Integrated Vegetation Management Plan

FOR

Open Space Lands

Of the City of San Luis Obispo

(San Luis Obispo, CA)

2015 - 2020

PREPARED BY Jonathan Hall, The Land Conservancy of San Luis Obispo County

(Note: This plan is a modification of a weed management plan template produced by The Nature Conservancy)

Table of Contents

1. INTRODUCTION

1.1 Description of the Site and Management Goals

The City of San Luis Obispo is surrounded by a network of Open Space Areas encompassing over 3,500 acres. San Luis Obispo (SLO) residents are justly proud of their rich and diverse environmental setting. Creeks, hills, morros, valleys and farmland create a striking landscape which is home to a wide variety of plants and animals. Over two hundred species of birds have been identified in the area and many amphibians, reptile and mammal species occur as well. The many creeks provide sheltered corridors that allow wildlife to move between habitats and open space areas while supporting populations of threatened southern steelhead trout and other native fishes.

In January 1994, the City Council adopted an updated Open Space Element to the General Plan for the City of San Luis Obispo. The Conservation and Open Space Element is a tool to protect and preserve these unique community resources. **Its overarching goal is to protect resources (such as air and water, wildlife habitat, scenic and agricultural lands, watershed and historic features) with a secondary goal of accommodating passive recreation where it will not harm the environment or interfere with agricultural operations.**

The current Open Space Areas owned in fee and managed by the City of San Luis Obispo are: Stenner Springs Natural Reserve, Bishop Peak Natural Reserve, Reservoir Canyon Natural Reserve, Cerro San Luis Natural Reserve, Laguna Lake Natural Reserve, Irish Hills Natural Reserve, Johnson Ranch Open Space, Filipponi Ecological Reserve, South Hills Natural Reserve, and the Terrace Hill Open Space (Map 1).

Each open space property is divided into land use designations that define how the property will be managed. This provides a practical means of achieving management objectives. The proposed land use designations are:

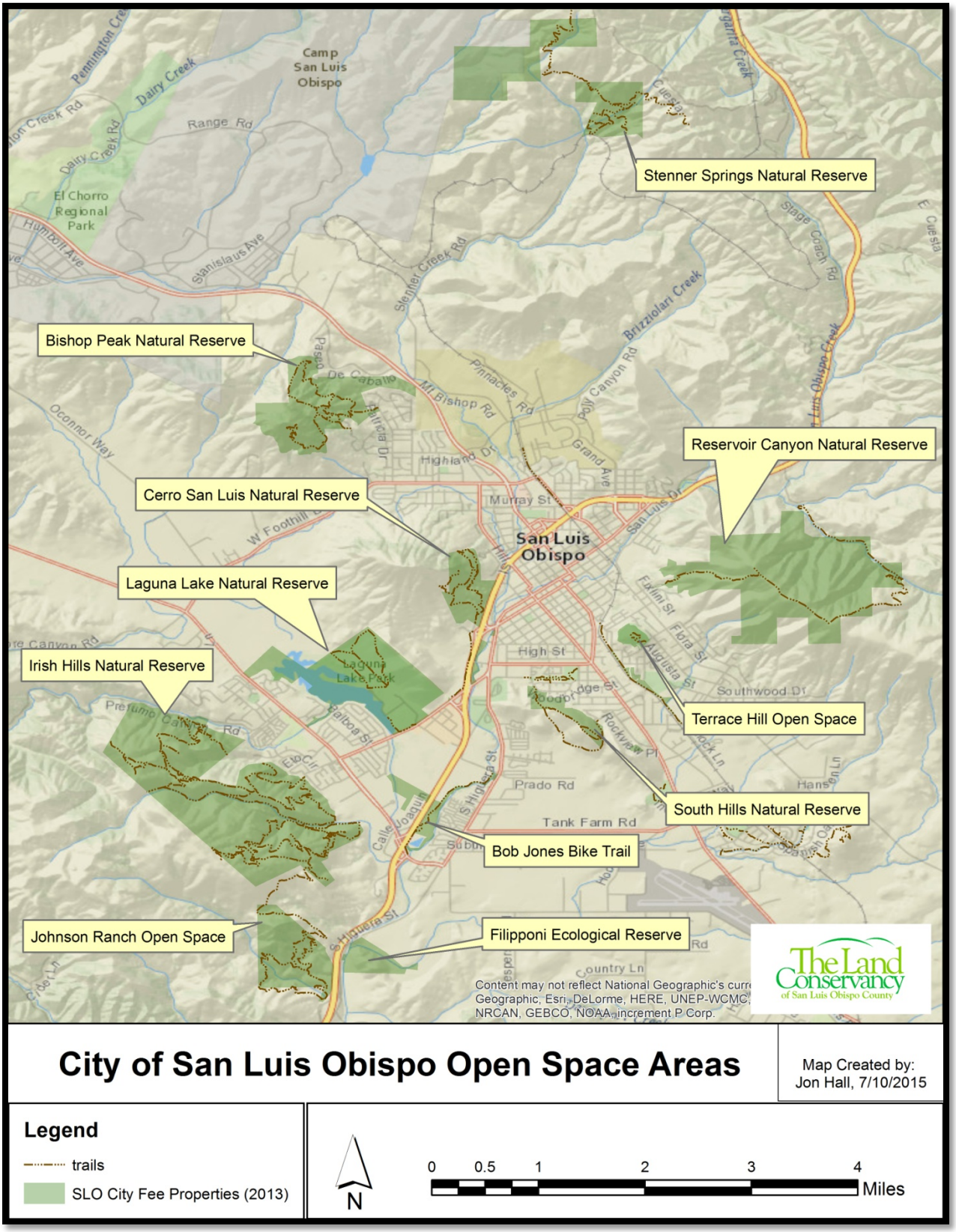
- *Habitat Area* – Land on which the primary objective will be to protect natural resources essential to the continued existence of native plants and resident and migratory wildlife.

- *Management Area/Trail Corridor* – Lands that have the potential to support low levels of recreational pressure or animal grazing; or those areas that may be impacted by adjacent land uses. Active management of land in these areas will be required to facilitate approved activities while protecting valuable natural resources.

- *Restoration Area* – Land on which restoration and enhancement of plant and animal habitats will be pursued in an effort to restore damaged or impacted natural resources.

- *Cultural/Historic Area* – Land managed to preserve and/or enhance cultural or historic resources on the site and provide for their interpretation. Restorative measures may be implemented if necessary.

- *Agricultural Area* – Land that will be managed for the production of row crops or forage (not including grazing lands) in a manner consistent with the protection and preservation of natural resources represented on the site.



Map 1. City of San Luis Obispo Open Space Areas.

1.2. How Non-Native Plants Interfere With Management Goals

The flora of the City of San Luis Obispo Open Space Areas includes over 190 non-native species, most of which were introduced and became established within the past 150 years. (For the purposes of this document, the term “non-native” is defined as a species that was introduced to California from elsewhere after the year 1542. In this document it is used synonymously with "alien", "exotic", “non-indigenous” and "introduced".) There is potential for many more exotic plant species to enter the City’s Open Space Areas in the future, and for present populations to increase in number, area covered and density.

A small percentage of non-native plant species become established, expand rapidly and have negative effects on human health, the economy, or the environment. These species are termed “invasive plants” or “noxious weeds”. There has been a tremendous expansion of invasive species across the US, including San Luis Obispo County. New problem invasive plant species arrive in San Luis Obispo every year. Invasive plants create large economic losses for agriculture in both cropland and rangeland situations. Noxious weeds often provide poorer habitat for wildlife than native vegetation and can alter ecosystem processes and threaten certain native species with extirpation. Thus, unchecked noxious weeds threaten our economic livelihood and our biological heritage.

Invasive plants are rapidly becoming one of the most pressing issues for natural resource managers. Unfortunately, most natural areas contain many alien plant species. In the vast majority of cases, there are not enough resources to control all exotic species that occur in a natural area forcing land managers to choose which invasive species they will control and which they will not, at least initially.

2. OVERVIEW OF INTEGRATED VEGETATION MANAGEMENT PLAN

2.1. General Management Philosophy

The City of San Luis Obispo follows an Integrated Pest Management (IPM) approach as identified in the *City of San Luis Obispo Open Space Lands Conservation Guidelines* (http://www.slocity.org/Home/ShowDocument?id=5911) for natural resource management. IPM is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.

There are four underlying principles of an IPM program (http://www.ipm.ucdavis.edu/GENERAL/whatisipm.html).

1. *IPM is based on scientific research*
2. *IPM focuses on long-term prevention of pests or their damage by managing the ecosystem*
3. *In IPM, monitoring and correct pest identification help you decide whether management is needed*
4. *IPM programs combine management approaches for greater effectiveness*

These IPM principles are combined to create IPM programs. While each situation is different, five major components are common to all IPM programs (Flint & Gouveia, 2001):

1. *Pest identification* – correctly identifying the pest is critical to determining if a pest is likely to become a problem and evaluating the best management strategy.

2. *Field monitoring and population assessment* – once pests are identified, it is essential to map and assess the extent of the infestation and the effect it is having on management goals. Field monitoring helps evaluate if a pest is increasing or decreasing and whether future control actions will be needed. Over the years, these records provide valuable historical data for long-term pest management.

3. *Guidelines for when management action is needed* – control action guidelines help decide whether management actions, including pesticide applications, are needed to avoid eventual loss from pest damage. They are useful only when combined with careful field monitoring and accurate pest identification. For agriculture systems there are usually numerical thresholds to trigger management actions. They are intended to reflect the population level that will cause economic damage. When dealing with invasive plants in wildland areas, an ecological threshold that would reflect when the population level will cause ecological damage is used instead of an economic threshold. Unfortunately, ecological impact thresholds are seldom known so guidelines must be based on other factors. These are usually based on perceived potential impact, size and location of infestations, future cost if not controlled and potential for success.

4. *Preventing pest problems* – because control costs can become very high, especially once a pest is well established, preventing invasive species from getting introduced can be the best use of available resources. Using practices that prevent problems is basic to IPM.

5. *Integrating biological, chemical, cultural, and physical/mechanical management tools* – A variety of pest control tools are available for any given pest. Most pest control tools do not eliminate all pest individuals, only a percentage of the population. Many are effective against one stage but ineffective against another stage. For good control, it is essential to evaluate all the tools available for their efficiency at controlling the pest population while minimizing adverse impacts to our conservation targets, the environment and human health. In most cases, many tools and techniques integrated together will produce the most desired results. Typically, management tools fit into one of four major categories:

    a. *Biological Control* – Broadly defined, biological control is any activity of one species that reduces the adverse effect of other species. For invasive plants, biological control can be provided by herbivores, insects or plant pathogens.
    b. *Cultural Control* – Cultural controls are the modification of landscape management practices to decrease pest establishment, reproduction, dispersal, and survival. Grazing and fire management strategies fall under this category.
    c. *Mechanical and Physical Control* – These are measures specifically taken to kill the pest directly or to indirectly make the environment unsuitable for pest entry, dispersal, survival, or reproduction. Weak links in the pest's life cycle or specific behavioral patterns are often targeted. Examples include flaming, tarping, soil solarization, and mechanical removal with a weed wrench.

d. *Chemical Control* – Chemical control is the use of pesticides. In IPM, pesticides are used only when needed and in combination with other approaches for more effective, long-term control. Also, pesticides are selected and applied in a way that minimizes their possible harm to people and the environment. With IPM you'll use the most selective pesticide that will do the job and be the safest for other organisms and for air, soil, and water quality; use pesticides in bait stations rather than sprays; or spot-spray a few weeds instead of an entire area.

This Integrated Vegetation Management Plan outlines an IPM Program for Weed control as part of the overall site management for City of San Luis Obispo Open Space Areas. The focus is on the species and communities desired in place of the weed species, rather than on simply eliminating weeds. The City will implement preventative programs to keep the site free of species that are not yet established there but which are known to be pests elsewhere in the region. Priorities will be set for the control or elimination of weeds that have already established on the site, according to their actual and potential impacts on native species and communities. Action will be taken only when careful consideration indicates leaving the weed unchecked will result in more damage than controlling it with available methods.

2.2. Summary of Specific Actions Planned

Although over 190 non-native plant species have been identified in the Open Space Areas of San Luis Obispo, many become naturalized in native plant communities, and function as native species without obviously altering ecosystem functions. These species are widespread throughout the region, and attempts to control them in City Open Space Areas would be impractical due to constant reintroduction from surrounding lands. Therefore, unless such plants pose a particular threat, they are considered innocuous and are monitored to assess future potential for impact to the ecosystem.

Exotic plants posing major biological/ecological/management threats are identified in this plan, and the most disruptive have been designated as high priority species for management action. An appropriate course of action for each high priority species is determined by the number and location of plants in City Open Space Areas and the region. This plan has four categories of population distribution/density with corresponding management actions:

I. *Present in region but not in SLO City Open Space Areas*. Contact cooperating agencies and landowners. Track spread if near open space area. Prevention of species establishment inside open space areas eliminates the need for control actions.

II. *Present in SLO City Open Space Areas as individuals or small, localized populations*. Remove by hand or other precision control technique, and maintain a record of actions. Monitor the removal sites, following up with additional removal as needed. This kind of diligence keeps control costs low.

III. *Present as large infestations in parts of SLO City Open Space Areas. Native plant communities are disrupted and native species displaced from infested areas*. Remove outliers first. If possible, eliminate the exotic seed bank in outlier areas after mature plants have been removed to deter

re-establishment. Map large infestations. Plan larger attack projects. Resources permitting, implement one or more large-scale projects, aimed as follows:

a. Contain spread to within infested areas.
b. Reduce the number and size of infestations, restore native species to bared sites, and follow a strategy that minimizes dispersal and re-infestation. In general, treat the smallest, furthest outlying areas first.
c. Eliminate the larger infestations, moving from the fringes toward the source of seed dispersal.

IV. *Present as continuous infestations within and beyond SLO City Open Space Area boundaries. Displaces many or all native plants in areas of infestation*. Complete control may be possible, but only by a coordinated, comprehensive effort between the City of SLO and neighboring agencies and land managers. Extensive planning and provision for public comment will be needed. New and applied research may be required before control is possible or cost effective. Ways to share costs of eradication on a regional scale will be pursued. If costs are unreasonable, it may be possible only to restore and protect certain critical open space areas from infestation. Control steps will be similar to III.

3. INVASIVE SPECIES INVENTORY AND PRIORITIZATION

3.1 Non-Native Plant Inventory

An inventory was conducted of non-native plant species on or near City of SLO Open Space Areas (Map 1). Non-native species lists were compiled using the online databases "CalFlora" (http://www.calflora.org) and "CalWeedMapper" (http://calweedmapper.cal-ipc.org). This inventory was supplemented with a cursory on-the-ground surveillance conducted by The Land Conservancy in spring of 2015, knowledge from SLO City Biologists, Natural Resource Managers and Rangers. The inventory was then sent to the San Luis Obispo Weed Management Area Coordinator (Marc Lea) for review. These inventory lists for each open space area are summarized in Table 1.

Table 1. Non-native plant inventories

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
Bishop Peak Natural Reserve	*Anagallis arvensis*	Myrsinaceae	Scarlet pimpernel	Watchlist	Jon Hall personal observation
	Anthemis cotula	Asteraceae	Dog fennel	Watchlist	Calflora
	Avena barbata	Poaceae	Slim oat	Moderate	Jon Hall personal observation
	Avena fatua	Poaceae	Wild oat	Moderate	Calflora
	Bellardia trixago	Orobanchaceae	Mediterranean linseed	Limited	Calflora
	Brassica nigra	Brassicaceae	Black mustard	Moderate	Jon Hall personal observation
	Bromus diandrus	Poaceae	Ripgut brome	Moderate	Jon Hall personal observation
	Bromus madritensis ssp. rubens	Poaceae	Red brome	High	Jon Hall personal observation
	Carduus pycnocephalus	Asteracea	Italian thistle	Moderate	Jon Hall personal observation
	Carthamus lanatus	Asteraceae	Woolly distaff thistle	Moderate-Alert	Calflora
	Centaurea calcitrapa	Asteraceae	Purple starthistle	Moderate	Calflora
	Centaurea iberica	Asteraceae	Iberian knapweed	Watchlist	Calflora
	Centaurea melitensis	Asteraceae	Tocalote	Moderate	Jon Hall personal observation
	Centaurea solstitialis	Asteraceae	Yellow starthistle	High	Bob Hill personal communication
	Chenopodium murale	Chenopodiaceae	Nettle leaf goosefoot		Jon Hall personal observation
	Chondrilla juncea	Asteraceae	Skeleton weed	Moderate	Marc Lea, SLO County Ag Department
	Cynara cardunculus	Asteraceae	Artichoke thistle	Moderate	Jon Hall personal observation
	Cynodon dactylon	Poaceae	Bermuda grass	Moderate	Jon Hall personal observation
	Erodium botrys	Geraniaceae	Big heron bill	Watchlist	Jon Hall personal observation
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Jon Hall personal observation
	Festuca myuros	Poaceae	Rattail sixweeks grass	Moderate	Jon Hall personal observation
	Festuca perennis	Poaceae	Italian rye grass	Moderate	Jon Hall personal observation
	Foeniculum vulgare	Apiaceae	Fennel	High	Calflora
	Gastridium phleoides	Asteraceae	Nit grass		Calflora
	Gazania linearis	Asteraceae	Gazania	Moderate-Alert	Jon Hall personal observation
	Hirschfeldia incana	Brassicaceae	Short podded mustard	Moderate	Jon Hall personal observation
	Holcus lanatus	Poaceae	Common velvetgrass	Moderate	Calflora
	Hordeum murinum	Poaceae	Foxtail barley	Moderate	Jon Hall personal observation
	Lamarckia aurea	Poaceae	Goldentop		Jon Hall personal observation
	Malva neglecta	Malvaceae	Common mallow		Jon Hall personal observation
	Malva nicaeensis	Malvaceae	Bull mallow		Calflora
	Matricaria discoidea	Asteraceae	Pineapple weed		Jon Hall personal observation
	Medicago polymorpha	Fabaceae	California burclover	Limited	Jon Hall personal observation
	Paspalum dilatatum	Poaceae	Dallis grass	Watchlist	Calflora
	Plantago lanceolata	Plantaginaceae	English plantain	Limited	Jon Hall personal observation
	Rumex crispus	Polygonaceae	Curly dock	Limited	Jon Hall personal observation
	Senecio vulgaris	Asteraceae	Common groundsel		Jon Hall personal observation
	Sherardia arvensis	Rubiaceae	Field madder		Calflora
	Sinapsis arvensis	Brassicaceae	Charlock	Limited	Calflora
	Soliva sessilis	Asteraceae	South American soliva		Calflora
	Sonchus asper	Asteraceae	Spiny sowthistle	Watchlist	Jon Hall personal observation
	Sonchus oleraceus	Asteraceae	Common sowthistle		Jon Hall personal observation
	Spergularia rubra	Caryophyllaceae	Purple sand spurry		Calflora
	Spergularia villosa	Caryophyllaceae	Villous sand spurry		Calflora
	Stellaria media	Caryophyllaceae	Chickweed		Jon Hall personal observation
	Trifolium hirtum	Fabaceae	Rose clover	Limited	Jon Hall personal observation
	Triticum aestivum	Poaceae	Common wheat		Jon Hall personal observation

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
Bob Jones Bike Trail	*Avena barbata*	Poaceae	Slim oat	Moderate	Jon Hall personal observation
	Avena fatua	Poaceae	Wild oat	Moderate	Calflora
	Brassica nigra	Brassicaceae	Black mustard	Moderate	Jon Hall personal observation
	Brassica rapa	Brassicaceae	Bird's rape mustard	Limited	Jon Hall personal observation
	Bromus diandrus	Poaceae	Ripgut brome	Moderate	Jon Hall personal observation
	Bromus hordeaceus	Poaceae	Soft chess	Limited	Jon Hall personal observation
	Bromus madritensis ssp. rubens	Poaceae	Red brome	High	Jon Hall personal observation
	Carduus pycnocephalus	Asteracea	Italian thistle	Moderate	Jon Hall personal observation
	Centaurea calcitrapa	Asteraceae	Purple starthistle	Moderate	Calflora
	Conium maculatum	Apiaceae	Poison hemlock	Moderate	Jon Hall personal observation
	Delairea odorata	Asteraceae	Cape ivy	High	Calflora
	Erigeron bonariensis	Asteraceae	Flax-leaved horseweed		Calflora
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Jon Hall personal observation
	Erodium moschatum	Geraniaceae	Whitestern filaree	Watchlist	Jon Hall personal observation
	Euphorbia peplus	Euphorbiaceae	Petty spurge		Jon Hall personal observation
	Festuca myuros	Poaceae	Rattail sixweeks grass	Moderate	Jon Hall personal observation
	Foeniculum vulgare	Apiaceae	Fennel	High	Jon Hall personal observation
	Fumaria capreolata	Papaveraceae	White ramping fumitory	Watchlist	Jon Hall personal observation
	Hirschfeldia incana	Brassicaceae	Short podded mustard	Moderate	Jon Hall personal observation
	Hordeum murinum	Poaceae	Foxtail barley	Moderate	Jon Hall personal observation
	Hypochaeris radicata	Asteraceae	Hairy cat's ear	Moderate	Jon Hall personal observation
	Lactuca serriola	Asteraceae	Prickly lettuce	Watchlist	Jon Hall personal observation
	Lepidium draba	Brassicaceae	Whitetop	Moderate	Jon Hall personal observation
	Malva nicaeensis	Malvaceae	Bull mallow		Jon Hall personal observation
	Marrubium vulgare	Lamiaceae	White horehound	Limited	Jon Hall personal observation
	Melilotus indicus	Fabaceae	Annual yellow sweetclover		Jon Hall personal observation
	Phoenix canariensis	Arecaceae	Canary Island date palm	Limited	Jon Hall personal observation
	Picris echioides	Asteraceae	Bristly oxtongue	Limited	Jon Hall personal observation
	Plantago lanceolata	Plantaginaceae	English plantain	Limited	Jon Hall personal observation
	Pseudognaphalium luteoalbum	Asteraceae	Jersey cudweed		Jon Hall personal observation
	Raphanus sativus	Brassicaceae	Wild radish	Limited	Jon Hall personal observation
	Ricinus communis	Euphorbiaceae	Castor bean	Limited	Jon Hall personal observation
	Rubus ulmifolius var. anoplothyrsus	Rosaceae	Elmleaf bramble	Watchlist	Jon Hall personal observation
	Rumex crispus	Polygonaceae	Curly dock	Limited	Jon Hall personal observation
	Schinus molle	Anacardiaceae	Peruvian pepper tree	Limited	Jon Hall personal observation
	Silybum marianum	Asteraceae	Milk thistle	Limited	Jon Hall personal observation
	Sonchus asper	Asteraceae	Spiny sowthistle	Watchlist	Jon Hall personal observation
	Sonchus oleraceus	Asteraceae	Common sowthistle	Watchlist	Jon Hall personal observation
	Stipa miliacea var. miliacea	Poaceae	Smilo grass	Limited	Jon Hall personal observation
	Taraxacum officinale	Asteraceae	Dandelion		Jon Hall personal observation
	Tropaeolum majus	Tropaeolaceae	Garden nasturtium		Jon Hall personal observation
	Vinca major	Apocynaceae	Vinca	Moderate	Jon Hall personal observation

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
Cerro San Luis Natural Reserve	*Avena barbata*	Poaceae	Slim oat	Moderate	Jon Hall personal observation
	Avena fatua	Poaceae	Wild oat	Moderate	Jon Hall personal observation
	Brassica nigra	Brassicaceae	Black mustard	Moderate	Jon Hall personal observation
	Bromus diandrus	Poaceae	Ripgut brome	Moderate	Jon Hall personal observation
	Bromus hordeaceus	Poaceae	Soft chess	Limited	Jon Hall personal observation
	Bromus madritensis ssp. Rubens	Poaceae	Red brome	High	Jon Hall personal observation
	Carduus pycnocephalus	Asteracea	Italian thistle	Moderate	Jon Hall personal observation
	Carpobrotus edulis	Aizoaceae	Iceplant	High	Jon Hall personal observation
	Centaurea calcitrapa	Asteracea	Purple starthistle	Moderate	Jon Hall personal observation
	Centaurea melitensis	Asteraceae	Tocalote	Moderate	Jon Hall personal observation
	Centaurea solstitialis	Asteraceae	Yellow starthistle	High	Jon Hall personal observation
	Cirsium vulgare	Asteraceae	Bull thistle	Moderate	Jon Hall personal observation
	Cotoneaster pannosus	Rosaceae	Woolly cotoneaster	Moderate	Calflora
	Dipsacus fullonum	Dipsacaceae	Fuller's teasel	Moderate	Jon Hall personal observation
	Erodium botrys	Geraniaceae	Big heron bill	Watchlist	Jon Hall personal observation
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Jon Hall personal observation
	Festuca perennis	Poaceae	Italian rye grass	Moderate	Jon Hall personal observation
	Foeniculum vulgare	Apiaceae	Fennel	High	Jon Hall personal observation
	Genista monspessulana	Fabaceae	French Broom	High	Jon Hall personal observation
	Hirschfeldia incana	Brassicaceae	Short podded mustard	Moderate	Jon Hall personal observation
	Hordeum murinum	Poaceae	Foxtail barley	Moderate	Jon Hall personal observation
	Lamarckia aurea	Poaceae	Goldentop		Jon Hall personal observation
	Lamium purpureum	Lamiaceae	Purple dead nettle		Calflora - on top of mountain, not in open space
	Marrubium vulgare	Lamiaceae	White horehound	Limited	Jon Hall personal observation
	Oxalis pes-caprae	Oxalidaceae	Sourgrass	Moderate	Jon Hall personal observation
	Pennisetum setaceum	Poaceae	Fountaingrass	Moderate	Calflora
	Pennisetum villosum	Poaceae	Feathertop	Watchlist	Jon Hall personal observation
	Picris echioides	Asteraceae	Bristly oxtongue	Limited	Jon Hall personal observation
	Plantago lanceolata	Plantaginaceae	English plantain	Limited	Jon Hall personal observation
	Ratibida columnifera	Asteraceae	Upright praire coneflower		Calflora
	Rumex crispus	Polygonaceae	Curly dock	Limited	Jon Hall personal observation
	Schinus molle	Anacardiaceae	Peruvian pepper tree	Limited	Jon Hall personal observation
	Silybum marianum	Asteraceae	Milk thistle	Limited	Jon Hall personal observation
	Sonchus asper	Asteraceae	Spiny sowthistle	Watchlist	Jon Hall personal observation

