agents within the ecosystem which can reduce the infestation.
- Determine whether the introduced biological control agent can survive in the environment of the treatment area.
- Determine what biological control agents are available for specific weed species.
- Determine if domestic animals (sheep/goats) are a viable option to control or contain specific weed species.

Herbicides

- Determine if the herbicides are labeled for:
    - Use on the target weed.
    - Use on the infested site (consider water, groundwater locations, climate, state labeling, soils, etc.).
- Determine if the herbicides are approved for use on Forest Service lands.
- Ensure properly trained and licensed personnel are available to apply the herbicide.
- Calibrate spray equipment

INTEGRATED WEED MANAGEMENT TECHNIQUES

IWM Treatment Methods

What follows are examples of a variety of management techniques within several general categories of vegetation management. The techniques selected for use at a specific work location are subject to the conditions and restrictions imposed by the site, the landowner, and other administrative, regulatory or legal considerations.

Mechanical. Large mechanical equipment is either rubber-tired or track equipped. Mechanical mowing is generally used for the initial control of dense woody species or on 2 - 5 year cycles in areas where herbicides are not a viable option. Rubber-tired equipment, such as the Hydro-ax and the Row King, are used to cut and chip woody species where slopes are less than 25 percent. The rubber-tired machines can also be used along improved road surfaces such as asphalt or gravel. Track mounted equipment (e.g., trade names include Slashbuster and Brontosaurus) is operated from unpaved road surfaces and on slopes up to 40 percent. These large mechanical brush mowers can be used to cut and masticate woody plants to a height of less than 12 inches from ground surface; significantly reducing dry fuel hazards. Mechanical treatment can result in vigorous resprouting by some woody species.

Manual. Chainsaws, polesaws, machetes, string trimmers, McLeods and chippers are used for manual vegetation management. Chainsaws, pole-saws, and machetes are used to remove woody species, such as oaks, conifers, and brush greater than 1 inch in diameter. The string trimmers and McLeods are used to clear grasses and smaller woody species. Manually cleared vegetation is then either lopped and scattered; piled and burned or chipped, depending on fuel hazard, soils, and access. Manual treatment can also result in vigorous resprouting of woody species.
Pruning (selective removal of branches) will be used in visually sensitive areas to maintain visual buffers (e.g., at road intersections or other corridors) as necessary. Where practical International Society of Arboriculture recommended pruning techniques will be used to help maintain the health of forest trees.

Cultural. Mulches can be used to help control annual grass and broadleaf species. Wood chips have been used to help control annual grass species and reduce the use of herbicides. Gravel is frequently used on dams to control erosion and provide some weed control in combination with pre-emergent herbicides. Seeding with native species is also used to develop and maintain a desirable growth form of vegetation (herbaceous and low growing woody species). The seeding of grasses is frequently used on the out-slope side of forebay dams to maintain a vegetation cover for erosion control while discouraging the invasion of broadleaf weeds.

Biological. Cattle and goats are two biological methods that have been used to control vegetation on dams, penstocks and canals. Goats have been used to reduce fuel volume and help control resprouting woody shrubs. Cattle have been used in some sites to graze predominately grass species. To be effective over large areas or in very brushy habitat, livestock must be controlled and concentrated in a managed rotational grazing system designed to achieve the desired impact on vegetation without causing secondary problems such as accelerated erosion and sedimentation. A combination of livestock and selective application of herbicides can be very effective, particularly where some plant species have a low palatability to livestock and are little affected by grazing selective herbicide applications.

There are also some very host specific insects and diseases that are available for control of certain weed species. The use of insects for the control of certain undesirable exotic species, such as yellow star thistle and puncture vine, has some potential in a long term IVM program.

Chemical (herbicides). The use of herbicides is regulated by the Federal Environmental Protection Agency (EPA), the California Environmental Protection Agency, the California Department of Pesticide Regulation (CDPR) and the local County Agricultural Commissioners. Herbicide applications require the following:

1) Annual safety and product training for each herbicide used

2) The use of safety equipment, including goggles, gloves, long pants, and long sleeved shirts

3) A written Pest Control Recommendation by a Licensed Pest Control Advisor (PCA)

4) Monthly reporting of each use of herbicide and adjuvant by county

5) Annual inspections by the County Agricultural Commissioner

Foliar And Contact Application Methods: Foliar backpack applications can be selective or non-selective, depending on the type of herbicide and the application method. Foliar applications are usually most effective when made when the target vegetation is actively growing. The herbicide triclopyr can selectively control broadleaf weeds such as yellow star thistle without affecting desirable grasses. Even non-selective herbicides, such as glyphosate, can be used for selective control through the use of low volume directed back-pack applications or by timing the application so that the desired annual species have already produced seed.

Basal stem treatments: Basal stem treatments are usually made using 5-gallon backpack sprayers. Herbicides are mixed with an oil carrier to allow adequate bark penetration and are applied to the lower two feet of a woody plant. Basal stem applications have a longer application season and can provide good control from March through November. Applications are frequently made during the dormant season because they are easier once the plants have lost their leaves. Dormant applications have the advantage of being a low profile approach since the target species never leafs out in the spring and there is no brownout.

Cut stump treatments: Cut-stump treatments are used to prevent woody species from resprouting. After trees and brush are cut with a chainsaw or loppers, the stump is treated with herbicide. Most cut stump treatments can be made year round.

Injection: Injection is another application method in which capsules containing herbicide are injected into the woody cambium and the herbicide gradually translocates to the roots and stems. This is another low profile application, since the applicator carries a 6-foot lance and not a backpack sprayer.