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
Filipponi Ecological Reserve	*Anagallis arvensis*	Myrsinaceae	Scarlet pimpernel	Watchlist	Jon Hall personal observation
	Avena fatua	Poaceae	Wild oat	Moderate	Jon Hall personal observation
	Brassica nigra	Brassicaceae	Black mustard	Moderate	Jon Hall personal observation
	Brassica rapa	Brassicaceae	Bird's rape mustard	Limited	Jon Hall personal observation
	Bromus diandrus	Poaceae	Ripgut brome	Moderate	Jon Hall personal observation
	Bromus hordaceus	Poaceae	Soft chess	Limited	Jon Hall personal observation
	Bromus madritensis ssp. rubens	Poaceae	Red brome	High	Jon Hall personal observation
	Carduus pycnocephalus	Asteraceae	Italian thistle	Moderate	Jon Hall personal observation
	Centaurea melitensis	Asteraceae	Tocalote	Moderate	Jon Hall personal observation
	Conium maculatum	Apiaceae	Poison hemlock	Moderate	Jon Hall personal observation
	Dipsacus fullonum	Dipsacaceae	Fuller's teasel	Moderate	Jon Hall personal observation
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Jon Hall personal observation
	Erodium moschatum	Geraniaceae	Whitestern filaree		Jon Hall personal observation
	Euphorbia peplus	Euphorbiaceae	Petty spurge		Jon Hall personal observation
	Festuca myuros	Poaceae	Rattail sixweeks grass	Moderate	Jon Hall personal observation
	Festuca perennis	Poaceae	Italian rye grass	Watchlist	Jon Hall personal observation
	Foeniculum vulgare	Apiaceae	Fennel	High	Jon Hall personal observation
	Fumaria capreolata	Papaveraceae	White ramping fumitory	Watchlist	Jon Hall personal observation
	Geranium dissectum	Geraniaceae	Wild geranium	Limited	Jon Hall personal observation
	Hirschfeldia incana	Brassicaceae	Short podded mustard	Moderate	Jon Hall personal observation
	Hordeum murinum	Poaceae	Foxtail barley	Moderate	Jon Hall personal observation
	Lactuca serriola	Asteraceae	Prickly lettuce	Watchlist	Jon Hall personal observation
	Lepidium draba	Brassicaceae	Whitetop	Moderate	Jon Hall personal observation
	Malva neglecta	Malvaceae	Common mallow		Jon Hall personal observation
	Medicago polymorpha	Fabaceae	California burclover	Limited	Jon Hall personal observation
	Melilotus indicus	Fabaceae	Annual yellow sweetclover		Jon Hall personal observation
	Picris echioides	Asteraceae	Bristly ox-tongue	Limited	Jon Hall personal observation
	Raphanus sativus	Brassicaceae	Wild radish	Limited	Jon Hall personal observation
	Rumex crispus	Polygonaceae	Curly dock	Limited	Jon Hall personal observation
	Schinus molle	Anacardiaceae	Peruvian pepper tree	Limited	Jon Hall personal observation
	Silybum marianum	Asteraceae	Milk thistle	Limited	Jon Hall personal observation
	Sonchus asper	Asteraceae	Spiny sowthistle	Watchlist	Jon Hall personal observation
	Sonchus oleraceus	Asteraceae	Common sowthistle	Watchlist	Jon Hall personal observation

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
Irish Hills Natural Reserve	*Ailanthus altissima*	Simbaroubaceae	Tree-of-heaven	Moderate	Scott Couture personal observation
	Avena barbata	Poaceae	Slim oat	Moderate	Jon Hall personal observation
	Avena fatua	Poaceae	Wild oat	Moderate	Jon Hall personal observation
	Briza maxima	Poaceae	Rattlesnake grass	Limited	Calflora
	Carduus pycnocephalus	Asteracea	Italian thistle	Moderate	Jon Hall personal observation
	Carthamus lanatus	Asteraceae	Woolly distaff thistle	Moderate-Alert	Dan Dixon, personal observation
	Centaurea melitensis	Asteraceae	Tocalote	Moderate	Jon Hall personal observation
	Centaurea solstitialis	Asteraceae	Yellow starthistle	High	Scott Couture personal observation
	Conium maculatum	Apiaceae	Poison hemlock	Moderate	Jon Hall personal observation
	Cortaderia jubata	Poaceae	Jubata grass	High	Jon Hall personal observation
	Delairea odorata	Asteraceae	Cape ivy	High	Dan Dixon, personal observation
	Erigeron bonariensis	Asteraceae	Flax-leaved horseweed		Calflora
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Jon Hall personal observation
	Erodium moschatum	Geraniaceae	Whitestern filaree		Jon Hall personal observation
	Gazania linearis	Asteraceae	Gazania	Moderate-Alert	Scott Couture personal observation
	Genista monspessulana	Fabaceae	French broom	High	Jon Hall personal observation
	Lamarckia aurea	Poaceae	Goldentop		Calflora
	Lathyrus latifolius	Fabaceae	Sweet pea	Watchlist	Calflora
	Medicago minima	Fabaceae	Small bur clover		Calflora
	Medicago polymorpha	Fabaceae	California bur clover	Limited	Calflora
	Mentha aquatica	Lamiaceae	Water mint		Calflora
	Oxalis pes-caprae	Oxalidaceae	Sourgrass	Moderate	Jon Hall personal observation
	Papaver somniferum	Papaveraceae	Opium poppy		Calflora
	Pennisetum clandestinum	Poaceae	Kikuyugrass	Limited	Dan Dixon, personal observation
	Phoenix canariensis	Arecaceae	Canary Island date palm	Limited	Dan Dixon, personal observation
	Plantago lanceolata	Plantaginaceae	English plantain	Limited	Jon Hall personal observation
	Rubus armeniacus	Rosaceae	Himalayan blackberry	High	Dan Dixon, personal observation
	Silybum marianum	Asteraceae	Milk thistle	Limited	Jon Hall personal observation
	Sorghum bicolor	Poaceae	Sorghum		Calflora
	Vinca major	Apocynaceae	Vinca	Moderate	Jon Hall personal observation

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
Johnson Ranch Open Space	*Asphodelus fistulosus*	Asphodelaceae	Onion weed	Moderate-Alert	Dan Dixon, personal observation
	Avena fatua	Poaceae	Wild oat	Moderate	Jon Hall personal observation
	Brassica nigra	Brassicaceae	Black mustard	Moderate	Jon Hall personal observation
	Bromus diandrus	Poaceae	Ripgut brome	Moderate	Jon Hall personal observation
	Bromus hordaceus	Poaceae	Soft chess	Limited	Jon Hall personal observation
	Bromus madritensis ssp. rubens	Poaceae	Red brome	High	Jon Hall personal observation
	Carduus pycnocephalus	Asteraceae	Italian thistle	Moderate	Jon Hall personal observation
	Carthamus lanatus	Asteraceae	Woolly distaff thistle	Moderate-Alert	Calflora
	Centaurea melitensis	Asteraceae	Tocalote	Moderate	Jon Hall personal observation
	Chenopodium murale	Chenopodiaceae	Nettle leaf goose foot		Jon Hall personal observation
	Cortaderia jubata	Poaceae	Jubata grass	High	Marc Lea, SLO County Ag Department
	Dipsacus fullonum	Dipsacaceae	Fuller's teasel	Moderate	Dan Dixon, personal observation
	Erodium botrys	Geraniaceae	Big heron bill	Watchlist	Jon Hall personal observation
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Jon Hall personal observation
	Festuca perennis	Poaceae	Italian rye grass	Watchlist	Jon Hall personal observation
	Foeniculum vulgare	Apiaceae	Fennel	High	Jon Hall personal observation
	Hirschfeldia incana	Brassicaceae	Short podded mustard	Moderate	Jon Hall personal observation
	Hordeum murinum	Poaceae	Foxtail barley	Moderate	Jon Hall personal observation
	Lactuca serriola	Asteraceae	Prickly lettuce	Watchlist	Jon Hall personal observation
	Lepidium draba	Brassicaceae	Whitetop	Moderate	Jon Hall personal observation
	Malva neglecta	Malvaceae	Common mallow		Jon Hall personal observation
	Marubium vulgare	Lamiaceae	White horehound	Limited	Dan Dixon, personal observation
	Matricaria discoidea	Asteraceae	Pineapple weed		Jon Hall personal observation
	Medicago polymorpha	Fabaceae	California burclover	Limited	Jon Hall personal observation
	Melilotus indicus	Fabaceae	Annual yellow sweetclover		Jon Hall personal observation
	Nicotiana glauca	Solanaceae	Tree tobacco	Moderate	Dan Dixon, personal observation
	Oxalis pes-caprae	Oxalidaceae	Sourgrass	Moderate	Jon Hall personal observation
	Picris echioides	Asteraceae	Bristly ox-tongue	Limited	Jon Hall personal observation
	Rubus armeniacus	Rosaceae	Himalayan blackberry	High	Dan Dixon, personal observation
	Rumex crispus	Polygonaceae	Curly dock	Limited	Jon Hall personal observation
	Silybum marianum	Asteraceae	Milk thistle	Limited	Jon Hall personal observation
	Sonchus asper	Asteraceae	Spiny sowthistle	Watchlist	Jon Hall personal observation
	Sonchus oleraceus	Asteraceae	Common sowthistle	Watchlist	Jon Hall personal observation
	Urtica urens	Urticaceae	dwarf nettle		Dan Dixon, personal observation

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
Laguna Lake Natural Reserve	*Amaryllis belladonna*	Amaryllidaceae	Naked lady		Calflora
	Anagallis arvensis	Myrsinaceae	Scarlet pimpernel	Watchlist	Calflora
	Anthemis cotula	Asteraceae	Dog fennel	Watchlist	Calflora
	Araujia sericifera	Apocynaceae	Bladderflower		Calflora
	Avena barbata	Poaceae	Slim oat	Moderate	Jon Hall personal observation
	Avena fatua	Poaceae	Wild oat	Moderate	Calflora
	Bellardia trixago	Orobanchaceae	Mediterranean linseed	Limited	Calflora
	Brassica nigra	Brassicaceae	Black mustard	Moderate	Calflora
	Bromus diandrus	Poaceae	Ripgut brome	Moderate	Calflora
	Bromus hordeaceus	Poaceae	Soft chess	Limited	Calflora
	Bromus madritensis ssp. rubens	Poaceae	Red brome	High	Calflora
	Centaurea calcitrapa	Asteracea	Purple starthistle	Moderate	Jon Hall personal observation
	Centaurea melitensis	Asteraceae	Tocalote	Moderate	Jon Hall personal observation
	Chondrilla juncea	Asteraceae	Skeleton weed	Moderate	Calflora
	Cirsium vulgare	Asteraceae	Bullthistle	Moderate	Calflora
	Conium maculatum	Apiaceae	Poison hemlock	Moderate	Jon Hall personal observation
	Cortaderia jubata	Poaceae	Jubata grass	High	Marc Lea, SLO County Ag Department
	Daucus carota	Apiaceae	Carrot	Watchlist	Calflora
	Digitaria ischaemum	Poaceae	Smooth crabgrass		Calflora
	Dipsacus sativus	Dipsacaceae	Indian teasel	Moderate	Calflora
	Drosanthemum floribundum	Aizoaceae	Rosy ice plant		Calflora
	Dysphania ambrosioides	Chenopodiaceae	Mexican tea		Calflora
	Erodium botrys	Geraniaceae	Big heron bill	Watchlist	Calflora
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Calflora
	Erodium moschatum	Geraniaceae	Whitestern filaree	Watchlist	Calflora
	Eucalyptus globulus	Myrtaceae	Tasmanian bluegum	Limited	Calflora
	Eucalyptus polyanthemos	Myrtaceae	Silver dollar gum		Calflora
	Eucalyptus viminalis	Myrtaceae	Manna gum		Calflora
	Euphorbia peplus	Euphorbiaceae	Petty spurge		Jon Hall personal observation
	Festuca bromoides	Poaceae	Brome fescue	Watchlist	Calflora
	Festuca myuros	Poaceae	Rattail sixweeks grass	Moderate	Calflora
	Festuca perennis	Poaceae	Italian rye grass	Watchlist	Calflora
	Foeniculum vulgare	Apiaceae	Fennel	High	Calflora
	Genista monspessulana	Fabaceae	French broom	High	Scott Couture, personal observation
	Geranium dissectum	Geraniaceae	Wild geranium	Limited	Calflora
	Hedypnois cretica	Asteraceae	Crete weed	Watchlist	Calflora
	Helminthotheca echioides	Asteraceae	Bristly ox-tongue	Limited	Calflora
	Hirschfeldia incana	Brassicaceae	Short podded mustard	Moderate	Calflora
	Hordeum marinum	Poaceae	Seaside barley	Moderate	Calflora
	Hordeum murinum ssp. leporinum	Poaceae	Farmer's foxtail	Moderate	Calflora
	Hypochaeris glabra	Asteraceae	Smooth cat's ear	Limited	Calflora
	Hypochaeris radicata	Asteraceae	Hairy cat's ear	Moderate	Calflora
	Lactuca saligna	Asteraceae	Willow lettuce	Watchlist	Calflora
	Lamium amplexicaule	Lamiaceae	Henbit		Calflora
	Lotus corniculatus	Fabaceae	Bird's foot trefoil	Watchlist	Calflora
	Lythrum hyssopifolia	Lythraceae	Hyssop loosestrife	Limited	Calflora
	Malva neglecta	Malvaceae	Common mallow		Jon Hall personal observation
	Malva pseudolavatera	Malvaceae	Cretan mallow		Calflora
	Matricaria discoidea	Asteraceae	Pineapple weed		Jon Hall personal observation
	Maytenus boaria	Celastraceae	Mayten	Watchlist	Calflora
	Medicago polymorpha	Fabaceae	California burclover	Limited	Calflora
	Melilotus indicus	Fabaceae	Annual yellow sweetclover		Calflora
	Oxalis latifolia	Oxalidaceae	Mexican oxalis		Calflora
	Panicum dichotomiflorum ssp. dichotomiflorum	Poaceae	Fall panic grass		Calflora
	Pennisetum setaceum	Poaceae	Fountaingrass	Moderate	Calflora
	Phalaris aquatica	Poaceae	Harding grass	Moderate	Jon Hall personal observation
	Plantago lanceolata	Plantaginaceae	Ribwort		Calflora
	Plantago major	Plantaginaceae	Common plantain		Calflora
	Polygonum aviculare	Polygonaceae	Prostrate knotweed		Jon Hall personal observation
	Polypogon interruptus	Poaceae	Ditch beard grass	Watchlist	Calflora
	Pyracantha angustifolia	Rosaceae	Firethorn	Limited	Calflora
	Raphanus sativus	Brassicaceae	Wild radish	Limited	Calflora
	Rumex acetosella	Polygonaceae	Sheep sorrel	Moderate	Calflora
	Rumex crispus	Polygonaceae	Curly dock	Limited	Jon Hall personal observation
	Scandix pecten-veneris	Apiaceae	Shepherd's needle		Calflora
	Silene gallica	Caryophyllaceae	Common catchfly		Calflora
	Silybum marianum	Asteraceae	Milk thistle	Limited	Calflora
	Sonchus asper	Asteraceae	Spiny sowthistle	Watchlist	Calflora
	Sonchus oleraceus	Asteraceae	Common sowthistle	Watchlist	Calflora
	Sporobolus indicus	Poaceae	Smutgrass	Watchlist	Calflora
	Stipa brachychaeta	Poaceae	Puna needle grass		Calflora
	Tamarix sp.	Tamaraciceae	Saltcedar	High	Bob Hill, SLO City
	Tragopogon porrifolius	Asteraceae	Salsify	Watchlist	Calflora
	Triticum aestivum	Poaceae	Common wheat		Jon Hall personal observation
	Veronica anagallis-aquatica	Plantaginaceae	Water speedwell		Calflora
	Vicia benghalensis	Fabaceae	Purple vetch		Calflora
	Vicia hirsuta	Fabaceae	Hairy vetch		Calflora
	Vicia villosa ssp. varia	Fabaceae	Smooth vetch		Calflora
	Vicia villosa ssp. Villosa	Fabaceae	Hairy vetch		Calflora

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
Reservoir Canyon Natural Reserve	*Ageratina adenophora*	Asteraceae	Sticky snakeroot	Moderate	Dan Dixon, personal observation
	Anagallis arvensis	Myrsinaceae	Scarlet pimpernel	Watchlist	Calflora
	Avena barbata	Poaceae	Slim oat	Moderate	Calflora
	Avena fatua	Poaceae	Wild oat	Moderate	Calflora
	Brachypodium distachyon	Poaceae	Purple false brome	Moderate	Calflora
	Brassica negra	Brassicaceae	Black mustard	Moderate	Calflora
	Bromus diandrus	Poaceae	Ripgut brome	Moderate	Calflora
	Bromus hordeaceus	Poaceae	Soft chess	Limited	Calflora
	Bromus madritensis ssp. rubens	Poaceae	Red brome	High	Calflora
	Carduus pycnocephalus	Asteraceae	Italian thistle	Moderate	Calflora
	Centaurea melitensis	Asteraceae	Tocalote	Moderate	Calflora
	Conium maculatum	Apiaceae	Poison hemlock	Moderate	Calflora
	Cynodon dactylon	Poaceae	Bermuda grass	Moderate	Jon Hall personal observation
	Ehrharta erecta	Poaceae	Panic veldtgrass	Moderate	Jon Hall personal observation
	Erigeron bonariensis	Asteraceae	Flax-leaved horseweed		Calflora
	Erodium botrys	Geraniaceae	Big heron bill	Watchlist	Calflora
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Calflora
	Erodium moschatum	Geraniaceae	Whitestem filaree	Watchlist	Calflora
	Eucalyptus globulus	Myrtaceae	Tasmanian bluegum	Moderate	Jon Hall personal observation
	Euphorbia peplus	Euphorbiaceae	Petty spurge		Jon Hall personal observation
	Festuca myuros	Poaceae	Rattail sixweeks grass	Moderate	Calflora
	Festuca perennis	Poaceae	Italian rye grass	Moderate	Calflora
	Foeniculum vulgare	Apiaceae	Fennel	High	Calflora
	Gastridium pheloides	Poaceae	Nit grass		Calflora
	Genista monspessulana	Fabaceae	French broom	High	Calflora
	Geranium dissectum	Geraniaceae	Wild geranium	Limited	Calflora
	Hirschfeldia incana	Brassicaceae	Short podded mustard	Moderate	Calflora
	Hordeum murinum	Poaceae	Foxtail barley		Calflora
	Hyphochaeris glabra	Asteraceae	Smooth cat's ear	Limited	Calflora
	Lactuca saligna	Asteraceae	Willow lettuce		Calflora
	Lamarckia aurea	Poaceae	Goldentop		Calflora
	Logfia gallica	Asteraceae	Narrowleaf cottonrose		Calflora
	Malva nicaeensis	Malvaceae	Bull mallow		Calflora
	Malva parviflora	Malvaceae	Cheeseweed		Calflora
	Marrubium vulgare	Lamiaceae	White horehound	Limited	Jon Hall personal observation
	Matricaria discoidea	Asteraceae	Pineapple weed		Calflora
	Medicago polymorpha	Fabaceae	California burclover	Limited	Calflora
	Melilotus indicus	Fabaceae	Annual yellow sweetclover	Watchlist	Calflora
	Oxalis pes-caprae	Oxalidaceae	Sourgrass	Moderate	Jon Hall personal observation
	Phalaris pardoxa	Poaceae	Hood canarygrass		Calflora
	Pittosporum undulatum	Pittosporaceae	Victorian box	Watchlist	Calflora
	Plantago lanceolata	Plantaginaceae	English plantain	Limited	Jon Hall personal observation
	Poa annua	Poaceae	Annual blue grass	Watchlist	Calflora
	Polygonum aviculare ssp. depressum	Polygonaceae	Prostrate knotweed		Calflora
	Polypogon interruptus	Poaceae	Ditch beard grass	Watchlist	Calflora
	Polypogon monspeliensis	Poaceae	Annual beard grass		Calflora
	Polypogon viridis	Poaceae	Water beard grass		Calflora
	Prunus dulcis	Rosaceae	Almond		Calflora
	Pseudognaphalium luteoalbum	Asteraceae	Jersey cudweed		Calflora
	Raphanus sativus	Brassicaceae	Jointed charlock	Limited	Calflora
	Rumex crispus	Polygonaceae	Curly dock	Limited	Calflora
	Silybum marianum	Asteraceae	Milk thistle	Limited	Calflora
	Sisymbrium officinale	Brassicaceae	Hedge mustard		Calflora
	Sonchus asper	Asteraceae	Spiny sowthistle	Watchlist	Calflora
	Sonchus oleraceus	Asteraceae	Common sowthistle	Watchlist	Calflora
	Stellaria media	Caryophyllaceae	Chickweed		Calflora
	Torilis nodosa	Apiaceae	Wild parsley	Watchlist	Calflora
	Trifolium hirtum	Fabaceae	Rose clover	Limited	Calflora
	Tropaeolum majus	Tropaeolaceae	Garden nasturtium	Watchlist	Calflora
	Vicia sativa ssp. sativa	Fabaceae	Common vetch		Calflora
	Vicia villosa ssp. varia	Fabaceae	Smooth vetch		Calflora

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
South Hills Natural Reserve	*Asparagus asparagoides*	Asparagaceae	African asparagus fern	Moderate-Alert	Jon Hall personal observation
	Avena barbata	Poaceae	Slim oat	Moderate	Jon Hall personal observation
	Avena fatua	Poaceae	Wild oat	Moderate	Jon Hall personal observation
	Bromus diandrus	Poaceae	Ripgut brome	Moderate	Calflora
	Bromus madritensis ssp. Rubens	Poaceae	Red brome	High	Jon Hall personal observation
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Jon Hall personal observation
	Eucalyptus globulus	Myrtaceae	Tasmanian bluegum	Limited	Calflora
	Euphorbia peplus	Euphorbiaceae	Petty spurge		Jon Hall personal observation
	Festuca perennis	Poaceae	Italian rye grass	Moderate	Jon Hall personal observation
	Foeniculum vulgare	Apiaceae	Fennel	High	Jon Hall personal observation
	Genista monspessulana	Fabaceae	French broom	High	Jon Hall personal observation
	Matricaria discoidea	Asteraceae	Pineapple weed		Jon Hall personal observation
	Medicago polymorpha	Fabaceae	California burclover	Limited	Jon Hall personal observation
	Nicotiana glauca	Solanaceae	Tree tobacco	Moderate	Jon Hall personal observation
	Oxalis pes-caprae	Oxalidaceae	Sourgrass	Moderate	Jon Hall personal observation
	Plantago lanceolata	Plantaginaceae	English plantain	Limited	Jon Hall personal observation
	Polygonum aviculare	Polygonaceae	Prostrate knotweed		Jon Hall personal observation
	Rubus armeniacus	Rosaceae	Himalayan blackberry	High	Dan Dixon, personal observation
	Rumex crispus	Polygonaceae	Curly dock	Limited	Jon Hall personal observation
	Schinus molle	Anacardiaceae	Peruvian pepper tree	Limited	Jon Hall personal observation
	Sonchus asper	Asteraceae	Spiny sowthistle	Watchlist	Jon Hall personal observation
	Sonchus oleraceus	Asteraceae	Common sowthistle	Watchlist	Jon Hall personal observation

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
Stenner Springs Natural Reserve	*Avena barbata*	Poacea	Slim oat	Moderate	Jon Hall personal observation
	Brassica nigra	Brassicaceae	Black mustard	Moderate	Jon Hall personal observation
	Bromus diandrus	Poacea	Ripgut brome	Moderate	Jon Hall personal observation
	Bromus hordeaceus	Poacea	Soft chess	Limited	Jon Hall personal observation
	Bromus madritensis	Poacea	Red brome	High	Jon Hall personal observation
	Carduus pycnocephalus	Asteracea	Italian thistle	Moderate	Jon Hall personal observation
	Centaurea calcitrapa	Asteracea	Purple starthistle	Moderate	Jon Hall personal observation
	Centaurea melitensis	Asteracea	Tocalote	Moderate	Jon Hall personal observation
	Centaurea solstitialis	Asteracea	Yellow starthistle	High	Jon Hall personal observation
	Conium maculatum	Apiaceae	Poison hemlock	Moderate	Jon Hall personal observation
	Cortaderia jubata	Poaceae	Jubata grass	High	Marc Lea, SLO County Ag Department
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Jon Hall personal observation
	Eucalyptus globulus	Myrtaceae	Tasmanian bluegum	Moderate	Jon Hall personal observation
	Festuca perennis	Poaceae	Italian rye grass	Moderate	Jon Hall personal observation
	Foeniculum vulgare	Apiaceae	Fennel	High	Jon Hall personal observation
	Hirschfeldia incana	Brassicaceae	Short podded mustard	Moderate	Jon Hall personal observation
	Melilotus indicus	Fabaceae	Annual yellow sweetclover	Watchlist	Jon Hall personal observation
	Plantago lanceolata	Plantaginaceae	Ribwort	Limited	Jon Hall personal observation
	Silybum marianum	Asteraceae	Milk thistle	Limited	Jon Hall personal observation
	Sonchus asper	Asteraceae	Spiny sowthistle	Watchlist	Jon Hall personal observation
	Vicia sativa	Fabaceae	Spring vetch		Jon Hall personal observation

Location	Scientific Name	Family	Common Name	CAL-IPC Rating	Source
Terrace Hill Open Space	*Avena barbata*	Poaceae	Slim oat	Moderate	Jon Hall personal observation
	Avena fatua	Poaceae	Wild oat	Moderate	Jon Hall personal observation
	Brassica nigra	Brassicaceae	Black mustard	Moderate	Jon Hall personal observation
	Bromus diandrus	Poaceae	Ripgut brome	Moderate	Jon Hall personal observation
	Chondrilla juncea	Asteraceae	Skeleton weed	Moderate	Calflora
	Cortaderia jubata	Poaceae	Jubata grass	High	Jon Hall personal observation
	Erodium botrys	Geraniaceae	Big heron bill	Watchlist	Jon Hall personal observation
	Erodium cicutarium	Geraniaceae	Coastal heron's bill	Limited	Jon Hall personal observation
	Erodium moschatum	Geraniaceae	Whitestem filaree		Jon Hall personal observation
	Festuca myuros	Poaceae	Rattail sixweeks grass	Moderate	Jon Hall personal observation
	Festuca perennis	Poaceae	Italian rye grass	Moderate	Jon Hall personal observation
	Foeniculum vulgare	Apiaceae	Fennel	High	Calflora
	Genista monspessulana	Fabaceae	French broom	High	Marc Lea, SLO County Ag Department
	Hirschfeldia incana	Brassicaceae	Short podded mustard	Moderate	Jon Hall personal observation
	Hordeum murinum	Poaceae	Foxtail barley	Moderate	Jon Hall personal observation
	Lactuca serriola	Asteraceae	Prickly lettuce	Watchlist	Jon Hall personal observation
	Lamarckia aurea	Poaceae	Goldentop		Jon Hall personal observation
	Malva neglecta	Malvaceae	Common mallow		Jon Hall personal observation
	Medicago polymorpha	Fabaceae	California burclover	Limited	Jon Hall personal observation
	Oxalis pes-caprae	Oxalidaceae	Sourgrass	Moderate	Jon Hall personal observation
	Pennisetum setaceum	Poaceae	Fountaingrass	Moderate	Jon Hall personal observation
	Plantago lanceolata	Plantaginaceae	English plantain	Limited	Jon Hall personal observation
	Taraxacum officinale	Asteraceae	Dandelion		Jon Hall personal observation
	Triticum aestivum	Poaceae	Common wheat		Jon Hall personal observation

3.2 Non-Native Plant Species Prioritization

Non-native plant lists created for each open space area were prioritized for control. To subjectively evaluate invasive plants requiring control, a prioritization scoring matrix developed by Tim Hyland (CA State Parks, Santa Cruz District) was utilized. In this prioritization system, highest priority goes to the combination of greatest potential threat to sensitive resources and ease of control. The prioritization matrix assigns a numerical value in each of the following Categories:

- **Goal**
- **Rate/Likelihood of Spread**
- **Threat to Sensitive Resources**
- **Logistics**
- **Politics**
- **Potential for Success**
- **Eradication dividend**

Goal: A numerical value from 1 to 5 was assigned to each species based on the goal when managing the species. These management goals correspond to different categories of specific actions planned in section 2.2. The highest rating goes to species with incipient population small enough to achieve complete eradication (Eradication). The lowest value is given to species that are so widespread that control would be on-going in perpetuity (Sustained Control).

- Eradication (5) – population is small and isolated enough that complete eradication of all plants and reproductive propagules is possible with little chance of re-introduction (Category II & III).
- Elimination/Zero Density (4) – Population is of high enough priority or small enough size to completely eliminate it from an Open Space Area, but the population is widespread enough that re-introduction is likely (Category III).
- Outlier Control (3) – When populations are present as large infestations in City Open Space Areas, the first priority is to eliminate small outlier populations away from the larger infestation (Category III).
- Perimeter Control (2) – When populations are present as large infestations in City Open Space Areas, once outlier populations have been eliminated, management focus switches to control around the perimeter of the larger infestation moving from the fringes towards the center (Category III).
- Sustained Control (1) – The species is so widespread that elimination from Open Space Areas is unlikely due to population size and pressure of continual reintroduction from neighboring properties. Control areas would most likely focus on specific high priority areas impacted from the species with a long term commitment expected (Category IV).

Rate/Likelihood of Spread: A numerical value from 1 to 3. Does the plant have new areas to move into and possess a high rate of invasion (Score 3), or has it already occupied all suitable niches (Score 1)?

Threat to Sensitive Resources: A numerical value from 1 to 3. A score of 3 means the species poses a severe threat to sensitive resources (listed species or rare habitats). A species that doesn't pose any significant threats to sensitive resources is scored 1. The California Invasive Plant Council (CalIPC) maintains "The California Invasive Plant Inventory" (http://www.cal-ipc.org/ip/inventory), which categorizes non-native invasive plants that threaten the state's wildlands. Categorization is based on an assessment of the ecological impacts of each plant. The Inventory represents the best available knowledge of invasive plant experts in the state. The Inventory categorizes plants as High, Moderate, or Limited, reflecting the level of each species' negative ecological impact in California. This inventory was used to help inform some of the plant ratings for "Threat to Sensitive Resources". A Cal-IPC inventory rating of High would receive a score of 3 and an inventory rating of limited would receive a score of 1.

Logistics: A numerical value from 1 to 3. This category evaluates how difficult it is to control a species. A value of 3 is given to species easy to access with adequate control techniques already known. A value of 1 is given to populations with difficult access and time intensive control techniques. Factors considered for this rating are:

- Distance from base of operations
- Steep slopes
- Accessibility
- Poison oak
- Complexity of control techniques

Politics: A numerical value from 1 to 3. A value of 3 has no political hurdles, good public support (i.e. already worked on by local Agriculture Department or Weed Management Area), and minimal permitting. A value of 1 would go to species with strong public opposition to removal. Some tree species fall into this category, where the public has a strong tie to a "Heritage" tree that is a non-native invasive plant. Politics ratings consider the following factors:

- Multiple Land Owners
- Visibility of Project
- Public Perception
- Permitting
- Other entities interested in helping

Potential for Success: A numerical value from 1 to 3. "Potential for success" evaluates the plant, its population size and distribution and the biology of the species to rate the feasibility of achieving adequacy of control. A species where control is considered to have a high potential for success is given a 3. If the species has an incredibly long lived seed bank, is hard to detect and has no good control options it would receive a lower rating of 1. Factors considered when evaluating the potential for success include:

- Efficacy of Control
- Seed Bank
- Detectability
- Life Cycle
- Likelihood of Reinvasion

Eradication Dividend: A numerical value from 1 to 3. Eradication dividend evaluates the effort required to maintain management. If we don't work on it now, how much is this going to cost us in the future? If the species is a minimal cost to control right now, but could be a big problem with expensive controls in the future, it would receive a rank of 3.

Scoring Matrix –

To build the scoring matrix, the Category "Goal" receives a value from 1 to 5 and all other categories are scored from 1 to 3. Values for each Category are combined to give an overall Prioritization Ranking (Fig. 1). Species scoring the highest priority ranking combine ease of control with severe threats to sensitive resources. Some species may be widespread on one City Open Space but contain only small incipient populations on another. This may lead to different invasive plant management goals for each Open Space Area. Therefore, all species are ranked separately for each Open Space Area (Table 3).

Scientific Name	Family	Common Name	CAL-IPC Rating	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
Centaurea solstitialis	Asteraceae	Yellow starthistle	High	Eradication	5	3	3	2	3	2	3	21
Genista monspessulana	Fabaceae	French Broom	High	Outlier Control	3	3	3	1	2	2	3	17
Silybum marianum	Asteraceae	Milk thistle	Limited	Elimination/Zero Density	4	2	2	2	2	2	2	16
Centaurea calcitrapa	Asteracea	Purple starthistle	Moderate	Elimination/Zero Density	4	2	2	2	2	2	2	16

Figure 1. Example priority ranking table.

Based on their Prioritization Ranking, species are assigned one of the following Prioritization Categories:

Prioritization Category	Priotization Ranking
High	16 to 23
Medium	13 to 15
Low	7 to 12
Watchlist	Not Applicable

Watchlist Species are *present in the region but not in SLO City Open Space Areas*. These species were determined by consultation with the California Invasive Plant Council, SLO County Department of Agriculture and SLO Weed Management Area to determine which species were nearby and posed a significant threat to SLO Open Space Areas. Watchlist species are targets for prevention as well as an early detection/rapid response control strategy. Watchlist species for SLO City Open Space Areas are included in Table 2.

Table 2. Watchlist species for SLO City Open Space Areas

Common Name	Species	Family	CDFA Listing	Cal-IPC Ranking	Priority
Giant reed	Arundo donax	Poaceae		High	Watch-List
Stinkwort	Dittrichea graveolens	Asteraceae		Moderate	Watch-List
Artichoke thistle	Cynara cardunculus	Asteraceae	BW	Moderate	Watch-List
Oblong spurge	Euphorbia oblongata	Euphorbiaceae	W	Limited	Watch-List
Medusahead	Elymus caput-medusae	Poaceae		High	Watch-List

Table 3. Prioritized List of Weed Species

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
HIGH	Stenner Springs Natural Reserve	Jubata grass	Eradication	5	3	3	2	3	3	3	22
	Cerro San Luis Natural Reserve	Yellow starthistle	Eradication	5	3	3	2	3	2	3	21
	Bishop Peak Natural Reserve	Yellow starthistle	Eradication	5	3	2	2	3	3	3	21
	Terrace Hill Open Space	Jubata grass	Eradication	5	3	2	3	3	3	2	21
	Irish Hills Natural Reserve	Jubata grass	Eradication	5	3	3	2	2	3	3	21
	Johnson Ranch Open Space	Jubata grass	Eradication	5	3	3	2	2	3	3	21
	Laguna Lake Natural Reserve	Saltcedar	Eradication	5	3	3	1	2	3	3	20
	Laguna Lake Natural Reserve	Jubata grass	Eradication	5	3	3	2	2	2	3	20
	Stenner Springs Natural Reserve	Yellow starthistle	Outlier Control	3	3	3	2	3	2	3	19
	Irish Hills Natural Reserve	Yellow starthistle	Outlier Control	3	3	3	2	3	2	3	19
	Irish Hills Natural Reserve	Woolly distaff thistle	Eradication	5	3	2	2	3	2	2	19
	Johnson Ranch Open Space	Woolly distaff thistle	Eradication	5	3	2	2	3	2	2	19
	Bishop Peak Natural Reserve	Woolly distaff thistle	Eradication	5	3	2	2	3	2	2	19
	Irish Hills Natural Reserve	Tree-of-heaven	Eradication	5	3	2	2	2	3	2	19
	Laguna Lake Natural Reserve	French broom	Elimination/Zero Density	4	3	3	2	2	2	3	19
	Terrace Hill Open Space	French broom	Elimination/Zero Density	4	3	3	2	2	2	3	19
	South Hills Natural Reserve	French broom	Elimination/Zero Density	4	3	3	2	2	2	3	19

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
MEDIUM	South Hills Natural Reserve	Himalayan blackberry	Elimination/Zero Density	4	3	3	2	2	2	2	18
	Irish Hills Natural Reserve	Himalayan blackberry	Elimination/Zero Density	4	3	3	2	2	2	2	18
	Johnson Ranch Open Space	Himalayan blackberry	Elimination/Zero Density	4	3	3	2	2	2	2	18
	Stenner Springs Natural Reserve	Fennel	Elimination/Zero Density	4	3	3	2	2	2	2	18
	Irish Hills Natural Reserve	Cape ivy	Elimination/Zero Density	4	3	3	2	2	2	2	18
	Bishop Peak Natural Reserve	Artichoke thistle	Eradication	5	2	2	2	3	2	2	18
	Johnson Ranch Open Space	Whitetop	Elimination/Zero Density	4	2	2	2	3	2	2	17
	Cerro San Luis Natural Reserve	French Broom	Outlier Control	3	3	3	1	2	2	3	17
	Stenner Springs Natural Reserve	Purple starthistle	Elimination/Zero Density	4	2	2	2	2	2	2	16
	Bishop Peak Natural Reserve	Purple starthistle	Elimination/Zero Density	4	2	2	2	2	2	2	16
	Cerro San Luis Natural Reserve	Purple starthistle	Elimination/Zero Density	4	2	2	2	2	2	2	16
	Laguna Lake Natural Reserve	Purple starthistle	Elimination/Zero Density	4	2	2	2	2	2	2	16
	Johnson Ranch Open Space	Onion weed	Elimination/Zero Density	4	2	2	2	2	2	2	16
	Cerro San Luis Natural Reserve	Milk thistle	Elimination/Zero Density	4	2	2	2	2	2	2	16
	Irish Hills Natural Reserve	Gazania	Eradication	5	2	1	2	2	2	2	16
	Bishop Peak Natural Reserve	Gazania	Eradication	5	2	1	2	2	2	2	16
	Reservoir Canyon Natural Reserve	French broom	Perimeter Control	2	3	2	2	2	2	3	16
	Irish Hills Natural Reserve	French broom	Perimeter Control	2	3	3	1	2	2	3	16
	Bob Jones Bike Trail	Whitetop	Elimination/Zero Density	4	2	2	1	2	2	2	15
	Reservoir Canyon Natural Reserve	Sticky snakeroot	Outlier Control	3	2	2	2	2	2	2	15
	Laguna Lake Natural Reserve	Skeleton weed	Outlier Control	3	2	2	2	3	2	1	15
	Filipponi Ecological Reserve	Milk thistle	Outlier Control	3	2	2	2	2	2	2	15
	Reservoir Canyon Natural Reserve	Milk thistle	Outlier Control	3	2	2	2	2	2	2	15
	Bob Jones Bike Trail	Milk thistle	Outlier Control	3	2	2	2	2	2	2	15
	Irish Hills Natural Reserve	Milk thistle	Outlier Control	3	2	2	2	2	2	2	15
	Johnson Ranch Open Space	Milk thistle	Outlier Control	3	2	2	2	2	2	2	15
	Laguna Lake Natural Reserve	Milk thistle	Outlier Control	3	2	2	2	2	2	2	15
	Bishop Peak Natural Reserve	Iberian knapweed	Outlier Control	3	2	2	2	2	2	2	15
	Johnson Ranch Open Space	Fuller's teasel	Elimination/Zero Density	4	2	2	2	2	2	1	15
	Reservoir Canyon Natural Reserve	Fennel	Perimeter Control	2	3	2	2	2	2	2	15
	Irish Hills Natural Reserve	Vinca	Sustained Control	1	3	2	2	2	2	2	14
	Reservoir Canyon Natural Reserve	Victorian box	Outlier Control	3	2	2	2	2	2	1	14
	South Hills Natural Reserve	Tree tobacco	Outlier Control	3	2	2	2	2	2	1	14
	Johnson Ranch Open Space	Tree tobacco	Elimination/Zero Density	4	2	1	2	2	2	1	14
	Reservoir Canyon Natural Reserve	Tasmanian bluegum	Outlier Control	3	2	2	2	1	2	2	14
	Bishop Peak Natural Reserve	Skeleton weed	Elimination/Zero Density	4	1	1	2	3	2	1	14
	Stenner Springs Natural Reserve	Short podded mustard	Outlier Control	3	3	2	1	2	1	2	14
	Bishop Peak Natural Reserve	Short podded mustard	Outlier Control	3	2	2	2	2	2	1	14
	Johnson Ranch Open Space	Short podded mustard	Perimeter Control	2	2	2	2	2	2	2	14
	Bob Jones Bike Trail	Purple starthistle	Outlier Control	3	2	2	2	2	2	1	14
	Cerro San Luis Natural Reserve	Iceplant	Perimeter Control	2	2	2	2	2	2	2	14
	Terrace Hill Open Space	Fountaingrass	Perimeter Control	2	2	2	2	2	2	2	14
	Bishop Peak Natural Reserve	Fennel	Sustained Control	1	3	2	2	2	2	2	14
	Terrace Hill Open Space	Fennel	Sustained Control	1	3	2	2	2	2	2	14
	South Hills Natural Reserve	Fennel	Sustained Control	1	2	3	2	2	2	2	14
	Laguna Lake Natural Reserve	Fennel	Sustained Control	1	2	3	2	2	2	2	14
	Bob Jones Bike Trail	Fennel	Sustained Control	1	3	2	2	2	2	2	14
	Johnson Ranch Open Space	Fennel	Sustained Control	1	3	2	2	2	2	2	14
	Bob Jones Bike Trail	Elmleaf bramble	Sustained Control	1	3	3	1	2	1	3	14
	Bob Jones Bike Trail	Cape ivy	Sustained Control	1	3	3	1	2	1	3	14
	Cerro San Luis Natural Reserve	Bull thistle	Outlier Control	3	2	2	2	2	2	1	14
	Stenner Springs Natural Reserve	Milk thistle	Elimination/Zero Density	4	2	1	2	2	2	1	14
	Bob Jones Bike Trail	Bird's rape mustard	Perimeter Control	2	2	2	2	2	2	2	14

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Cerro San Luis Natural Reserve	Woolly cotoneaster	Perimeter Control	2	2	2	2	2	2	1	13
	Filipponi Ecological Reserve	Whitetop	Perimeter Control	2	2	2	1	2	2	2	13
	Reservoir Canyon Natural Reserve	White horehound	Outlier Control	3	2	1	2	2	2	1	13
	Johnson Ranch Open Space	White horehound	Outlier Control	3	2	1	2	2	2	1	13
	Stenner Springs Natural Reserve	Tasmanian bluegum	Perimeter control	2	2	2	2	1	2	2	13
	Irish Hills Natural Reserve	Sweet pea	Elimination/Zero Density	4	2	1	2	1	2	1	13
	Reservoir Canyon Natural Reserve	Short podded mustard	Outlier Control	3	2	2	1	2	1	2	13
	Laguna Lake Natural Reserve	Short podded mustard	Outlier Control	3	2	2	1	2	1	2	13
	Cerro San Luis Natural Reserve	Short podded mustard	Outlier Control	3	2	2	2	2	1	1	13
	Stenner Springs Natural Reserve	Poison hemlock	Sustained Control	1	2	2	2	2	2	2	13
	South Hills Natural Reserve	Peruvian pepper tree	Perimeter Control	2	2	2	2	1	2	2	13
	Cerro San Luis Natural Reserve	Peruvian pepper tree	Perimeter Control	2	2	2	2	1	2	2	13
	Reservoir Canyon Natural Reserve	Panic veldtgrass	Outlier Control	3	2	2	1	2	1	2	13
	Bishop Peak Natural Reserve	Mediterranean linseed	Outlier Control	3	2	1	2	2	1	2	13
	Cerro San Luis Natural Reserve	Fountaingrass	Perimeter Control	2	2	2	2	2	1	2	13
	Cerro San Luis Natural Reserve	Fennel	Sustained Control	1	2	2	2	2	2	2	13
	Filipponi Ecological Reserve	Fennel	Sustained Control	1	2	2	2	2	2	2	13
	Bob Jones Bike Trail	Canary Island date palm	Elimination/Zero Density	4	1	2	2	1	2	1	13
	Irish Hills Natural Reserve	Canary Island date palm	Elimination/Zero Density	4	2	1	2	1	2	1	13
	Laguna Lake Natural Reserve	Bullthistle	Outlier Control	3	2	2	2	2	1	1	13
	South Hills Natural Reserve	Tasmanian bluegum	Perimeter Control	2	2	2	2	1	2	2	13
	Laguna Lake Natural Reserve	Tasmanian bluegum	Perimeter Control	2	2	2	2	1	2	2	13
	Stenner Springs Natural Reserve	Black mustard	Perimeter control	2	2	2	2	2	2	1	13
	Bishop Peak Natural Reserve	Black mustard	Perimeter Control	2	2	2	2	2	2	1	13
	South Hills Natural Reserve	African asparagus fern	Outlier Control	3	2	2	1	2	1	2	13
	Bob Jones Bike Trail	White horehound	Outlier Control	3	1	1	2	2	2	1	12
	Bob Jones Bike Trail	Vinca	Perimeter Control	2	2	2	1	2	1	2	12
	Stenner Springs Natural Reserve	Tocalote	Sustained Control	1	3	2	1	2	1	2	12

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Johnson Ranch Open Space	Tocalote	Sustained Control	1	3	2	1	2	1	2	12
	Reservoir Canyon Natural Reserve	Tocalote	Sustained Control	1	3	2	1	2	1	2	12
	Cerro San Luis Natural Reserve	Tocalote	Sustained Control	1	3	2	1	2	1	2	12
	Filipponi Ecological Reserve	Tocalote	Sustained Control	1	3	2	1	2	1	2	12
	Laguna Lake Natural Reserve	Tocalote	Sustained Control	1	3	2	1	2	1	2	12
	Irish Hills Natural Reserve	Tocalote	Sustained Control	1	3	2	1	2	1	2	12
	Bishop Peak Natural Reserve	Tocalote	Sustained Control	1	3	2	1	2	1	2	12
	South Hills Natural Reserve	Sourgrass	Sustained Control	1	2	2	2	2	2	1	12
	Terrace Hill Open Space	Skeleton weed	Sustained Control	1	2	2	2	3	1	1	12
	Laguna Lake Natural Reserve	Petty spurge	Sustained Control	1	3	2	1	2	1	2	12
	Filipponi Ecological Reserve	Peruvian pepper tree	Perimeter Control	2	1	2	2	1	2	2	12
	Irish Hills Natural Reserve	Opium poppy	Outlier Control	3	2	1	1	2	2	1	12
	Irish Hills Natural Reserve	Kikuyugrass	Outlier Control	3	2	1	1	2	2	1	12
	Laguna Lake Natural Reserve	Indian teasel	Perimeter Control	2	2	2	2	2	1	1	12
	Cerro San Luis Natural Reserve	Fuller's teasel	Sustained Control	1	2	2	2	2	2	1	12
	Laguna Lake Natural Reserve	Fountaingrass	Perimeter Control	2	2	2	2	2	1	1	12
	Bishop Peak Natural Reserve	Common wheat	Outlier Control	3	1	1	2	2	2	1	12
	Bishop Peak Natural Reserve	Bermuda grass	Perimeter Control	2	2	2	2	1	2	1	12
	Terrace Hill Open Space	Short podded mustard	Sustained Control	1	2	2	2	2	1	1	11
	Filipponi Ecological Reserve	Short podded mustard	Sustained Control	1	2	2	2	2	1	1	11
	Reservoir Canyon Natural Reserve	Rose clover	Sustained Control	1	2	2	2	2	1	1	11
	Stenner Springs Natural Reserve	Red brome	Sustained Control	1	3	3	1	1	1	1	11
	Bob Jones Bike Trail	Red brome	Sustained Control	1	3	2	1	1	1	2	11
	Johnson Ranch Open Space	Red brome	Sustained Control	1	3	2	1	1	1	2	11
	Reservoir Canyon Natural Reserve	Poison hemlock	Sustained Control	1	2	2	1	2	1	2	11
	Laguna Lake Natural Reserve	Poison hemlock	Sustained Control	1	2	2	1	2	1	2	11
	Irish Hills Natural Reserve	Poison hemlock	Sustained Control	1	2	2	1	2	1	2	11
	Filipponi Ecological Reserve	Poison hemlock	Sustained Control	1	2	2	1	2	1	2	11
	South Hills Natural Reserve	Petty spurge	Sustained Control	1	2	2	1	2	1	2	11
	Laguna Lake Natural Reserve	Naked lady	Outlier Control	3	1	1	2	2	1	1	11
	Laguna Lake Natural Reserve	Mediterranean linseed	Outlier Control	3	2	1	1	2	1	1	11
	Reservoir Canyon Natural Reserve	Italian rye grass	Sustained Control	1	3	2	1	1	1	2	11
	Filipponi Ecological Reserve	Fuller's teasel	Sustained Control	1	2	2	1	2	1	2	11