APPENDIX E
PESTICIDE APPLICATION GUIDE

APPENDIX E

Pesticide Application Guide

Definitions

Triple Rinse: Filling the empty container at least 1/10 full of clean water, replacing the container lid, shaking vigorously for at least 15 seconds and immediately pouring contents from the container into the batch tank. This will be done three times.

Wash Down: Spraying the contaminated seedling to runoff with clean water.

Batch Tank: A mixing tank with a constant agitator that can be moved and operated separately from the clean water tank; for example, mounted on a separate vehicle from the clean water tank, or mounted on a trailer.

Clean Water Tank: A tank that contains water for mixing and wash down. It must be free of all pesticide residue.

Herbicide mixture: The herbicide, water, surfactant, and dye, (if used).

Herbicide: is the concentrate before mixing occurs.

Crop Tree: A planted conifer or a conifer seedling at least 6" high which meets the spacing guidelines that were used to plant the stand.

Specifications

Work Methods

The Contractor shall keep equipment in good operating condition maintaining flow rate and nozzle pressure. Application of herbicide mixture will be made with a nozzle pressure of 15 psi (1055 gscm). The spray tip will be kept from 12 to 24 inches (30.5 to 61.0 cm) from the target vegetation during application.

Application of herbicide mix may be discontinued if the following critical weather parameters exist:

1. Precipitation or a 70% or greater chance predicted within 24 hours.

2. Sustained wind speeds and air temperature that exceed the herbicide label requirements.

3. Temperatures cold enough to freeze the herbicide mix in the nozzles.

If not otherwise specified on the label, spraying will be discontinued when the following conditions exist: 1.) wind speeds are in excess of 5 mph (8.1 kmph); 2.) air temperature is in excess of 80 degrees F. or relative humidity is less than 15% when spraying Garlon 4. The Contracting Officer or his representative will monitor weather conditions.

The Contractor shall be responsible for washing and cleaning out all equipment at the end of each work day. The exact location for cleanup will be selected by the Contracting Officer.

The Contractor shall use soft material such as bristle to clean the nozzles. Wire shall not be used.

Under no circumstances shall sprayers, containers, clothing, personnel or other contaminated materials be washed in any stream, lake, or reservoir.

In order to maximize the effects of herbicides, the Contracting Officer shall determine the sequence in which each stand will be treated. Each stand shall be completed prior to moving on to the next stand. The contractor will flag a line delineating the sprayed portion of any partially completed unit at the end of each day.

The Contractor shall keep his crew organized so that units are covered systematically without skipped areas. The Contractor shall not scatter his crew over different parts of the unit.

The Contractor shall be responsible for training his employees in the proper techniques to be used during application of herbicides and safety procedures to be followed when handling herbicides.

A graduated container of at least one-half gallon in size shall be used to measure chemicals and surfactants during the batching operation.

Batching sequence is as follows:

a. One half of the water for the mix shall be put in the batch tank.

b. The herbicide(s) and colorants, if used shall be put in the batch tank next. Then begin agitation.

c. Now put the remaining water in the batch tank while continuing agitation.

d. The last ingredient to be added to the tank will be the surfactant, if used.

The herbicide mix shall be under constant agitation in the batch tank to prevent separation. All mix shall be sprayed out. The mix shall not sit overnight in the batch tank or other equipment unless permitted by the Contracting Officer.

Storing and Transporting Herbicides

All unattended herbicide concentrate shall be stored under lock and key in its original container.

The Contractor shall work with the Contracting Officer to insure a minimal amount of herbicide mix is moved between units.

Disposal of Containers

The Contractor shall dispose of the containers in the following manner:

1. All containers shall be triple rinsed, with clean water, on the work site. The rinse water shall be disposed of by placing it in the batch tank.

2. Used containers, except those that are returnable, shall be punctured on the top and bottom to render them unusable.
3. A log of the containers and how they were rinsed and where they were disposed of shall be made available to the Contracting Officer.

4. Certification of disposal at an approved dump or a receipt from the point of redemption on returnable containers is required.

Herbicide Spills

Contact the Forest Dispatcher in Camino at (916) 644-6113 as soon as possible.
If a spill occurs, the contractor shall:

1. Take action immediately to contain the spill.

2. Notify the Contracting Officers' Representative on site. If this person is not available call Eldorado National Forest Dispatcher in Camino at (916) 644-6113 as soon as possible.

3. Be under the control of the Contracting Officer during the spill clean up.

4. Be liable for all costs of damages, clean-up, and decontamination.

Equipment Requirements

Backpack sprayers will have an adjustable pressure regulator or a pressure gauge mounted on the spray wand. All sprayers will be equipped with a "TeeJet" XR80-04VS spray tip or equivalent with a 50 mesh screen. Plastic, brass, or aluminum spray tip nozzles will not be used.

Locked storage area for herbicide and containers.

Spill kit containing a minimum of 25 pounds (9.3 kg) of absorbent material such as kitty

litter, two 30 gallon (113.6 l), 4 mil (0.1 mm) polyethylene garbage bags with ties, and 2 shovels.

Calibration and Equipment check

Prior to and during work the Contracting Officer reserves the right to inspect, test, and approve equipment. For example, the Contracting Officer will check for cracked hoses, worn seals and leaks.

Prior to and during work the Contracting Officer reserves the right to test and inspect the herbicide concentrate and mixture.

Prior to and during work the Contractor shall be required to calibrate his equipment in the presence of the Contracting Officer.