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Johnson Ranch Open Space	Dwarf nettle	Sustained Control	1	2	1	2	2	2	1	11
	Bishop Peak Natural Reserve	Dallis grass	Outlier Control	3	2	1	1	2	1	1	11
	Bishop Peak Natural Reserve	Common velvetgrass	Perimeter Control	2	2	2	1	1	1	2	11
	Bishop Peak Natural Reserve	Coastal heron's bill	Sustained Control	1	2	2	1	2	1	2	11
	Bob Jones Bike Trail	Castor bean	Sustained Control	1	2	1	2	2	2	1	11
	Terrace Hill Open Space	Black mustard	Sustained Control	1	2	2	2	2	1	1	11
	Cerro San Luis Natural Reserve	Black mustard	Sustained Control	1	2	2	2	2	1	1	11
	Laguna Lake Natural Reserve	Black mustard	Sustained Control	1	2	2	2	2	1	1	11
	Bob Jones Bike Trail	Black mustard	Sustained Control	1	2	2	2	2	1	1	11
	Johnson Ranch Open Space	Black mustard	Sustained Control	1	2	2	2	2	1	1	11
	Filipponi Ecological Reserve	Black mustard	Sustained Control	1	2	2	1	2	1	2	11
	Filipponi Ecological Reserve	Bird's rape mustard	Perimeter Control	2	2	2	1	2	1	1	11
	South Hills Natural Reserve	Spiny sowthistle	Sustained Control	1	2	1	2	2	1	1	10
	Reservoir Canyon Natural Reserve	Sourgrass	Sustained Control	1	2	1	1	2	1	2	10
	Terrace Hill Open Space	Sourgrass	Sustained Control	1	2	2	1	2	1	1	10
	Cerro San Luis Natural Reserve	Sourgrass	Sustained Control	1	2	2	1	2	1	1	10
	Irish Hills Natural Reserve	Sorghum	Sustained Control	1	2	1	2	2	1	1	10
	Laguna Lake Natural Reserve	Silver dollar gum	Perimeter Control	2	1	1	2	1	2	1	10
	Bob Jones Bike Trail	Short podded mustard	Sustained Control	1	2	2	1	2	1	1	10
	Bishop Peak Natural Reserve	Ripgut brome	Sustained Control	1	2	2	1	1	1	2	10
	Bishop Peak Natural Reserve	Red brome	Sustained Control	1	2	2	1	1	1	2	10
	Reservoir Canyon Natural Reserve	Red brome	Sustained Control	1	2	2	1	1	1	2	10
	South Hills Natural Reserve	Red brome	Sustained Control	1	2	2	1	1	1	2	10
	Cerro San Luis Natural Reserve	Red brome	Sustained Control	1	2	2	1	1	1	2	10
	Laguna Lake Natural Reserve	Red brome	Sustained Control	1	2	2	1	1	1	2	10
	South Hills Natural Reserve	Prostrate knotweed	Sustained Control	1	2	1	2	2	1	1	10
	Bob Jones Bike Trail	Poison hemlock	Sustained Control	1	2	2	1	2	1	1	10
	Bob Jones Bike Trail	Petty spurge	Sustained Control	1	2	2	1	2	1	1	10
	Filipponi Ecological Reserve	Petty spurge	Sustained Control	1	2	2	1	2	1	1	10
	Bob Jones Bike Trail	Peruvian pepper tree	Perimeter Control	2	1	1	2	1	2	1	10
	Laguna Lake Natural Reserve	Manna gum	Perimeter Control	2	1	1	2	1	2	1	10
	Bishop Peak Natural Reserve	Italian thistle	Sustained Control	1	2	2	1	2	1	1	10
	Johnson Ranch Open Space	Italian thistle	Sustained Control	1	2	2	1	2	1	1	10

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Stenner Springs Natural Reserve	Italian thistle	Sustained Control	1	2	2	1	2	1	1	10
	Reservoir Canyon Natural Reserve	Italian thistle	Sustained Control	1	2	2	1	2	1	1	10
	Cerro San Luis Natural Reserve	Italian thistle	Sustained Control	1	2	2	1	2	1	1	10
	Bob Jones Bike Trail	Italian thistle	Sustained Control	1	2	2	1	2	1	1	10
	Irish Hills Natural Reserve	Italian thistle	Sustained Control	1	2	2	1	2	1	1	10
	Filipponi Ecological Reserve	Italian thistle	Sustained Control	1	2	2	1	2	1	1	10
	Bishop Peak Natural Reserve	Italian rye grass	Sustained Control	1	2	2	1	1	1	2	10
	South Hills Natural Reserve	Italian rye grass	Sustained Control	1	2	2	1	1	1	2	10
	Cerro San Luis Natural Reserve	Italian rye grass	Sustained Control	1	2	2	1	1	1	2	10
	Laguna Lake Natural Reserve	Italian rye grass	Sustained Control	1	2	2	1	1	1	2	10
	Laguna Lake Natural Reserve	Harding grass	Sustained Control	1	2	2	1	2	1	1	10
	Terrace Hill Open Space	English plantain	Sustained Control	1	2	1	2	2	1	1	10
	Terrace Hill Open Space	Common wheat	Sustained Control	1	1	1	2	2	2	1	10
	Bob Jones Bike Trail	Common sowthistle	Sustained Control	1	2	2	1	2	1	1	10
	South Hills Natural Reserve	Common sowthistle	Sustained Control	1	2	1	2	2	1	1	10
	Laguna Lake Natural Reserve	Bladderflower	Perimeter Control	2	2	1	1	2	1	1	10
	Reservoir Canyon Natural Reserve	Black mustard	Sustained Control	1	2	2	1	2	1	1	10
	Reservoir Canyon Natural Reserve	Bermuda grass	Perimeter Control	2	1	2	1	1	1	2	10
	Bishop Peak Natural Reserve	Wild oat	Sustained Control	1	2	2	1	1	1	1	9
	Terrace Hill Open Space	Wild oat	Sustained Control	1	2	2	1	1	1	1	9
	Reservoir Canyon Natural Reserve	Wild oat	Sustained Control	1	2	2	1	1	1	1	9
	South Hills Natural Reserve	Wild oat	Sustained Control	1	2	2	1	1	1	1	9
	Cerro San Luis Natural Reserve	Wild oat	Sustained Control	1	2	2	1	1	1	1	9
	Laguna Lake Natural Reserve	Wild oat	Sustained Control	1	2	2	1	1	1	1	9
	Bob Jones Bike Trail	Wild oat	Sustained Control	1	2	2	1	1	1	1	9
	Irish Hills Natural Reserve	Wild oat	Sustained Control	1	2	2	1	1	1	1	9
	Johnson Ranch Open Space	Wild oat	Sustained Control	1	2	2	1	1	1	1	9
	Filipponi Ecological Reserve	Wild oat	Sustained Control	1	2	2	1	1	1	1	9
	Bob Jones Bike Trail	Wild radish	Sustained Control	1	2	1	1	2	1	1	9
	Laguna Lake Natural Reserve	Wild radish	Sustained Control	1	2	1	1	2	1	1	9

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Filipponi Ecological Reserve	Wild radish	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Wild parsley	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Wild geranium	Sustained Control	1	2	1	1	2	1	1	9
	Laguna Lake Natural Reserve	Whitestern filaree	Sustained Control	1	2	1	1	2	1	1	9
	Bob Jones Bike Trail	Whitestern filaree	Sustained Control	1	2	1	1	2	1	1	9
	Irish Hills Natural Reserve	Whitestern filaree	Sustained Control	1	2	1	1	2	1	1	9
	Filipponi Ecological Reserve	Whitestern filaree	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Whitestem filaree	Sustained Control	1	2	1	1	2	1	1	9
	Terrace Hill Open Space	Whitestem filaree	Sustained Control	1	2	1	1	2	1	1	9
	Irish Hills Natural Reserve	Water mint	Sustained Control	1	2	1	1	2	1	1	9
	Bob Jones Bike Trail	Spiny sowthistle	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Spiny sowthistle	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	Spiny sowthistle	Sustained Control	1	2	1	1	2	1	1	9
	Cerro San Luis Natural Reserve	Spiny sowthistle	Sustained Control	1	2	1	1	2	1	1	9
	Laguna Lake Natural Reserve	Spiny sowthistle	Sustained Control	1	2	1	1	2	1	1	9
	Filipponi Ecological Reserve	Spiny sowthistle	Sustained Control	1	2	1	1	2	1	1	9
	Irish Hills Natural Reserve	Sourgrass	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	Sourgrass	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Smooth cat's ear	Sustained Control	1	2	1	1	2	1	1	9
	Laguna Lake Natural Reserve	Smooth cat's ear	Sustained Control	1	2	1	1	2	1	1	9
	Bob Jones Bike Trail	Smilo grass	Sustained Control	1	2	1	1	2	1	1	9
	Irish Hills Natural Reserve	Small bur clover	Sustained Control	1	2	1	1	2	1	1	9
	Bishop Peak Natural Reserve	Slim oat	Sustained Control	1	2	2	1	1	1	1	9
	Terrace Hill Open Space	Slim oat	Sustained Control	1	2	2	1	1	1	1	9
	South Hills Natural Reserve	Slim oat	Sustained Control	1	2	2	1	1	1	1	9
	Reservoir Canyon Natural Reserve	Slim oat	Sustained Control	1	2	2	1	1	1	1	9
	Cerro San Luis Natural Reserve	Slim oat	Sustained Control	1	2	2	1	1	1	1	9
	Laguna Lake Natural Reserve	Slim oat	Sustained Control	1	2	2	1	1	1	1	9
	Bob Jones Bike Trail	Slim oat	Sustained Control	1	2	2	1	1	1	1	9
	Irish Hills Natural Reserve	Slim oat	Sustained Control	1	2	2	1	1	1	1	9
	Reservoir Canyon Natural Reserve	Scarlet pimpernel	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Ripgut brome	Sustained Control	1	2	2	1	1	1	1	9

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Terrace Hill Open Space	Ripgut brome	Sustained Control	1	2	2	1	1	1	1	9
	South Hills Natural Reserve	Ripgut brome	Sustained Control	1	2	2	1	1	1	1	9
	Cerro San Luis Natural Reserve	Ripgut brome	Sustained Control	1	2	2	1	1	1	1	9
	Laguna Lake Natural Reserve	Ripgut brome	Sustained Control	1	2	2	1	1	1	1	9
	Bob Jones Bike Trail	Ripgut brome	Sustained Control	1	2	2	1	1	1	1	9
	Johnson Ranch Open Space	Ripgut brome	Sustained Control	1	2	2	1	1	1	1	9
	Filipponi Ecological Reserve	Ripgut brome	Sustained Control	1	2	2	1	1	1	1	9
	Stenner Springs Natural Reserve	Ribwort	Sustained Control	1	2	1	1	2	1	1	9
	Irish Hills Natural Reserve	Rattlesnake grass	Sustained Control	1	2	1	1	2	1	1	9
	Terrace Hill Open Space	Rattail sixweeks grass	Sustained Control	1	2	2	1	1	1	1	9
	Bishop Peak Natural Reserve	Spiny sowthistle	Sustained Control	1	2	1	1	2	1	1	9
	Stenner Springs Natural Reserve	Spiny sowthistle	Sustained Control	1	2	1	1	2	1	1	9
	Terrace Hill Open Space	Prickly lettuce	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	Prickly lettuce	Sustained Control	1	2	1	1	2	1	1	9
	Bob Jones Bike Trail	Prickly lettuce	Sustained Control	1	2	1	1	2	1	1	9
	Filipponi Ecological Reserve	Prickly lettuce	Sustained Control	1	2	1	1	2	1	1	9
	Bishop Peak Natural Reserve	Pineapple weed	Sustained Control	1	2	1	1	2	1	1	9
	South Hills Natural Reserve	Pineapple weed	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	Pineapple weed	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Pineapple weed	Sustained Control	1	2	1	1	2	1	1	9
	Laguna Lake Natural Reserve	Pineapple weed	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Petty spurge	Sustained Control	1	2	1	1	2	1	1	9
	Bishop Peak Natural Reserve	Nettle leaf goosefoot	Sustained Control	1	1	1	2	2	1	1	9
	Reservoir Canyon Natural Reserve	Jointed charlock	Sustained Control	1	2	1	1	2	1	1	9
	Terrace Hill Open Space	Italian rye grass	Sustained Control	1	2	2	1	1	1	1	9
	Johnson Ranch Open Space	Italian rye grass	Sustained Control	1	2	2	1	1	1	1	9
	Laguna Lake Natural Reserve	Hairy cat's ear	Sustained Control	1	2	1	1	2	1	1	9
	Bob Jones Bike Trail	Hairy cat's ear	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Garden nasturtium	Sustained Control	1	2	1	1	2	1	1	9
	Bob Jones Bike Trail	Garden nasturtium	Sustained Control	1	1	2	1	2	1	1	9

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Bishop Peak Natural Reserve	Foxtail barley	Sustained Control	1	2	2	1	1	1	1	9
	Irish Hills Natural Reserve	Flax-leaved horseweed	Sustained Control	1	2	1	1	2	1	1	9
	Bishop Peak Natural Reserve	English plantain	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	English plantain	Sustained Control	1	2	1	1	2	1	1	9
	Bishop Peak Natural Reserve	Curly dock	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Curly dock	Sustained Control	1	2	1	1	2	1	1	9
	Laguna Lake Natural Reserve	Curly dock	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	Curly dock	Sustained Control	1	2	1	1	2	1	1	9
	Laguna Lake Natural Reserve	Common wheat	Sustained Control	1	1	1	2	2	1	1	9
	Johnson Ranch Open Space	Common sowthistle	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Common sowthistle	Sustained Control	1	2	1	1	2	1	1	9
	Bishop Peak Natural Reserve	Common mallow	Sustained Control	1	2	1	1	2	1	1	9
	Terrace Hill Open Space	Common mallow	Sustained Control	1	2	1	1	2	1	1	9
	Laguna Lake Natural Reserve	Common mallow	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	Common mallow	Sustained Control	1	2	1	1	2	1	1	9
	Filipponi Ecological Reserve	Common mallow	Sustained Control	1	2	1	1	2	1	1	9
	Stenner Springs Natural Reserve	Coastal heron's bill	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Coastal heron's bill	Sustained Control	1	2	1	1	2	1	1	9
	Terrace Hill Open Space	Coastal heron's bill	Sustained Control	1	2	1	1	2	1	1	9
	South Hills Natural Reserve	Coastal heron's bill	Sustained Control	1	2	1	1	2	1	1	9
	Laguna Lake Natural Reserve	Coastal heron's bill	Sustained Control	1	2	1	1	2	1	1	9
	Bob Jones Bike Trail	Coastal heron's bill	Sustained Control	1	2	1	1	2	1	1	9
	Irish Hills Natural Reserve	Coastal heron's bill	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	Coastal heron's bill	Sustained Control	1	2	1	1	2	1	1	9
	Filipponi Ecological Reserve	Coastal heron's bill	Sustained Control	1	2	1	1	2	1	1	9
	Bishop Peak Natural Reserve	California burclover	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	California burclover	Sustained Control	1	2	1	1	2	1	1	9
	Terrace Hill Open Space	California burclover	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	California burclover	Sustained Control	1	2	1	1	2	1	1	9

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Bishop Peak Natural Reserve	Bull mallow	Sustained Control	1	2	1	1	2	1	1	9
	Laguna Lake Natural Reserve	Bristly ox-tongue	Sustained Control	1	2	1	1	2	1	1	9
	Bob Jones Bike Trail	Bristly ox-tongue	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	Bristly ox-tongue	Sustained Control	1	2	1	1	2	1	1	9
	Bishop Peak Natural Reserve	Big heron bill	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Big heron bill	Sustained Control	1	2	1	1	2	1	1	9
	Terrace Hill Open Space	Big heron bill	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	Big heron bill	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Annual yellow sweetclover	Sustained Control	1	2	1	1	2	1	1	9
	Johnson Ranch Open Space	Annual yellow sweetclover	Sustained Control	1	2	1	1	2	1	1	9
	Reservoir Canyon Natural Reserve	Almond	Sustained Control	1	1	1	2	1	2	1	9
	Reservoir Canyon Natural Reserve	Willow lettuce	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Willow lettuce	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Wild geranium	Sustained Control	1	1	1	1	2	1	1	8
	Filipponi Ecological Reserve	Wild geranium	Sustained Control	1	1	1	1	2	1	1	8
	Bob Jones Bike Trail	White ramping fumitory	Sustained Control	1	1	1	1	2	1	1	8
	Filipponi Ecological Reserve	White ramping fumitory	Sustained Control	1	1	1	1	2	1	1	8
	Cerro San Luis Natural Reserve	White horehound	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Water speedwell	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	Villous sand spurry	Sustained Control	1	1	1	1	2	1	1	8
	Cerro San Luis Natural Reserve	Upright praire coneflower	Sustained Control	1	1	1	1	2	1	1	8
	Stenner Springs Natural Reserve	Spring vetch	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	South American soliva	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Soft chess	Sustained Control	1	2	1	1	1	1	1	8
	Laguna Lake Natural Reserve	Soft chess	Sustained Control	1	2	1	1	1	1	1	8
	Johnson Ranch Open Space	Soft chess	Sustained Control	1	2	1	1	1	1	1	8
	Reservoir Canyon Natural Reserve	Smooth vetch	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Smooth vetch	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Smooth crabgrass	Sustained Control	1	2	1	1	1	1	1	8
	Stenner Springs Natural Reserve	Slim oat	Sustained Control	1	1	2	1	1	1	1	8
	Laguna Lake Natural Reserve	Shepherd's needle	Sustained Control	1	1	1	1	2	1	1	8

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Laguna Lake Natural Reserve	Sheep sorrel	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	Scarlet pimpernel	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Scarlet pimpernel	Sustained Control	1	1	1	1	2	1	1	8
	Filipponi Ecological Reserve	Scarlet pimpernel	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Salsify	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Rosy ice plant	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	Rose clover	Sustained Control	1	1	1	1	2	1	1	8
	Stenner Springs Natural Reserve	Ripgut brome	Sustained Control	1	1	2	1	1	1	1	8
	Laguna Lake Natural Reserve	Ribwort	Sustained Control	1	1	1	1	2	1	1	8
	Filipponi Ecological Reserve	Red brome	Sustained Control	1	2	1	1	1	1	1	8
	Bishop Peak Natural Reserve	Rattail sixweeks grass	Sustained Control	1	2	1	1	1	1	1	8
	Reservoir Canyon Natural Reserve	Rattail sixweeks grass	Sustained Control	1	2	1	1	1	1	1	8
	Laguna Lake Natural Reserve	Purple vetch	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	Purple sand spurry	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Purple false brome	Sustained Control	1	1	2	1	1	1	1	8
	Cerro San Luis Natural Reserve	Purple dead nettle	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Prostrate knotweed	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Prostrate knotweed	Sustained Control	1	1	1	1	2	1	1	8
	Johnson Ranch Open Space	Nettle leaf goose foot	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Narrowleaf cottonrose	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Mexican tea	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Mexican oxalis	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Mayten	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Jersey cudweed	Sustained Control	1	1	1	1	2	1	1	8
	Bob Jones Bike Trail	Jersey cudweed	Sustained Control	1	1	1	1	2	1	1	8
	Stenner Springs Natural Reserve	Italian rye grass	Sustained Control	1	1	2	1	1	1	1	8
	Filipponi Ecological Reserve	Italian rye grass	Sustained Control	1	1	2	1	1	1	1	8
	Laguna Lake Natural Reserve	Hyssop loosestrife	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Hood canarygrass	Sustained Control	1	1	1	1	2	1	1	8

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Laguna Lake Natural Reserve	Henbit	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Hedge mustard	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Hairy vetch	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Hairy vetch	Sustained Control	1	1	1	1	2	1	1	8
	Irish Hills Natural Reserve	Goldentop	Sustained Control	1	2	1	1	1	1	1	8
	Terrace Hill Open Space	Foxtail barley	Sustained Control	1	2	1	1	1	1	1	8
	Cerro San Luis Natural Reserve	Foxtail barley	Sustained Control	1	2	1	1	1	1	1	8
	Johnson Ranch Open Space	Foxtail barley	Sustained Control	1	2	1	1	1	1	1	8
	Reservoir Canyon Natural Reserve	Flax-leaved horseweed	Sustained Control	1	1	1	1	2	1	1	8
	Bob Jones Bike Trail	Flax-leaved horseweed	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Firethorn	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	Field madder	Sustained Control	1	1	1	1	2	1	1	8
	Cerro San Luis Natural Reserve	Feathertop	Sustained Control	1	1	1	1	2	1	1	8
	South Hills Natural Reserve	English plantain	Sustained Control	1	1	1	1	2	1	1	8
	Cerro San Luis Natural Reserve	English plantain	Sustained Control	1	1	1	1	2	1	1	8
	Bob Jones Bike Trail	English plantain	Sustained Control	1	1	1	1	2	1	1	8
	Irish Hills Natural Reserve	English plantain	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	Dog fennel	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Dog fennel	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Ditch beard grass	Sustained Control	1	2	1	1	1	1	1	8
	Terrace Hill Open Space	Dandelion	Sustained Control	1	1	1	1	2	1	1	8
	Bob Jones Bike Trail	Dandelion	Sustained Control	1	1	1	1	2	1	1	8
	South Hills Natural Reserve	Curly dock	Sustained Control	1	1	1	1	2	1	1	8
	Cerro San Luis Natural Reserve	Curly dock	Sustained Control	1	1	1	1	2	1	1	8
	Bob Jones Bike Trail	Curly dock	Sustained Control	1	1	1	1	2	1	1	8
	Filipponi Ecological Reserve	Curly dock	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Crete weed	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Cretan mallow	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Common vetch	Sustained Control	1	1	1	1	2	1	1	8

Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Laguna Lake Natural Reserve	Common sowthistle	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	Common sowthistle	Sustained Control	1	1	1	1	2	1	1	8
	Filipponi Ecological Reserve	Common sowthistle	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Common plantain	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	Common groundsel	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Common catchfly	Sustained Control	1	1	1	1	2	1	1	8
	Cerro San Luis Natural Reserve	Coastal heron's bill	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	Chickweed	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Chickweed	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Cheeseweed	Sustained Control	1	1	1	1	2	1	1	8
	Bishop Peak Natural Reserve	Charlock	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Carrot	Sustained Control	1	1	1	1	2	1	1	8
	South Hills Natural Reserve	California burclover	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	California burclover	Sustained Control	1	1	1	1	2	1	1	8
	Filipponi Ecological Reserve	California burclover	Sustained Control	1	1	1	1	2	1	1	8
	Irish Hills Natural Reserve	California bur clover	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Bull mallow	Sustained Control	1	1	1	1	2	1	1	8
	Bob Jones Bike Trail	Bull mallow	Sustained Control	1	1	1	1	2	1	1	8
	Cerro San Luis Natural Reserve	Bristly oxtongue	Sustained Control	1	1	1	1	2	1	1	8
	Filipponi Ecological Reserve	Bristly oxtongue	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Bird's foot trefoil	Sustained Control	1	1	1	1	2	1	1	8
	Cerro San Luis Natural Reserve	Big heron bill	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Big heron bill	Sustained Control	1	1	1	1	2	1	1	8
	Stenner Springs Natural Reserve	Annual yellow sweetclover	Sustained Control	1	1	1	1	2	1	1	8
	Laguna Lake Natural Reserve	Annual yellow sweetclover	Sustained Control	1	1	1	1	2	1	1	8
	Bob Jones Bike Trail	Annual yellow sweetclover	Sustained Control	1	1	1	1	2	1	1	8
	Filipponi Ecological Reserve	Annual yellow sweetclover	Sustained Control	1	1	1	1	2	1	1	8
	Reservoir Canyon Natural Reserve	Annual blue grass	Sustained Control	1	2	1	1	1	1	1	8

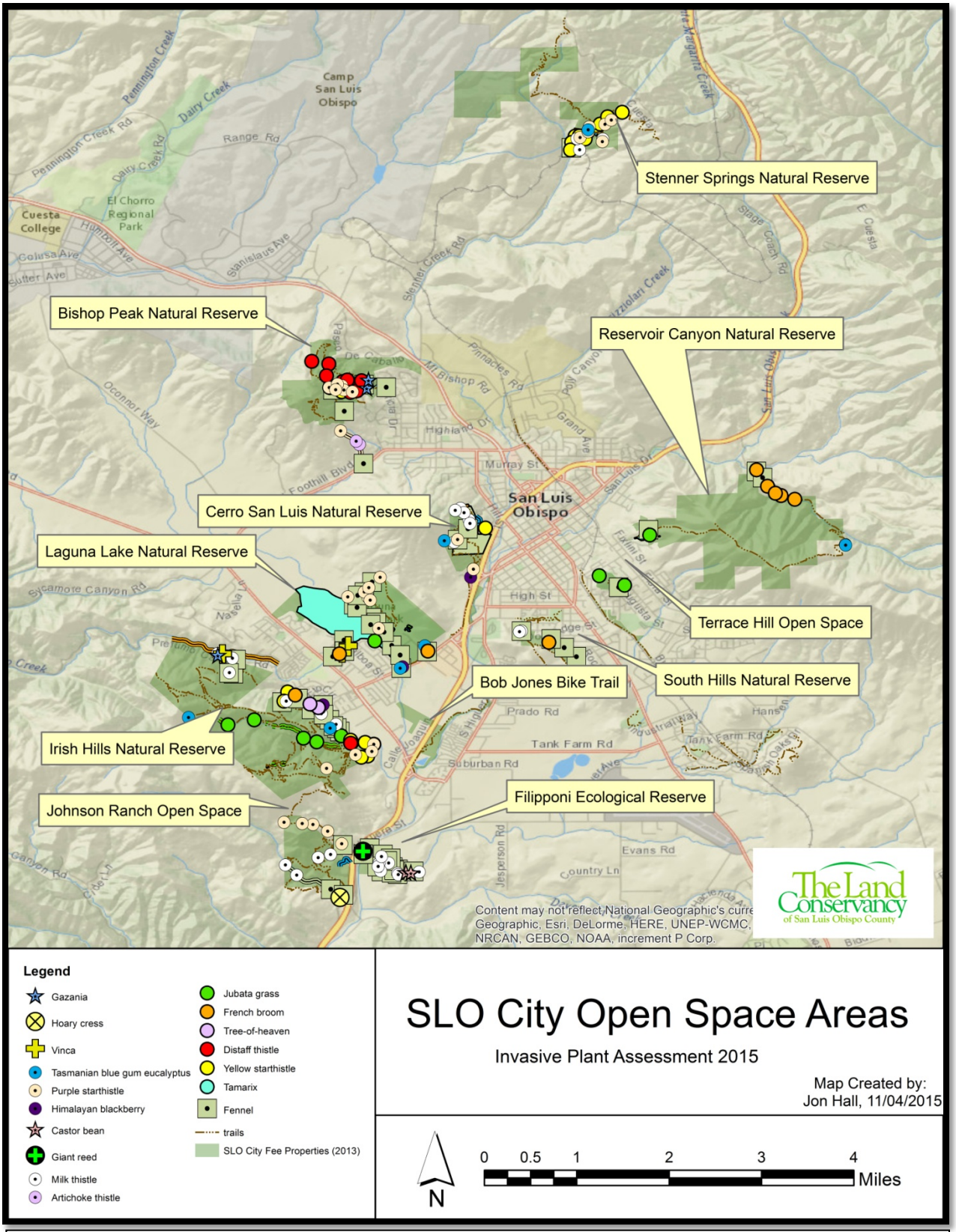
Priority	Location	Common Name	Goal Description	Goal	Spread	Threat	Logistics	Politics	Success	Future Cost	Prioritization Ranking
LOW	Reservoir Canyon Natural Reserve	Water beard grass	Sustained Control	1	1	1	1	1	1	1	7
	Stenner Springs Natural Reserve	Soft chess	Sustained Control	1	1	1	1	1	1	1	7
	Cerro San Luis Natural Reserve	Soft chess	Sustained Control	1	1	1	1	1	1	1	7
	Bob Jones Bike Trail	Soft chess	Sustained Control	1	1	1	1	1	1	1	7
	Filipponi Ecological Reserve	Soft chess	Sustained Control	1	1	1	1	1	1	1	7
	Laguna Lake Natural Reserve	Smutgrass	Sustained Control	1	1	1	1	1	1	1	7
	Laguna Lake Natural Reserve	Seaside barley	Sustained Control	1	1	1	1	1	1	1	7
	Laguna Lake Natural Reserve	Rattail sixweeks grass	Sustained Control	1	1	1	1	1	1	1	7
	Bob Jones Bike Trail	Rattail sixweeks grass	Sustained Control	1	1	1	1	1	1	1	7
	Filipponi Ecological Reserve	Rattail sixweeks grass	Sustained Control	1	1	1	1	1	1	1	7
	Laguna Lake Natural Reserve	Puna needle grass	Sustained Control	1	1	1	1	1	1	1	7
	Bishop Peak Natural Reserve	Nit grass	Sustained Control	1	1	1	1	1	1	1	7
	Reservoir Canyon Natural Reserve	Nit grass	Sustained Control	1	1	1	1	1	1	1	7
	Bishop Peak Natural Reserve	Goldentop	Sustained Control	1	1	1	1	1	1	1	7
	Reservoir Canyon Natural Reserve	Goldentop	Sustained Control	1	1	1	1	1	1	1	7
	Terrace Hill Open Space	Goldentop	Sustained Control	1	1	1	1	1	1	1	7
	Cerro San Luis Natural Reserve	Goldentop	Sustained Control	1	1	1	1	1	1	1	7
	Reservoir Canyon Natural Reserve	Foxtail barley	Sustained Control	1	1	1	1	1	1	1	7
	Bob Jones Bike Trail	Foxtail barley	Sustained Control	1	1	1	1	1	1	1	7
	Filipponi Ecological Reserve	Foxtail barley	Sustained Control	1	1	1	1	1	1	1	7
	Laguna Lake Natural Reserve	Farmer's foxtail	Sustained Control	1	1	1	1	1	1	1	7
	Laguna Lake Natural Reserve	Fall panic grass	Sustained Control	1	1	1	1	1	1	1	7
	Laguna Lake Natural Reserve	Ditch beard grass	Sustained Control	1	1	1	1	1	1	1	7
	Laguna Lake Natural Reserve	Brome fescue	Sustained Control	1	1	1	1	1	1	1	7
	Reservoir Canyon Natural Reserve	Annual beard grass	Sustained Control	1	1	1	1	1	1	1	7

3.3 Invasive Plant Mapping

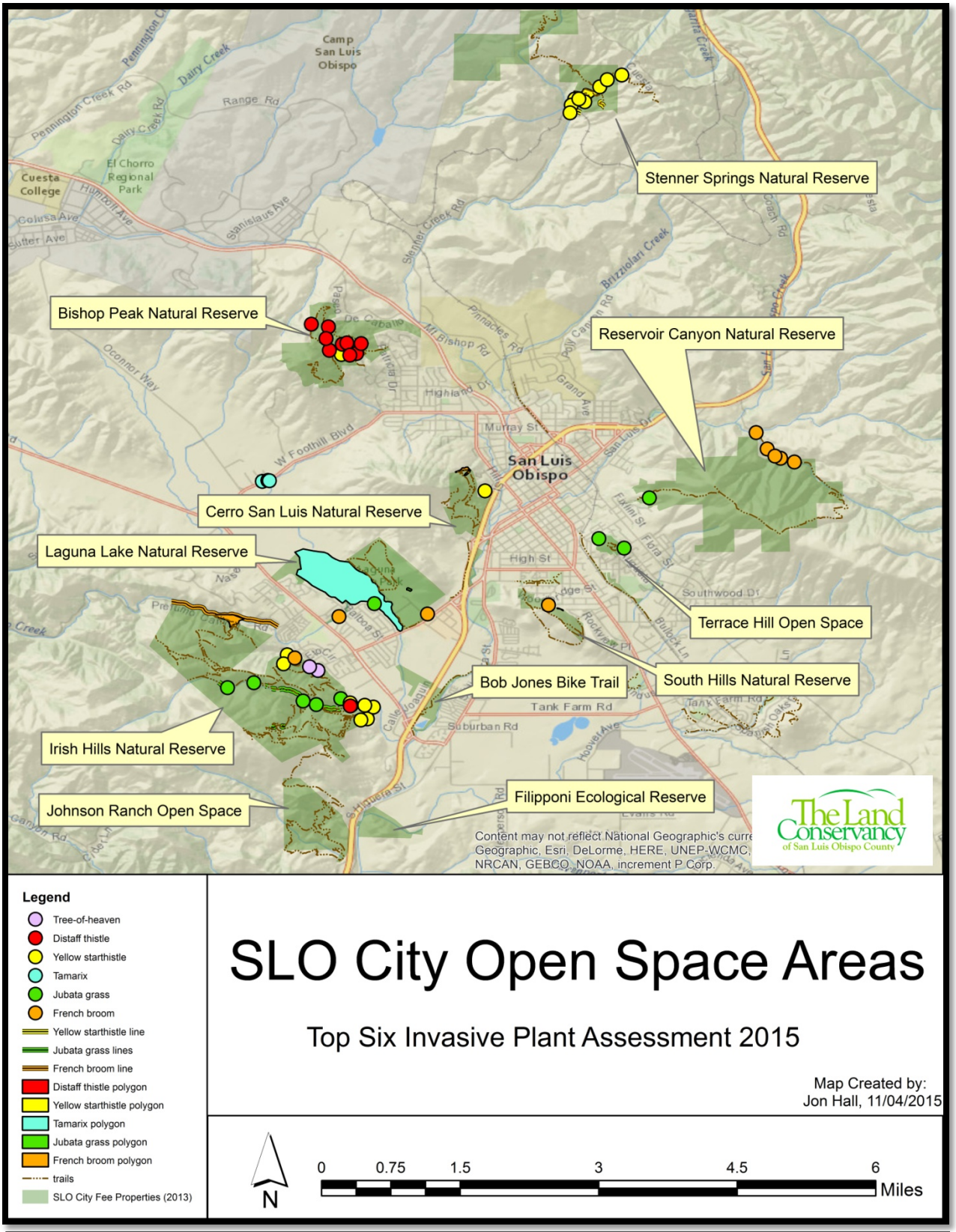
Twenty-one (21) weed species were identified as targets for mapping to inform future control strategies. These species included all High Priority ranked invasive plants, select medium and low priority invasive plants that present particular management concerns, and a list of "watchlist" species that aren't known to occur on city open space lands, but are part of regional eradication and control efforts through the San Luis Obispo Weed Management Area (SLOWMA). Priority species for mapping include:

PRIORITY SPECIES FOR MAPPING					
Common Name	**Species**	**Family**	**CDFA Listing**	**Cal-IPC Ranking**	**Priority**
Jubata grass	Cortaderia jubata	Poaceae		High	High
Yellow starthistle	Centaurea solstitialis	Asteraceae	CW	High	High
Woolly distaff thistle	Carthamus lanatus	Asteracea	BW	Moderate-Alert	High
Himalayan blackberry	Rubus armeniacus	Rosaceae		High	High
Saltcedar	Tamarix sp.	Tamaraciceae		High	High
French broom	Genista monspessulana	Fabaceae		High	High
Gazania	Gazania linearis	Asteraceae		Moderate-Alert	Medium
Onion weed	Asphodelus fistulosus	Asphodelaceae	W	Moderate-Alert	Medium
Fennel	Foeniculum vulgare	Apiaceae		High	Medium
Purple starthistle	Centaurea calcitrapa	Asteraceae		Moderate	Medium
Whitetop	Lepidium draba	Brassicaceae		Moderate	Medium
Milk thistle	Silybum marianum	Asteraceae		Limited	Medium
Cape ivy	Delairea odorata	Asteraceae		High	Medium
Tasmanian bluegum	Eucalyptus globulus	Myrtaceae		Moderate	Medium
Vinca	Vinca major	Apocynaceae		Moderate	Medium
Castor bean	Ricinus communis	Euphorbiaceae		Limited	Low
Giant reed	Arundo donax	Poaceae		High	Watch-List
Stinkwort	Dittrichea graveolens	Asteraceae		Moderate	Watch-List
Artichoke thistle	Cynara cardunculus	Asteraceae	BW	Moderate	Watch-List
Oblong spurge	Euphorbia oblongata	Euphorbiaceae	W	Limited	Watch-List
Medusahead	Elymus caput-medusae	Poaceae		High	Watch-List

In the spring of 2015, an extensive mapping effort was performed to visually assess and map the status of priority mapping targets (Map 2 & Map 3). In addition to location maps, a population assessment form was filled out for each observation (Appendix 3).



Map 2. Population assessment of all 21 target weed species on SLO City Open Space Areas.



Map 3. Population assessment of the six (6) high priority invasive plant targets on SLO City Open Space Areas.

4. SPECIFIC CONTROL PLANS FOR HIGH PRIORITY WEED SPECIES:

This section outlines specific control plans for the six (6) highest priority management concerns for San Luis Obispo Open Space Areas. These species include:

- Jubata grass (*Cortaderia jubata*)
- Yellow starthistle (*Centaurea solstitialis*)
- Woolly distaff thistle (*Carthamus lanatus*)
- Saltcedar (*Tamarix sp.*)
- French broom (*Genista monspessulana*)
- Tree-of-heaven (*Ailanthus altissima*)

Species description information and control option data was derived largely from the publication:

Ditomaso, J.M., G.B. Keyser et al. 2013. Weed Control in Natural Areas in the Western United States. Weed Research and information Center, University of California. 544 pp.

Scientific name: *Cortaderia jubata* **Common name:** Jubata grass

Updated : June 31, 2015

A. PRIORITY High

B. DESCRIPTION

Jubata grass tolerates a wide variety of soil types. It can be found in disturbed areas, dunes, bluffs, roadsides, road cuts, logged forests, grassland (including serpentine soils), riparian areas and undisturbed shrub land. Jubata grass is a large, perennial grass with showy plume-like inflorescences. The dense fibrous roots grow from shallow lateral rhizomes. Reproduction is only by seed. Seeds are very light and can transport long distances in the wind. Because seeds are so small, they are not long-lived in the seedbank. Germination occurs in fall after first rains, continuing through spring. It is native to mid-elevation regions of the Andes Mountains in Peru, Bolivia, Ecuador and Northern Argentina.

C. CURRENT DISTRIBUTION ON THE SITE

Jubata grass has a limited distribution on SLO City Open Space Areas, but can be found on numerous private property locations within the City and in several locations in the San Luis Creek riparian corridor (Map 4). It can be found in the Irish Hills Natural Reserve and Laguna Lake Natural Reserve and may be present in the Stenner Springs Natural Reserve. Occurrences favor enhanced moisture such as seeps, springs and riparian habitats. There are a number of occurrences in San Luis Creek and on private property adjoining Open Space Areas throughout the city.

D. DAMAGE & THREATS

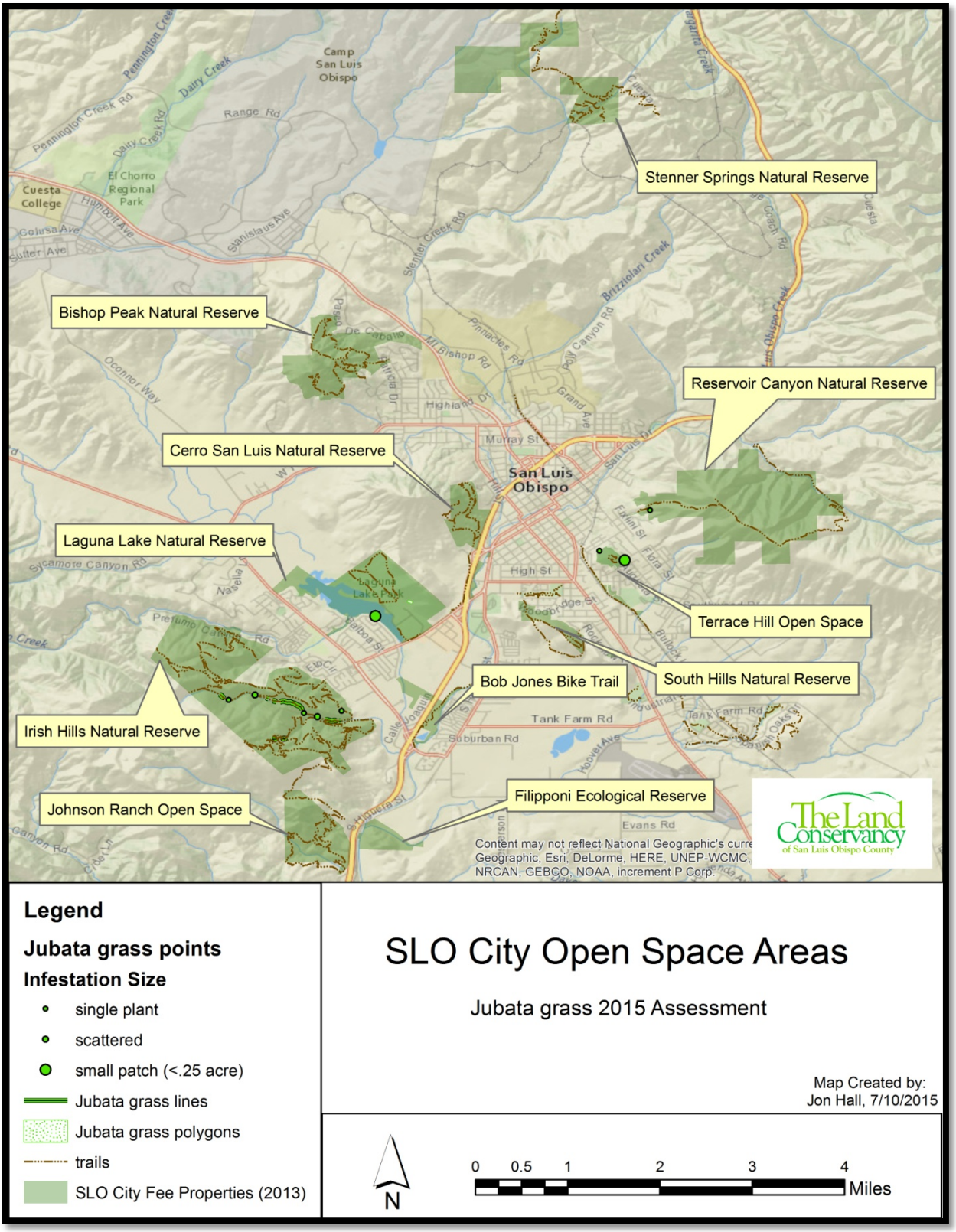
Mature plants are highly competitive displacing native vegetation. If left unchecked, it could displace the federally and state listed endangered Chorro creek bog thistle (*Cirsium fontinale var. obispoense*) found on serpentine seeps.

E. GOALS

The long-term goal for this species is complete eradication from SLO City Open Space Areas. Due to its limited distribution in the San Luis Obispo Area and its short lived seed bank, eradication is an achievable and appropriate goal.

F. OBJECTIVES (Measurable)

Eliminate jubata grass from all Open Space areas within 5 years.



Map 4. Overview map showing geographic distribution of jubata grass (*Cortaderia jubata*) on City of SLO Open Space Areas.

G. MANAGEMENT OPTIONS

Viable control options are:

(1) No treatment;

(2) (Biological); There are currently no biological control agents available for *Cortaderia jubata*.

(3) (Cultural); Heavily mulching bare sites or high density plantings of desirable species may reduce seedling establishment. Cattle grazing has not proven to be a viable option.

(4) (Mechanical); Hand pulling or mechanical removal with a Pulaski has proven effective for smaller plants. Removed plants should be inverted to discourage re-rooting. Larger plants are more difficult to remove, but it is possible with a large chainsaw or weed-whacker used to expose the base of the plant for better removal of the crown. If plants can't be controlled, plumes can be removed to minimize contributions to the seedbank.

(5) (Chemical); The use of herbicides should always follow label instructions. There are numerous herbicides that have been shown to be effective at controlling jubata grass.

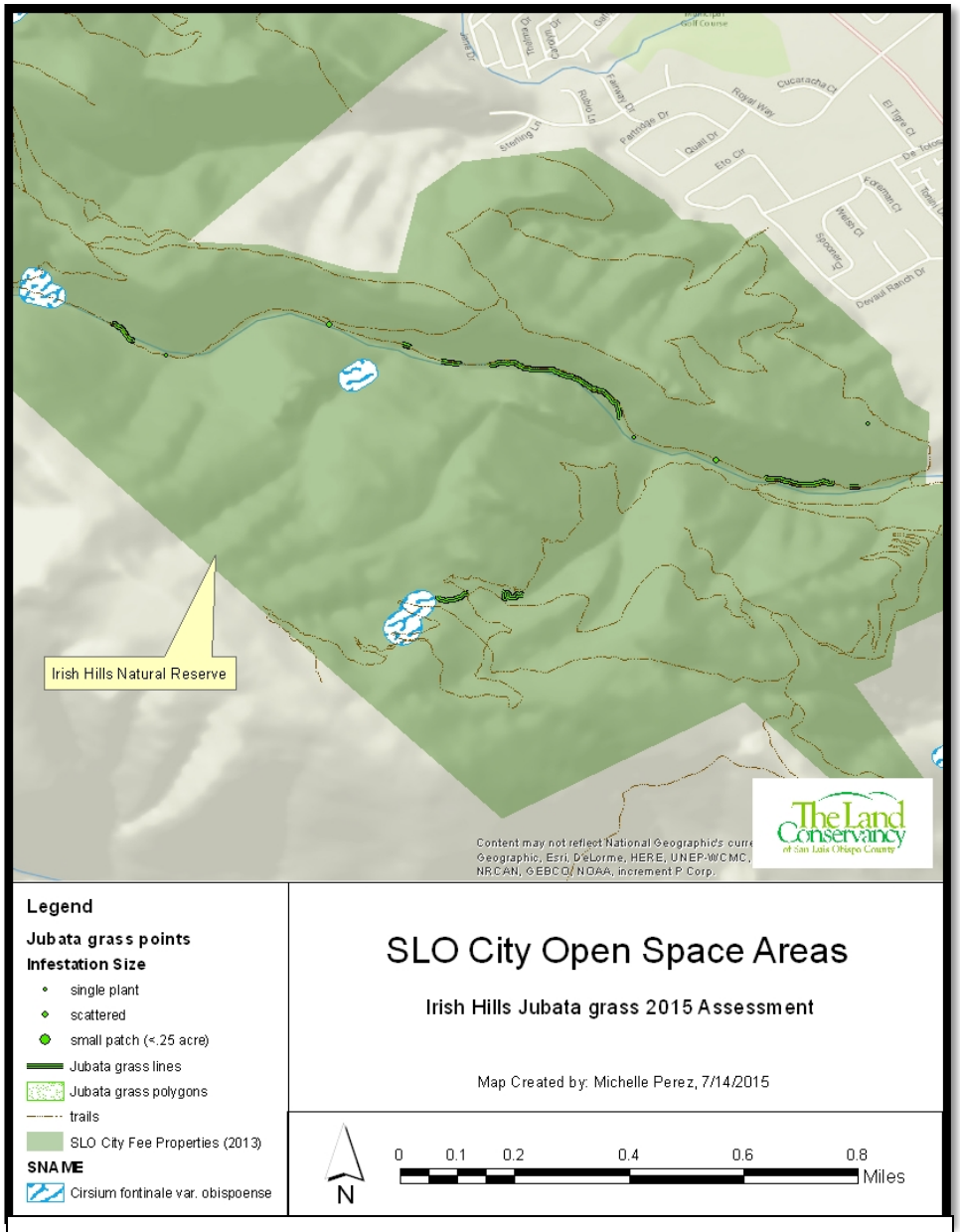
LIPID SYNTHESIS INHIBITORS	
Fluazifop *Fusilade*	**Application Type(s): High-volume spray-to-wet s**pot treatment; Low volume treatment. **Timing**: Postemergence. Best in late summer or fall, after flowering when translocation of herbicide to base of tillers and rhizomes is at its peak. **Remarks:** In studies conducted by UC Davis, **c**ontrol of jubatagrass with fluazifop was inconsistent. It has no soil residual activity. Other grass herbicides were not as effective.
AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup Pro Conc, Aquaneat, others*	**Application Type(s):** Broadcast treatment; High-volume spray-to-wet spot treatment; Low-volume treatment; Wick application **Timing:** Postemergence. Best in late summer or fall, after flowering when translocation of herbicide to base of tillers and rhizomes is at its peak. **Remarks:** In studies conducted by UC Davis, Glyphosate provided the most consistent jubatagrass control with all plant sizes in both fall and early summer. Low volume treatment and wick applications gave the best and most consistent control.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapyr *Habitat, Polaris*	**Application Type(s):** High-volume spray-to-wet spot treatment **Timing:** Postemergence. Best in late summer or fall, after flowering when translocation of herbicide to base of tillers and rhizomes is at its peak. **Remarks:** In studies conducted by UC Davis, results were inconsistent from site to site and year to year. Imazapyr is a slow-acting systemic herbicide and may take a year or two to achieve effective control on *Cortaderia.*

H. ACTIONS PLANNED (Treatments and monitoring)

Actions for specific Open Space Areas –

Irish Hills Natural Reserve:

Presently, jubata grass is restricted to the Froom Creek Area and surrounding hillsides (Map 5). Previous control work has been done by the SLO County Department of Agriculture. This work predominately removed jubata grass from the upland areas surrounding Froom Creek but had not yet begun formal treatment of the Froom Creek drainage. In 2014 The Land Conservancy of San Luis Obispo County (The Land Conservancy) working under a contract from the City of San Luis Obispo, surveyed and removed all known jubata grass plants from the Froom Creek drainage. Follow-up surveys and re-treatments occurred in spring 2015 in the Froom Creek drainage and surrounding upland areas. The SLO County Department of Agriculture worked with the Land Conservancy on upland surveys to ensure continuity of treatment. Future work should involve annual surveys in the springtime/early summer after seedling germination. Any individuals found should be removed. For small plants, manual removal is appropriate. Plants not suitable for manual removal (i.e. large size or steep terrain) will be treated with a low volume application of a glyphosate containing product. It is recommended that this cycle of survey and treatment occur over the next five years, until the seedbank is eliminated.

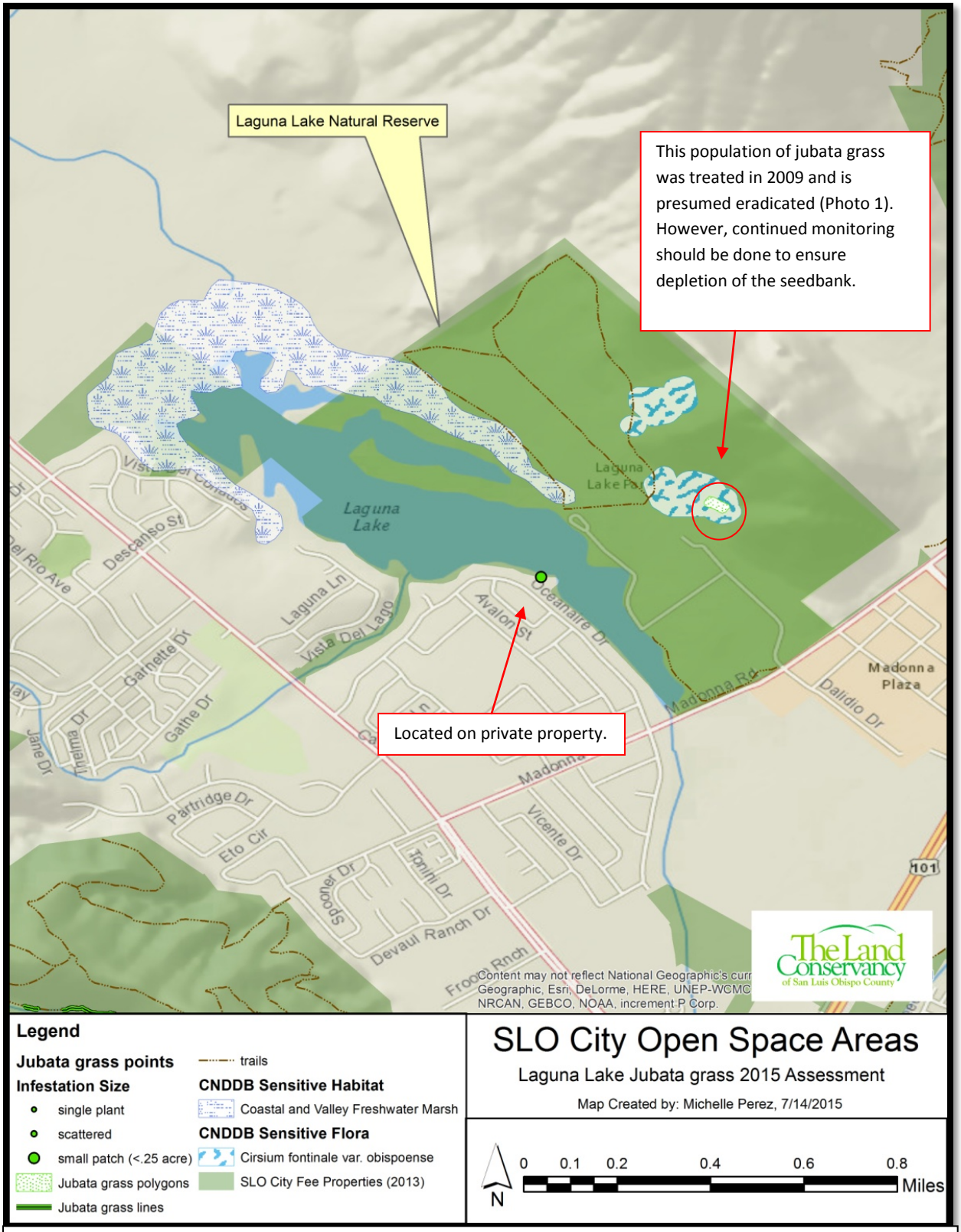


Map 5. Jubata grass population locations overlaid with locations of the endangered Chorro Creek Bog thistle. All mapped jubata grass locations are currently under management.

Laguna Lake Natural Reserve: Jubata grass has previously been found growing in serpentine seeps (Map 6)(Photo 1). The SLO County Department of Agriculture began removal of this population in 2009. All populations have been eliminated, and the project is now in the survey and monitoring phase. Any new jubata grass plants that come up can easily be removed by hand. Care should be taken while working in serpentine seeps to avoid the state and federally endangered Chorro Creek Bog thistle (*Cirsium fontinale* var. obispoense). There is also a population on private property on the edge of the reserve which falls under the *Category I Control Action*:

> *Present in region but not in SLO City Open Space Areas. Contact cooperating agencies and landowners. Track spread if near open space area. Prevention of species establishment inside open space areas eliminates the need for control actions.*

Photo 1: Taken in 2009 by Marc Lea (SLO County Department of Agriculture), *Cortaderia jubata* growing in serpentine seep at Laguna Lake Natural Reserve.



Map 6. Jubata grass locations in Laguna Lake Natural Reserve overlaid with Chorro Creek Bog thistle (*Cirsium fontinale* var. obispoense) and sensitive habitats.

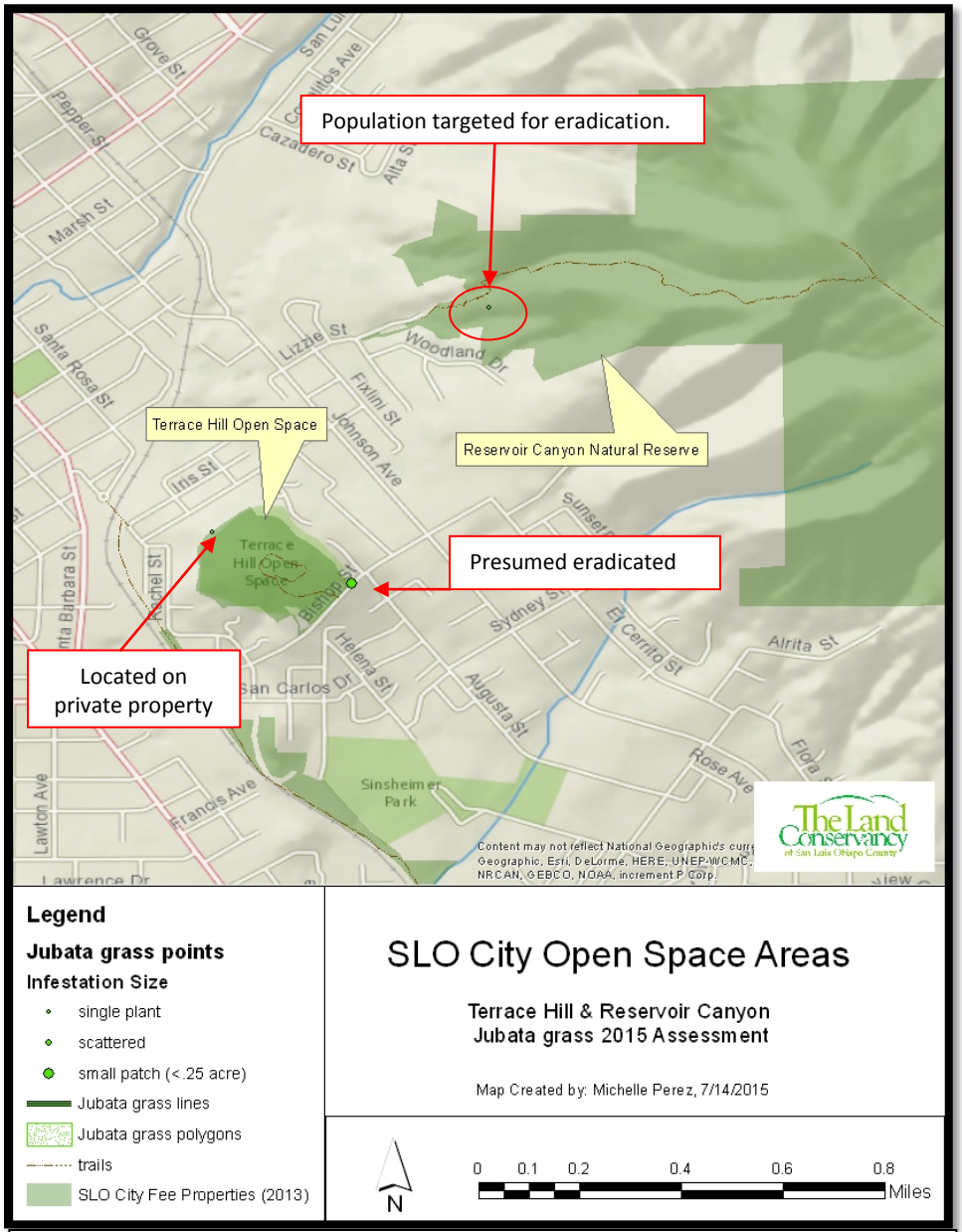
Terrace Hills Open Space Area: There is only one (1) population of jubata grass in the Terrace Hills Open Space Area. This population is dead and appears to have been controlled at some point in the past. It is presumed eradicated, but future monitoring is recommended to ensure the seedbank is no longer viable. The other population is on private property (Map 7) and falls under the *Category I Control Action*:

> *Present in region but not in SLO City Open Space Areas. Contact cooperating agencies and landowners. Track spread if near open space area. Prevention of species establishment inside open space areas eliminates the need for control actions.*

Reservoir Canyon Natural Reserve: There were only a few jubata grass plants detected in the Reservoir Canyon Natural Reserve. Due to the small size, and neighboring geographic distribution the course of action identified is *Category II:*

> *Present in SLO City Open Space Areas as individuals or small, localized populations. Remove by hand or other precision control technique, and maintain a record of actions. Monitor the removal sites, following up with additional removal as needed. This kind of diligence keeps control costs low.*

Surveys should also be done on neighboring properties to identify potential seed sources.



Map 7. Jubata grass (*Cortaderia jubata*) populations in Terrace Hills Open Space Area and Reservoir Canyon Natural Reserve.

I. HOW ACTIONS WILL BE EVALUATED (Criteria for success)

Success will be determined by removal of jubata grass from all SLO City Open Space Areas with monitoring indicating three years with no individuals detected. Yearly monitoring of all previously treated populations in the spring or early summer will occur using the Invasive Plant Assessment Form (Appendix C).

J. RESOURCE NEEDS

Time and cost estimates will be inserted later upon consultation with the SLO City Natural Resource Manager, Robert Hill.

Permits – The following list of permits may be required for jubata grass control work:

CA Department of Fish and Wildlife (CDFW) 2081(a) Research and Management Permit – If work is close to or may impact a state listed species under the California Endangered Species Act, CDFW should be consulted with about which permits apply to the situation. For work in serpentine seeps around the Chorro Creek Bog thistle (*Cirsium fontinale* var. obispoense), most likely a 2081(a) Research and Management Permit would be recommended.

State Water Resources Control Board National Pollution Elimination System (NPDES) Pesticide Permit for Weed Control - The State Water Resources Control Board adopted the Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications, Water Quality Order 2013-0002-DWQ, for the reissuance of General NPDES Permit CAG990005 in June 2013. Order 2013-0002-DWQ became effective on December 1, 2013.

This General Permit covers the point source discharge to waters of the United States of residues resulting from pesticide applications using products containing 2,4-D, acrolein, copper, diquat, endothall, fluridone, glyphosate, imazamox, imazapyr, penoxsulam, sodium carbonate peroxyhydrate, and triclopyr-based algaecides and aquatic herbicides, and adjuvants containing ingredients represented by the surrogate nonylphenol.

It is possible this permit would be needed for control of jubata grass in Froom Creek if applications are made when there is water in the creek and there will be a point source discharge to the water column through direct application or drift. If this permit is needed, a corresponding "Aquatic Pesticide Application Plan" or APAP must be prepared. Yearly fees are also associated with this permit.

K. RESULTS OF EVALUATION

(This section is to be filled in later, preferably within 1 year, when monitoring data has been taken and evaluated, at least preliminarily. The evaluation should be used to determine whether any of the sections B-K above should be modified.)

Scientific name: *Centaurea solstitialis* **Common name:** Yellow starthistle

Updated : June 31, 2015

A. PRIORITY High

B. DESCRIPTION

Yellow starthistle is native to southern Europe. It can be found in open disturbed sites, grassland/ rangeland, open woodlands, crop fields, pastures, roadsides and waste places. Light is a limiting factor for this plant. It does poorly in shaded areas. Yellow starthistle is an herbaceous winter annual, but can sometimes grow as a biennial. Large flushes of seeds germinate after the first fall rains, but smaller germination flushes can occur during winter and early spring. Most of the seedbank is only viable for 4 years, although some seeds have been known to survive for up to 10 years under field conditions. Plants form a basal rosette of leaves until mid-spring when they bolt and begin flowering in early summer. The taproot can extend deep into the soil (>6 ft) allowing plants to utilize deep soil moisture not available to other annual species, particularly grasses. Most seeds fall near the parent plant, but they can be transported by wind or can attach to machinery in mud. Seeds could also be transported in mud attached to mountain bike tires or hikers shoes. Frequent introductions have also been recorded in contaminated hay used for livestock or erosion control.

C. CURRENT DISTRIBUTION ON THE SITE

Yellow starthistle is absent from many of SLO City's Open Space Areas. Infestations can be found in the Stenner Springs Natural Reserve, as an incipient population at the Bishop Peak Natural Reserve, and in limited quantities on the Irish Hills Natural Reserve. It can also be found on neighboring properties to the Cerro San Luis Natural Reserve and the Irish Hills Natural Reserve (Map 8). Yellow starthistle can be found throughout the City of San Luis Obispo but can still be considered at manageable levels.

D. DAMAGE & THREATS

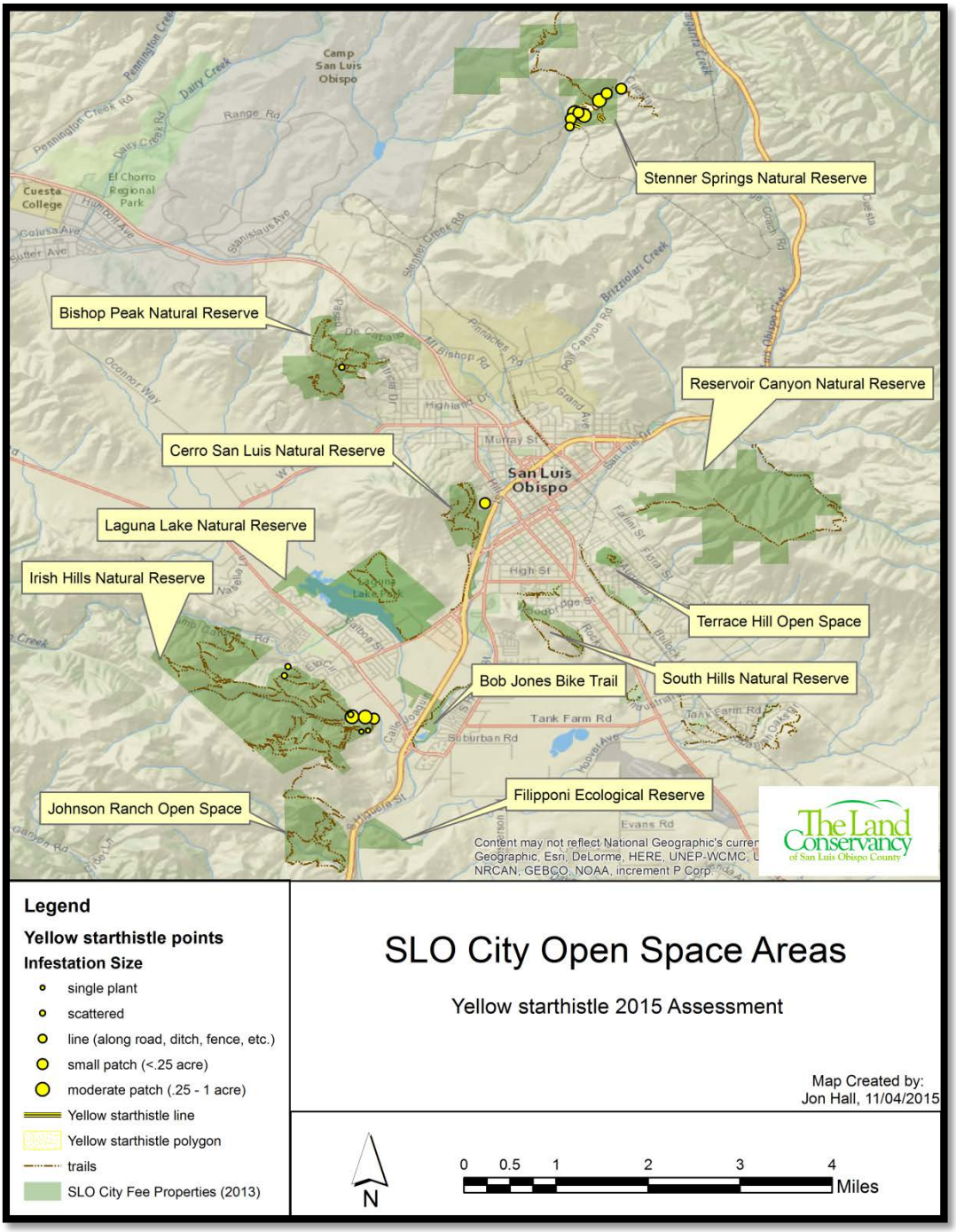
Plants are highly competitive, typically developing dense monocultures displacing desirable vegetation in rangelands, natural areas, roadsides and other places. Yellow starthistle is considered one of the most serious rangeland weeds in the western United States. Its dense growth and spiny flower heads reduces the quality of grazing land and impacts passive recreational activities like mountain biking and hiking.

E. GOALS

The long-term goal for this species is eradication from Bishop Peak Natural Reserve, prevention from SLO City Open Space Areas not currently infested, and to eliminate satellite populations and begin perimeter control at the Stenner Springs natural Reserve and Irish Hills Natural Reserve.

F. OBJECTIVES (Measurable)

Eradicate yellow starthistle from Bishop Peak Natural Reserve within 5 years. Eliminate yellow starthistle from Irish Hills Natural Reserve within 5 years. Reduce yellow starthistle infestation by 70% of 2015 levels at Stenner Springs Natural Reserve within 5 years with 95% reduction within 10 years.



Map 8. Overview map showing geographic distribution of yellow starthistle (*Centaurea solstitialis*) on City of SLO Open Space Areas.

G. MANAGEMENT OPTIONS
Viable control options include:

(1) No treatment;

(2) (Biological); Six insects have become established for the control of yellow starthistle in the western United States. These include three species of weevils (seed-head weevil [*Bangasternus orientalis*], flower weevil [*Larinus curtus*], and the hairy weevil [*Eustenopus villousus]*), and three species of flies (seed-head fly [*Uropha sirunaseva*], peacock fly [*Chaetorellia australis*], and the false peacock fly [*Chaetorellia succinea*]). Of these, only two insects, *E. villosus* and *C. succinea* have any significant impact on reproduction. The combination of these two insects reduces seed production by 43 to 76%. Although this level of suppression is not sufficient to provide long-term yellow starthistle management, the use of biological control agents can be an important component of an integrated management approach. Biological control agents for yellow starthistle have previously been released by the SLO County Department of Agriculture throughout the county. One or more of these organisms may already be established in San Luis Obispo, and simply need encouragement to help provide control. Eradication is not a control option with biological control, but a reduction in density may be observed.

(3) (Cultural);
Grazing - High-intensity, short-duration grazing has shown moderate success in managing yellow starthistle seedbanks. It can be a useful tool in an integrated management program.

Fire - Prescribed fire can provide control if conducted at the proper timing. Repeat burning over consecutive years is desirable, but a single burn has been used to good effect as a tool in an integrated approach. The best results have been seen with one year of controlled burn that flushes the seedbank, followed by two successive years of herbicide application.

Flaming – flaming seedlings with a propane torch has been used on yellow starthistle, but the technique is non-selective and results are inconsistent. There is a fire hazard when using flaming as a tool. This technique should only be done when it is raining or the ground is wet.

(4) (Mechanical);
Manual Removal – manual removal is most effective when dealing with small patches or as follow-up for plants missed during another control technique. The best timing for manual removal is during early bolting before the plant produces viable seed.

Mowing – mowing is most effective when 2 to 5% of the total population of seedheads is in bloom. Mowing too early can actually increase seed production. To successfully manage yellow starthistle with mowing, multiple years of continuous treatment is required. It is often part of an integrated approach and not very successful by itself. Mowing is not feasible in many locations due to rocks, steep terrain and the possibility of starting a fire. Mowing is not always effective and can decrease the reproductive

efforts of insect biocontrol agents, injure late growing native plants, and reduce fall and winter forage for wildlife and livestock.

Tillage – This is an effective and appropriate tool for roadsides and croplands. It is not an appropriate tool in rangelands and natural areas because it can damage and disrupt native species, increase erosion, alter the soil structure, and expose the soil for rapid re-infestation if subsequent rainfall occurs.

(5) (Chemical); The use of herbicides should always follow the label. There are numerous herbicides that have been shown to be effective at controlling yellow starthistle.

GROWTH REGULATORS	
Aminopyralid *Milestone*	**Application type(s):** Broadcast; High-volume spray-to-wet spot treatment **Timing**: Preemergence or postemergence. Postemergence applications should be applied from seedling to the mid-rosette stage. **Remarks:** Aminopyralid is one of the most effective herbicides for the control of yellow starthistle. It is safe on grasses, although can impact them at higher rates. Aminopyralid has a longer residual and higher activity than clopyralid. Other members of the Asteraceae and Fabaceae are very sensitive to aminopyralid.
Clopyralid *Transline*	**Application type(s):** Broadcast; High-volume spray-to-wet spot treatment **Timing**: Preemergence or postemergence. Postemergence applications should be applied from late rosette to early bolting stage. **Remarks:** Clopyralid gives excellent control of yellow starthistle. It is safe on grassess. Other members of the Asteraceae and Fabaceae can be sensitive to clopyralid. Clopyralid does not bind very tightly to soil and thus can leach into water easily. Once suspended in the water column, it will not breakdown until it falls out with the sediment.
Triclopyr *Garlon 3A, Garlon 4 Ultra*	**Application type(s):** Broadcast; High-volume spray-to-wet spot treatment **Timing**: Postemergence from seedling to bolting stage. **Remarks:** Triclopyr has little to no residual activity. It is broadleaf-selective and typically does not harm grasses. *Garlon 4 Ultra* is formulated as an ester. In warm temperatures (>80^{o}F), there is arisk of volatilization and off-target damage.
AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup Pro Conc, Aquaneat, others*	**Application type(s):** Broadcast; High-volume spray-to-wet spot treatment **Timing:** Postemergence to plant from bolting to beginning of flowering. **Remarks:** Glyphosate is the most effective herbicide for late season control. It has no soil activity and is nonselective.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapyr *Habitat, Polaris*	**Application type(s):** Broadcast; High-volume spray-to-wet spot treatment **Timing:** Has preemergent and some postemergent properties. It has a long soil residual life. **Remarks:** Seldom used for yellow starthistle but has been shown to be somewhat effective. Broad spectrum control, will kill grasses as well.

H. ACTIONS PLANNED (Treatments and monitoring)

Actions for specific Open Space Areas –

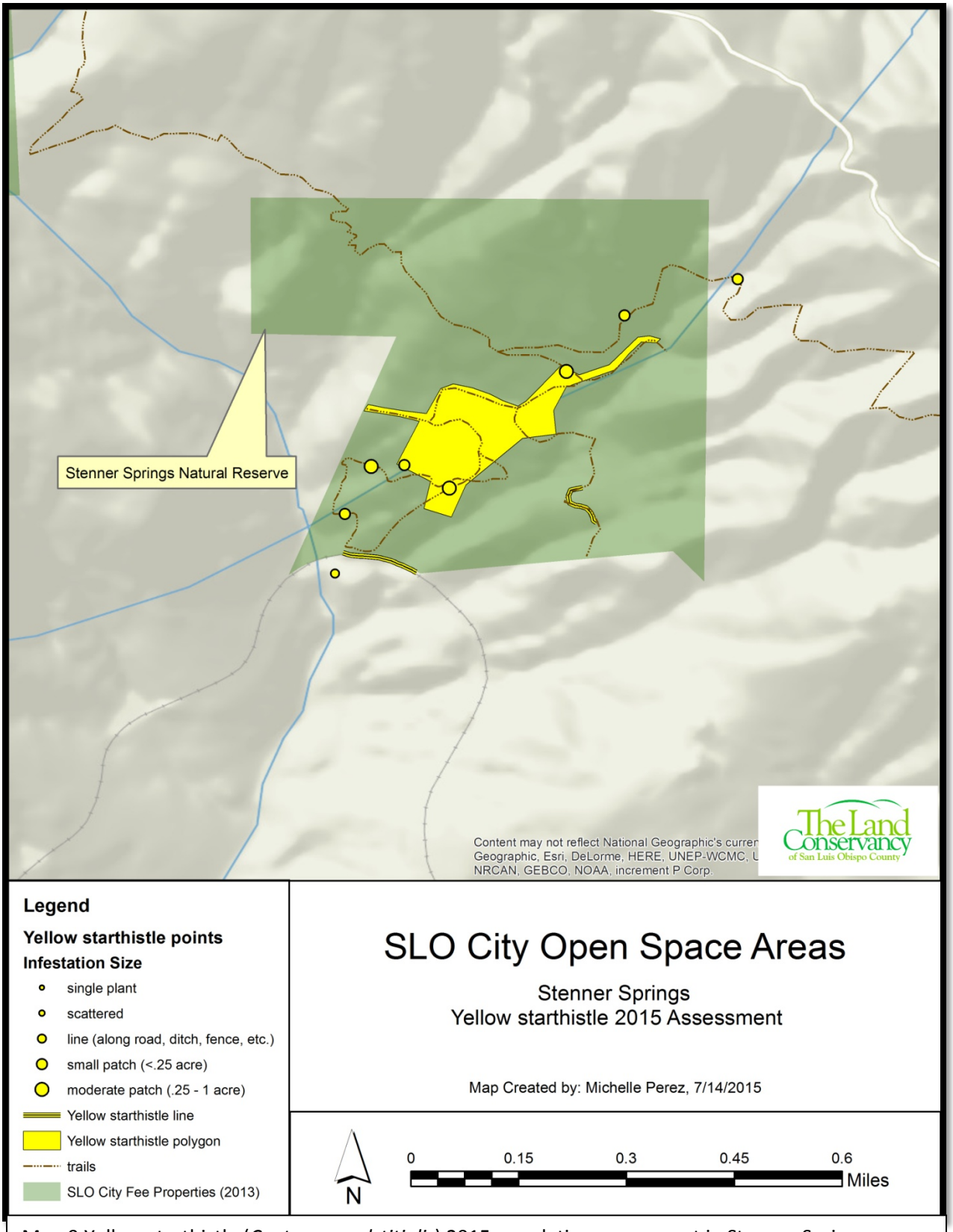
Stenner Springs Natural Reserve: There's approximately 15+ acres infested with yellow starthistle on the Stenner Springs Natural Reserve. Infestations can be found along trails, on roadsides and throughout the grassland parts of the reserve (Map 9). There are also established infestations on neighboring properties. Because of the areas heavy use by mountain bikers, there is a risk that seeds could get transported on equipment and bike tires to other City owned Open Space Areas with recreational trails. The size and distribution of this infestation lends it towards the *Category III Control Action:*

> *Present as large infestations in parts of SLO City Open Space Areas. Native plant communities are disrupted and native species displaced from infested areas. Remove outliers first. If possible, eliminate the exotic seed bank in outlier areas after mature plants have been removed to deter re-establishment. Map large infestations. Plan larger attack projects. Resources permitting, implement one or more large-scale projects, aimed as follows:*
>
> a. *Contain spread to within infested areas.*
> b. *Reduce the number and size of infestations, restore native species to bared sites, and follow a strategy that minimizes dispersal and re-infestation. In general, treat the smallest, furthest outlying areas first.*
> c. *Eliminate the larger infestations, moving from the fringes toward the source of seed dispersal.*

Although widespread, access to the site is good, allowing for numerous management options. The overall strategy should target outlier populations first and then begin control on the perimeter of the larger population working towards the center. Fire could be a good tool, but because of proximity to highly combustible chaparral, coastal scrub and Tasmanian blue gum eucalyptus communities, the possibility for a controlled burn to spread to non-target areas may be too high a risk. The preferred tool for this site, providing the best control with the least impact, would be a low-toxicity selective herbicide (aminopyralid or clopyralid) sprayed as a broadcast technique in heavily infested areas or high-volume spot spray in outlier populations. These herbicides are broad-leaf specific which allows the use of "competitive exclusion" as a control technique in grassland areas. There are healthy native grass communities in this area. It is anticipated that natural recruitment will help expand this grassland, but in certain areas, re-seeding with site appropriate native grasses may be desirable.

Additional work should be done through the SLO County Weed Management Area to coordinate similar control efforts with neighboring property owners like California Polytechnic State University and Camp San Luis Obispo.

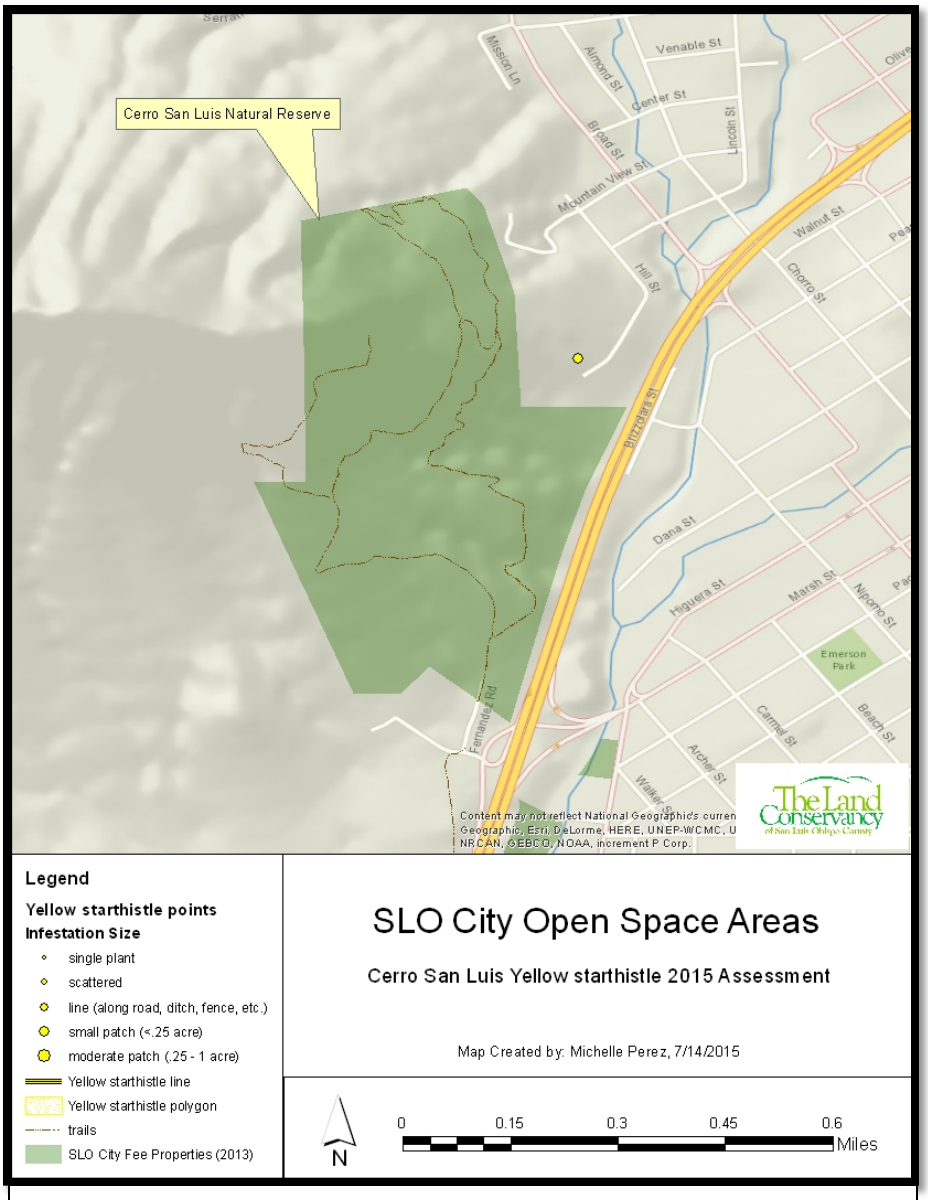
Initial monitoring and site assessment should begin in mid spring with initial herbicide applications happening in early to mid rosette stage. Follow up surveys should be performed at two week intervals after the initial treatment to inform the need for follow-up treatments. Treatments will go through early summer.



Map 9.Yellow starthistle (*Centaurea solstitialis*) 2015 population assessment in Stenner Springs Natural Reserve.

Cerro San Luis Natural Reserve: During the 2015 SLO City Open Space Area Invasive Plant Assessment, no yellow starthistle was detected on the Cerro San Luis Natural Reserve. However, there was one isolated population found near the Hill Street entrance (Map 10) that should be addressed before it spreads onto the neighboring Open Space Area. This population falls under a *Category I Control Action*:

> *Present in region but not in SLO City Open Space Areas. Contact cooperating agencies and landowners. Track spread if near open space area. Prevention of species establishment inside open space areas eliminates the need for control actions.*

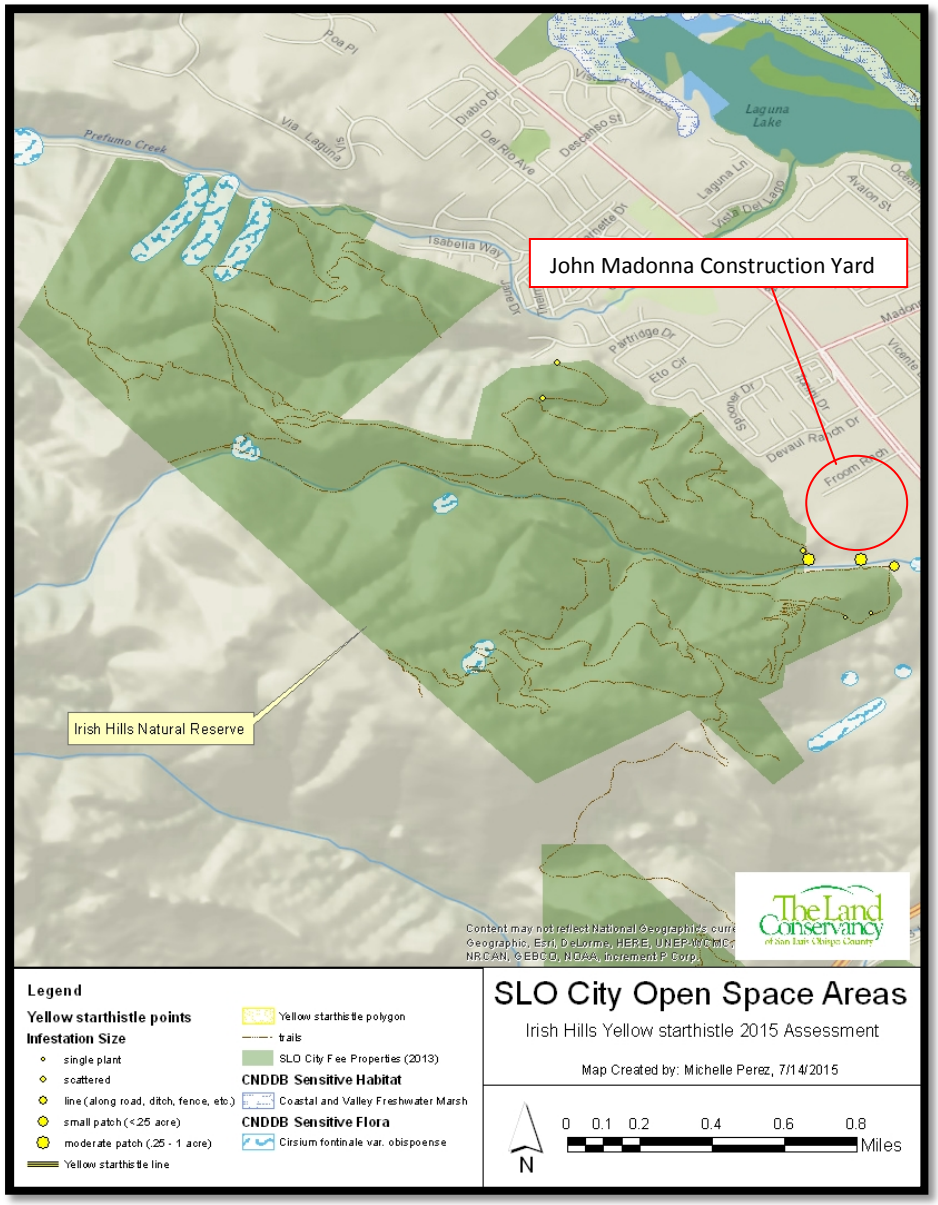


Map 10.Yellow starthistle (*Centaurea solstitialis*) population location near the Cerro San Luis Natural Reserve.

Irish Hills Natural Reserve: At the Irish Hills Natural Reserve yellow starthistle (*C. solstitialis*) is just beginning to encroach into the reserve from the western perimeter (Map 11). The largest of these populations is at the John Madonna Construction (JMC)yard. On the reserve itself, there are only a few small outlier infestations. This situation falls under a *Category II Management Action:*

> *Present in SLO City Open Space Areas as individuals or small, localized populations. Remove by hand or other precision control technique, and maintain a record of actions. Monitor the removal sites, following up with additional removal as needed. This kind of diligence keeps control costs low.*

This is best accomplished through careful monitoring starting in early spring and continuing into midsummer. In most cases, individual or small patches found can be recorded and removed by hand. If flower heads have formed, plants should be bagged and removed from the site. If infestations are larger than 100 sq ft, spot treatment with a low toxicity, selective herbicide (clopyralid or aminopyralid) may be required. In addition to outlier removal and perimeter monitoring, a coordinated effort between JMC, the SLO County Weed Management Area and the SLO County Department of Agriculture should be pursued to eliminate this seed source. Not only does this infested construction yard represent a seed source for infesting the surrounding areas, but there is a high probability that yellow starthistle can be transported throughout SLO County.

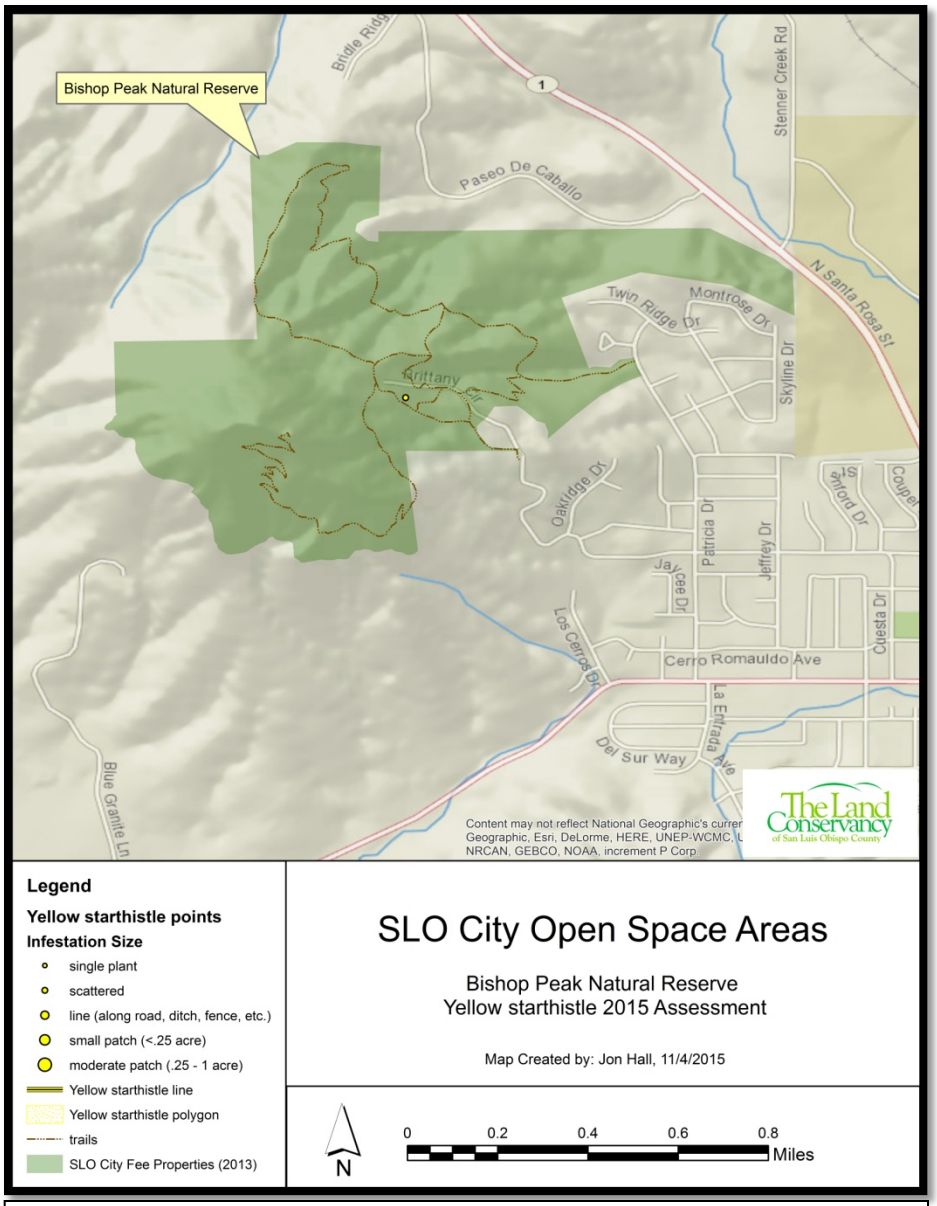


Map 11. Yellow starthistle (*Centaurea solstitialis*) population assessment at the Irish Hills Natural Reserve overlaid with the federally and state listed Chorro Creek Bog thistle (*Cirsium fontinale* var. obispoense).

Bishop Peak Natural Reserve: At the Bishop Peak Natural Reserve there is one incipient population of yellow starthistle (*C. solstitialis*) (Map 12). This population is still relatively small, but is surrounded by a larger population of woolly distaff thistle (*C. lanatus*). This situation falls under a *Category II Management Action:*

> *Present in SLO City Open Space Areas as individuals or small, localized populations. Remove by hand or other precision control technique, and maintain a record of actions. Monitor the removal sites, following up with additional removal as needed. This kind of diligence keeps control costs low.*

This is best accomplished through careful monitoring starting in early spring and continuing into midsummer. In most cases, individual or small patches found can be recorded and removed by hand. If flower heads have formed, plants should be bagged and removed from the site. If infestations are larger than 100 sq ft, spot treatment with a low toxicity, selective herbicide (clopyralid or aminopyralid) may be required. In 2015 the entire population was removed by hand. The effort only required 2 person hours and filled one large bag. Although a few plants had set seed, the seed bank at this time is relatively small. This is an excellent target for eradication. Hand removal is an appropriate method of control for this population. However, if the surrounding woolly distaff thistle (*C. lanatus*) infestation is treated chemically, control efforts should be coordinated to include both plant species.



Map 12. Yellow starthistle (*Centaurea solstitialis*) population location in the Bishop Peak Natural Reserve.

I. HOW ACTIONS WILL BE EVALUATED (Criteria for success)

For the Stenner Springs Natural Reserve, success will be determined by a reduction of 70% of 2015 levels within 5 years and a 95% reduction within 10 years. This will be evaluated through both before and after photos, detailed GIS mapping and annual monitoring using the Invasive Plant Assessment Forms (Appendix C).

For the Irish Hills Natural Reserve, the objective is elimination of yellow starthistle to 0% density within 5 years. This will be evaluated through annual monitoring using the Invasive Plant Assessment Forms (Appendix C). Another measure of success will be the elimination of the JMC construction yard yellow starthistle infestation within 10 years.

For the Bishop Peak Natural Reserve, the objective is eradication of yellow starthistle within 5 years. This will be evaluated through annual monitoring using the Invasive Plant Assessment Forms (Appendix C).

For all un-infested Open Space Areas, prevention is key. Success will be measured by the absence of infestations found through annual monitoring.

J. RESOURCE NEEDS

Time and cost estimates will be inserted later upon consultation with the SLO City Natural Resource Manager, Robert Hill.

Permits Required: All herbicides sprayed should be done by a licensed and insured pesticide applicator. Reporting requirements exist through the California Department of Pesticide Regulation and are submitted through the local County Department of Agriculture. Other permits will be required if a controlled burn is pursued as a control strategy for yellow starthistle at the Stenner Springs Natural Reserve.

K. RESULTS OF EVALUATION

(This section is to be filled in later, preferably within 1 year, when monitoring data has been taken and evaluated, at least preliminarily. The evaluation should be used to determine whether any of the sections B-K above should be modified.)

Scientific name: *Carthamus lanatus* **Common name:** Woolly distaff thistle

Updated : June 31, 2015

A. PRIORITY High

B. DESCRIPTION

Woolly distaff thistle (*Carthamus lanatus*) is found in disturbed open sites, roadsides, agriculture fields, grassland/rangeland and pastures. It is an erect winter annual. Plants exist as rosettes until flower stems develop in spring/summer. Plants reproduce only by seed. Most seeds fall near the parent plant, however they can be dispersed long distances by animals, humans, machinery such as tractors and road grading equipment, mud and water. Most seeds germinate the first couple of years, but some can remain viable for up to 8 years under field conditions. Woolly distaff thistle is native to the Mediterranean region of Europe.

C. CURRENT DISTRIBUTION ON THE SITE

Woolly distaff thistle has a limited distribution on SLO City Open Space Areas (Map 12). It can be found on the Bishop Peak Natural Reserve, but has also been noted near the Irish Hills Natural Reserve at the gate near John Madonna Construction (JMC) yard. It is present in the land surrounding the City of San Luis Obispo, but would not be considered widespread.

D. DAMAGE & THREATS

Woolly distaff thistle is well armed and presents a real challenge to grazing animals in rangelands and passive recreational users. The plant is highly competitive and displaces desirable rangeland vegetation.

E. GOALS

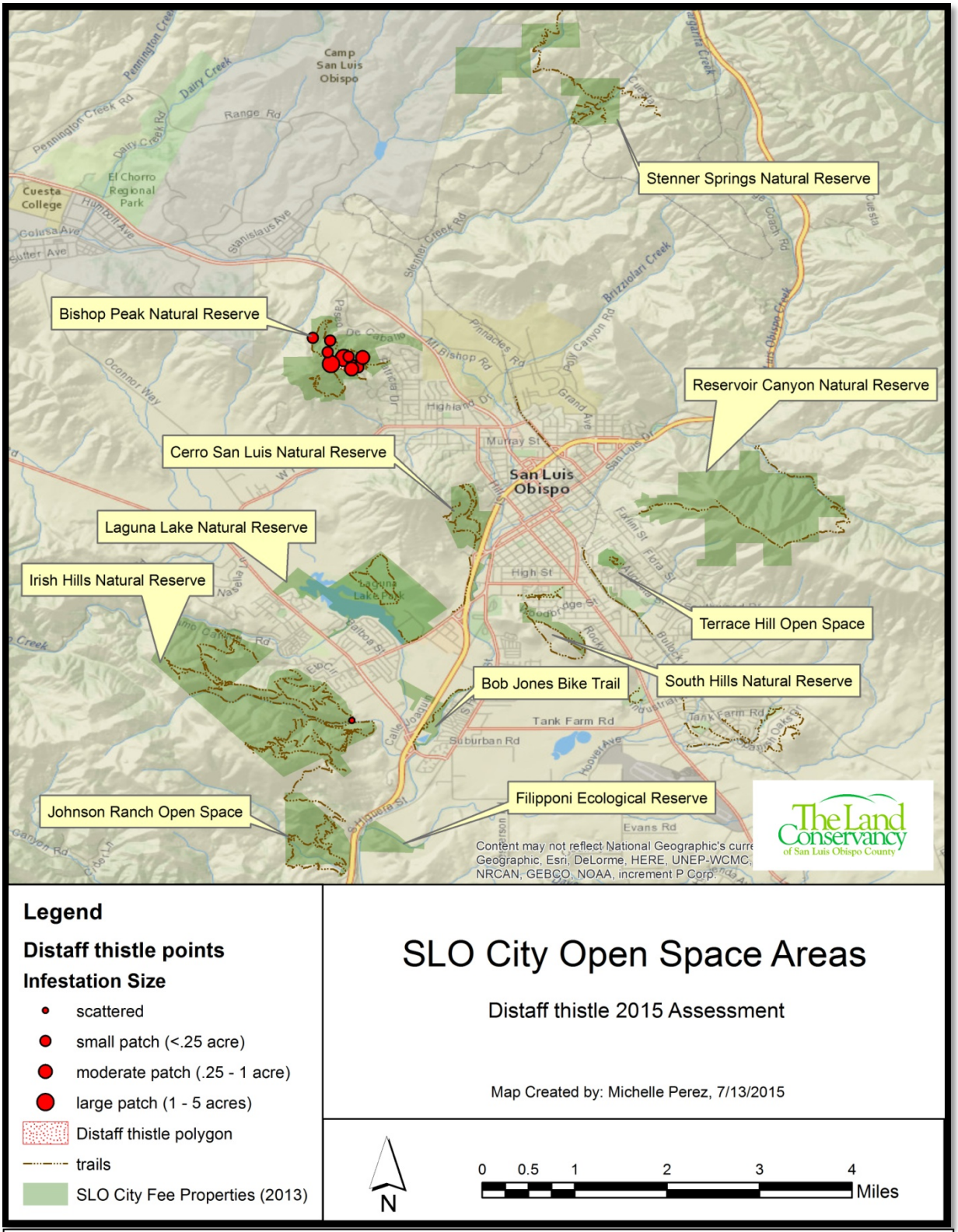
The 5 year goal is “elimination to zero density” on Bishop Peak Natural Reserve. The 11 year goal would be total eradication from the site.

The goal for the Irish Hills Natural Reserve is “eradication”. The goal for all other City Open Space Areas is “prevention”.

F. OBJECTIVES (Measurable)

Eliminate Woolly Distaff thistle to 0% density Bishops Peak Natural Reserve within 5 years. Total Eradication should be achieved within 11 years. Total eradication is judged by no new plants found for a period of 3 years.

Total Eradication from Irish Hills should be achieved within 5 years. Total eradication is judged by no new plants found for a period of 3 years.



Map 13. 2015 Invasive Plant Assessment showing woolly distaff thistle (*Carthamus lanatus*) distribution in SLO City Open Space Areas.

G. MANAGEMENT OPTIONS

Viable control options are:
(1) No treatment;

(2) (Biological); There are currently no biological control agents available for *Carthamus lanatus*.

(3) (Cultural); Heavy grazing increases distaff thistle populations because livestock selectively graze more palatable and less spiny species, reducing competition with other plants for light and nutrients.

(4) (Mechanical);
Hoeing – this is an effective control for small populations. The timing should occur before flowering. Plants must be cut below the soil surface to prevent resprouting.

Mowing – timing should be after bolting but before flower bud development. Plants mowed after flower heads develop can still produce viable seeds in cut heads.

(5) (Chemical); The use of herbicides should always follow the label. There are numerous herbicides that have been shown to be effective at controlling woolly distaff thistle.

GROWTH REGULATORS	
Aminopyralid *Milestone*	**Application type(s):** Broadcast; High-volume spray-to-wet spot treatment **Timing**: Preemergence or postemergence. Postemergence applications are most effective from seedling to the early-rosette stage (late winter or early spring). **Remarks:** Aminopyralid gives excellent control of woolly distaff thistle. It is safe on grasses, although can impact them at higher rates. Aminopyralid has a longer residual and higher activity than clopyralid. Other members of the Asteraceae and Fabaceae are very sensitive to aminopyralid.
Clopyralid *Transline*	**Application type(s):** Broadcast; High-volume spray-to-wet spot treatment **Timing**: Preemergence or postemergence. Postemergence applications should be applied from seedling to late rosette stage. **Remarks:** Clopyralid gives good control of woolly distaff thistle, but not as good as Aminopyralid. It is safe on grassess. Other members of the Asteraceae and Fabaceae can be sensitive to clopyralid. Clopyralid does not bind very tightly to soil and thus can leach into water easily. Once suspended in the water column, it will not breakdown until it falls out with the sediment.
Triclopyr *Garlon 3A, Garlon 4 Ultra*	**Application type(s):** Broadcast; High-volume spray-to-wet spot treatment **Timing**: Postemergence from seedling to small rosette stage. **Remarks:** Triclopyr has little to no residual activity. It is broadleaf-selective and typically does not harm grasses. *Garlon 4 Ultra* is formulated as an ester. In warm temperatures (>80^{o}F), there is arisk of volatilization and off-target damage.
AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup Pro Conc, Aquaneat, others*	**Application type(s):** Broadcast; High-volume spray-to-wet spot treatment **Timing:** Postemergence to plant from rosette to early bolting. **Remarks:** Glyphosate has no soil activity and is nonselective.

H. ACTIONS PLANNED (Treatments and monitoring)

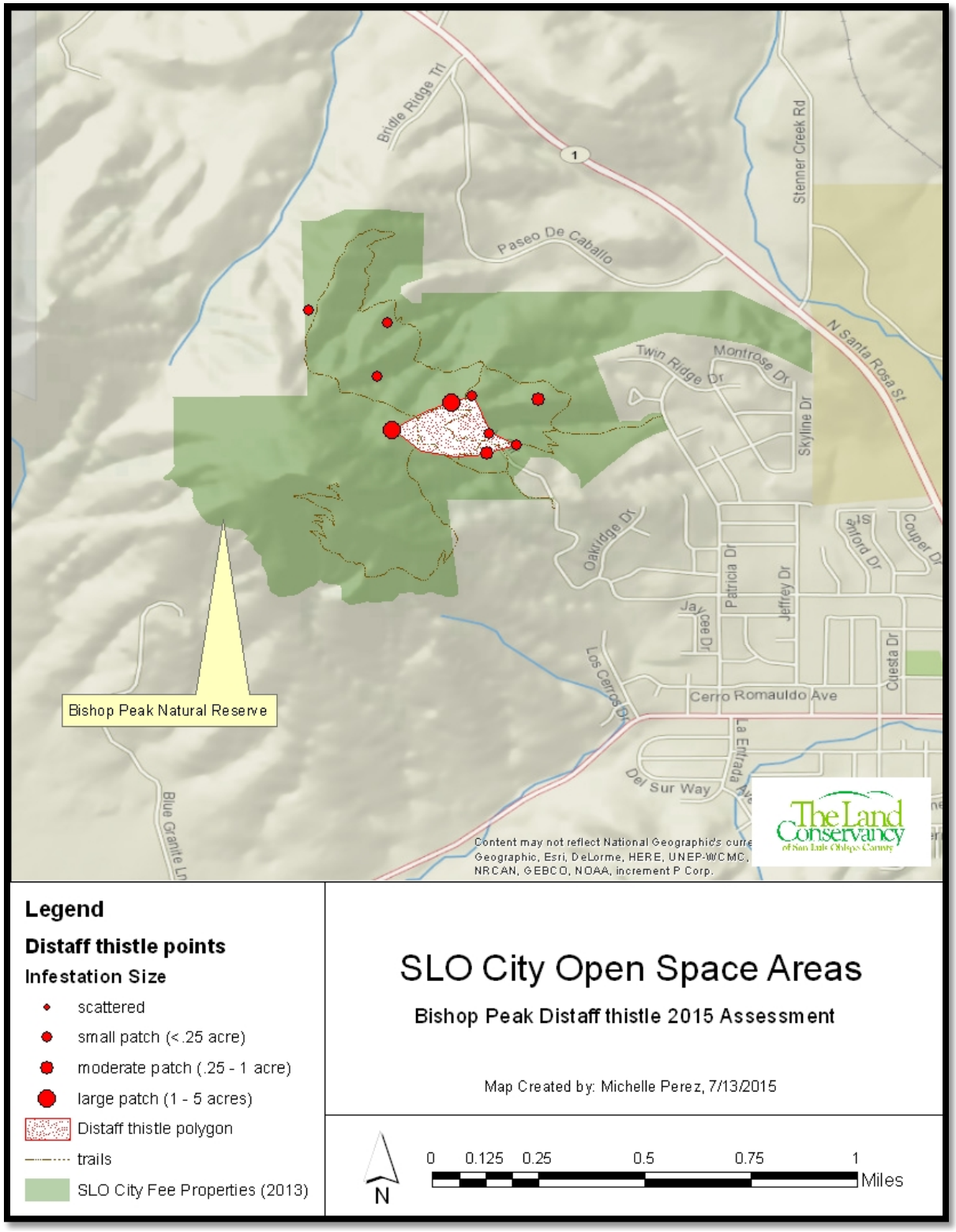
Actions for specific Open Space Areas –

Bishop Peak Natural Reserve: On the Bishop Peak Natural Reserve the largest population can be found near the Highland Drive entrance. This population covers approximately a 12 acre area. Outside of this core population there are 4 distinct satellite populations that can be found at various locations along the "Felsman's Loop" trail (Map 14). All of these populations are in grassland/rangeland areas or along fire roads and trails. Some control work has occurred in the past, but the treatments have been on an "opportunity" basis and have had minimal if any success. The size and distribution of this infestation lends it towards the *Category III Control Action:*

> *Present as large infestations in parts of SLO City Open Space Areas. Native plant communities are disrupted and native species displaced from infested areas. Remove outliers first. If possible, eliminate the exotic seed bank in outlier areas after mature plants have been removed to deter re-establishment. Map large infestations. Plan larger attack projects. Resources permitting, implement one or more large-scale projects, aimed as follows:*
>
> a. *Contain spread to within infested areas.*
> b. *Reduce the number and size of infestations, restore native species to bared sites, and follow a strategy that minimizes dispersal and re-infestation. In general, treat the smallest, furthest outlying areas first.*
> c. *Eliminate the larger infestations, moving from the fringes toward the source of seed dispersal.*

Access to the site is good, allowing for numerous management options. The overall strategy should target outlier populations first and then begin control on the perimeter of the larger population working towards the center. The preferred tool for this site, providing the best control with the least impact, would be a low-toxicity selective herbicide (aminopyralid or clopyralid) sprayed as a broadcast technique in heavily infested areas or high-volume spot spray in outlier populations. These herbicides are broad-leaf specific which allows the use of "competitive exclusion" as a control technique in grassland areas. There are healthy native grass communities in this area. It is anticipated that natural recruitment will help expand this grassland, but in certain areas, re-seeding with site appropriate native grasses may be desirable. After initial herbicide application, follow-up treatments should be done with either herbicide spot treatments or manual removal with a hoe, pulaski or McLeod.

Initial monitoring and site assessment should begin in March with initial herbicide applications happening in around April-May when the plant is in the seedling to early rosette stage. Follow up surveys should be performed at two week intervals after the initial treatment to inform the need for follow-up treatments. Treatments will go through late spring.

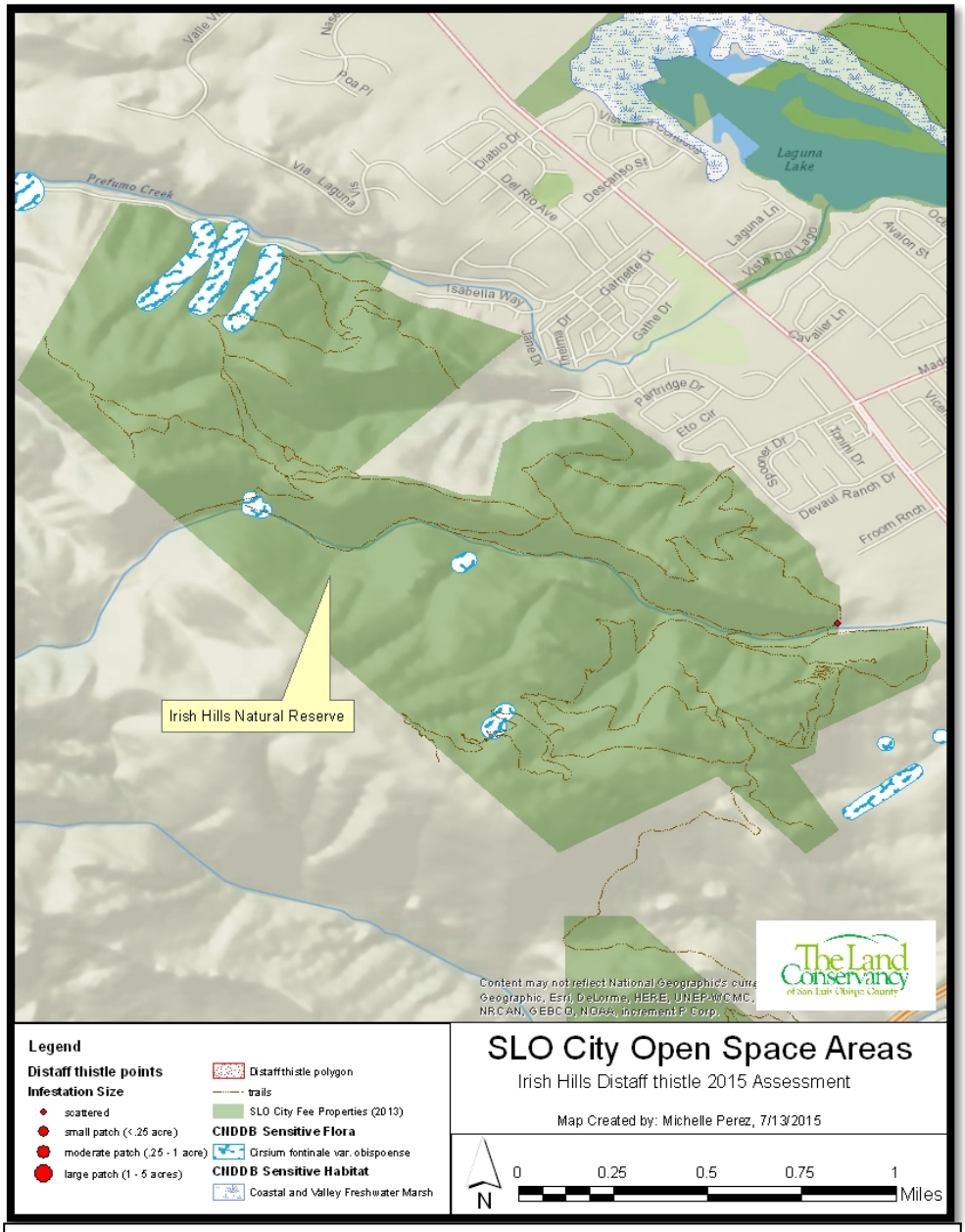


Map 14. Woolly distaff thistle (*Carthamus lanatus*) 2015 population assessment in Bishop Peak Natural Reserve.

Irish Hills Natural Reserve: The geographic distribution of woolly distaff thistle (*C. lanatus*) is currently restricted to the perimeter near the John Madonna Construction yard (Map 15). Due to the limited size and geographic distribution of this species, a *Category II Management Action* is being implemented:

Present in SLO City Open Space Areas as individuals or small, localized populations. Remove by hand or other precision control technique, and maintain a record of actions. Monitor the removal sites, following up with additional removal as needed. This kind of diligence keeps control costs low.

Currently this population is being monitored and removed by SLO City Rangers. Additional surveys will be done to determine if these were isolated incidents, or if a larger seed source is nearby. Surveys should be conducted in July when plants have bolted and are easiest to find.



Map 15. Woolly distaff thistle (*Carthamus lanatus*) 2015 population assessment in Irish Hills Natural Reserve overlaid with locations of the federally and state listed Chorro Creek Bog Thistle (*Cirsium fontinale* var. obispoense).

I. HOW ACTIONS WILL BE EVALUATED (Criteria for success)

For the Bishop Peak Natural Reserve, success will be determined by a reduction of 95% of 2015 levels within 5 years and a 100% reduction within 11 years. This will be evaluated through both before and after photos, detailed GIS mapping and annual monitoring using the Invasive Plant Assessment Forms (Appendix C). Success is determined by total eradication by year 11. Total eradication means a constant zero population density over a three year period of monitoring.

For the Irish Hills Natural Reserve, the objective is elimination of woolly distaff thistle to 0% density within 5 years. This will be evaluated through annual monitoring using the Invasive Plant Assessment Forms (Appendix C).

For all un-infested Open Space Areas, prevention is key. Success will be measured by the absence of infestations found through annual monitoring.

J. RESOURCE NEEDS

Time and cost estimates will be inserted later upon consultation with the SLO City Natural Resource Manager, Robert Hill.

Permits Required: All herbicides sprayed should be done by a licensed and insured pesticide applicator. Reporting requirements exist through the California Department of Pesticide Regulation and are submitted through the local County Department of Agriculture.

K. RESULTS OF EVALUATION

(This section is to be filled in later, preferably within 1 year, when monitoring data has been taken and evaluated, at least preliminarily. The evaluation should be used to determine whether any of the sections B-K above should be modified.)

Scientific name: *Tamarix sp.* **Common name:** Saltcedar, Tamarisk

Updated : June 31, 2015

A. PRIORITY High

B. DESCRIPTION

Tamarisk can occupy rivers, lake and pond margins, washes, roadsides, ditches, and springs. It grows best in alkaline soil, but tolerates salinity and acidity. Plants grow as small trees or shrubs. They develop deep root systems to about 15 ft. and have a high evapotranspiration rate. Reproduction is predominantly by seed, but can also reproduce vegetatively from root sprouts and stem fragments. Seeds disperse by both wind and water. Seeds lack a dormancy period and most germinate within 24 hours after contacting water. Seeds typically survive for only 5 weeks. Tamarisk is native to eastern Asia, northern Africa, the Middle East, India, and southern Europe.

C. CURRENT DISTRIBUTION ON THE SITE

Tamarisk is currently invading the Laguna Lake Natural Reserve. It is presumed that the source population originates on private property off of Foothill Blvd (Map 16).

D. DAMAGE & THREATS

Tamarisk plants can use both surface and groundwater. The presence of numerous trees along riparian areas have been known to seriously reduce ground water tables and surface water availability, drying up wetlands, and reducing flows. Roots extract salts from deep soil layers and excrete it from leaves. Salt is deposited on the soil surface with the leaf litter. The increased salinity of the upper soil profile inhibits the growth, survival, and recruitment of desirable native vegetation.

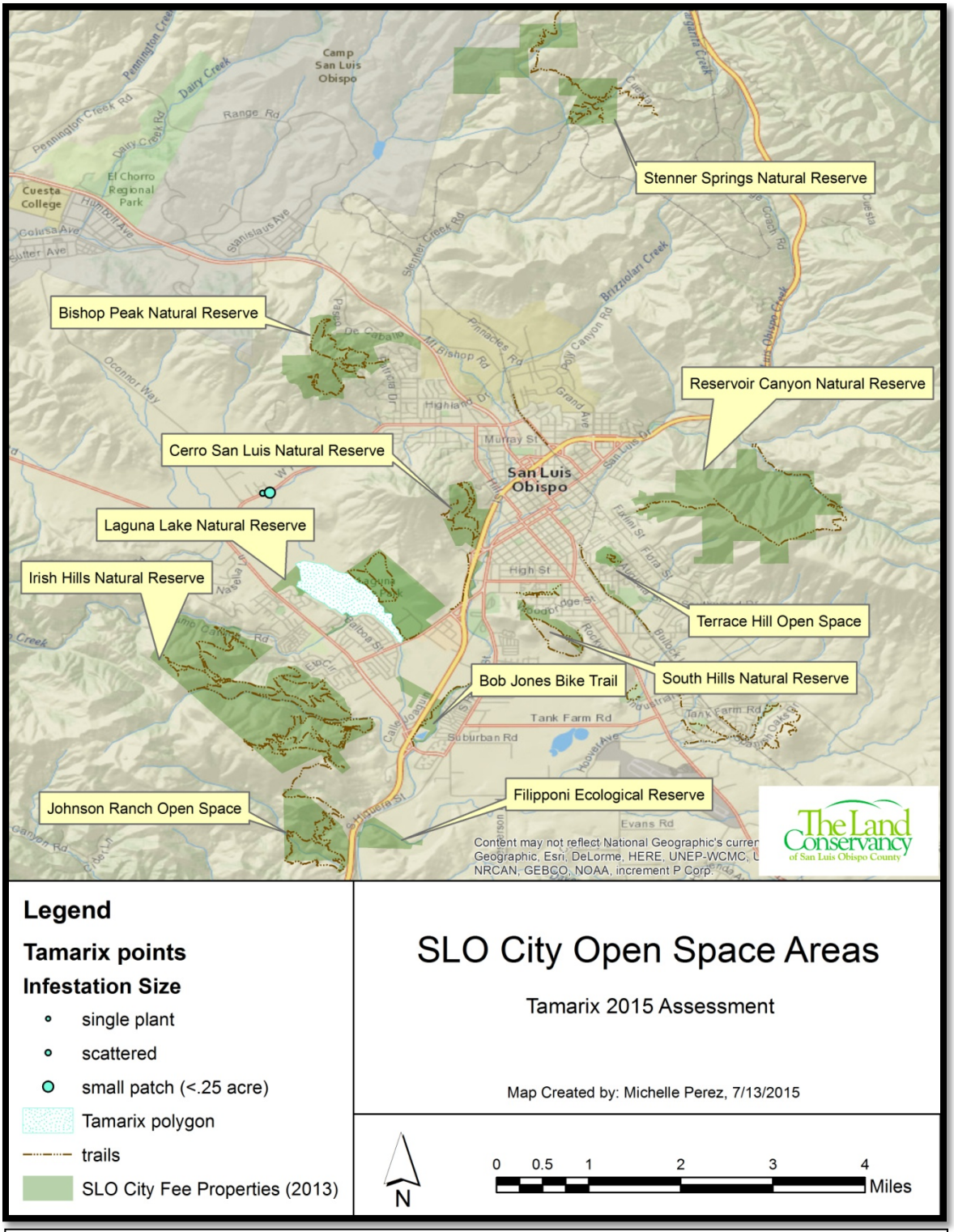
E. GOALS

The long-term goal for this species is complete eradication from SLO City Open Space Areas. Due to its limited distribution in the San Luis Obispo Area and its short lived seed bank, eradication is an achievable and appropriate goal.

F. OBJECTIVES (Measurable)

Eliminate Tamarisk to 0% density at the Laguna Lake Natural Reserve within 5 years.

Eliminate seed source population of Tamarisk within 5 yrs. Once access is obtained to remove source populations, the management object can move to eradication in 10 years.



Map 16. 2015 Invasive Plant Assessment showing *Tamarix sp.* distribution in SLO City Open Space Areas.

G. MANAGEMENT OPTIONS

Viable control options are:

(1) No treatment;

(2) (Biological); A new biotype of saltcedar leaf beetle (*Diorhabda elongate*) has been released in California and is establishing well. Biological control will not eradicate tamarisk but it has the potential to suppress populations by 75 to 85%. It is doubtful this would be an effective tool in San Luis Obispo because there is not enough tamarisk to support a *Diorhabda* population.

(3) (Cultural);

Burning – As a stand-alone strategy burning has not been successful. To be successful, prescribed fires should be followed by herbicide application to control resprouts.

Flooding – Young seedlings of tamarisk can be controlled by flooding for 1 month.

(4) (Mechanical); Mechanical control methods include mowing, chopping, chaining, and disking. However, these methods usually only suppress tamarisk temporarily and will not eradicate infestations. Tamarisk is also able to resprout vigorously from the root crown following mechanical control methods. Any fragments that move into the water column can resprout. Hand pulling can be effective on small plants when the roots can be removed as well.

(5) (Chemical); The use of herbicides should always follow the label. There are numerous herbicides that have been shown to be effective at controlling tamarisk.

GROWTH REGULATORS	
Triclopyr *Garlon 3A, Garlon 4 Ultra, Pathfinder II*	**Application type(s):** Cut stump treatment: Basal bark treatment on young trees without well-developed bark. **Timing**: Summer or Fall when plants are still growing but not water stressed. At this time herbicide will translocate to the roots. **Remarks:** Cut stump treatments can be very effective. Basal bark treatment is only effective on young trees without well-developed bark.
AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup Pro Conc, Aquaneat, others*	**Application type(s):** Broadcast foliar treatment: Cut stump treatment: **Timing:** Broadcast treatments should be made in late summer or early fall when plants are translocating carbohydrates to the below-ground tissues. Cut stump treatments can be made year-round but avoid treatment under drought conditions.. **Remarks:** Glyphosate provides only partial control of *Tamarix* species. Because the herbicide precipitates out when in contact with divalent and trivalent salts, the salty excretions on the foliar glands will reduce the effectiveness of glyphosate. Foliar treatment with glyphosate will probably be most effective if applied shortly after a rainfall event.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapyr *Habitat, Polaris*	**Application type(s):** Broadcast foliar treatment: Spot treatment high volume spray-to-wet: Spot treatment low volume: Cut stump treatment: Hack-and-squirt treatment **Timing:** Late summer or early fall when plants are fully expanded and are translocating carbohydrates to the below-ground tissues. **Remarks:** Imazapyr is the most widely used herbicide to control tamarisk. It is approved for use in aquatic environments. Both broadcast and low volume treatments give excellent control. This herbicide is fairly non-selective, so off target damage should be considered. Imazapyr takes a long time to kill the plant. Plants should not be removed for at least 2 years to ensure good control.

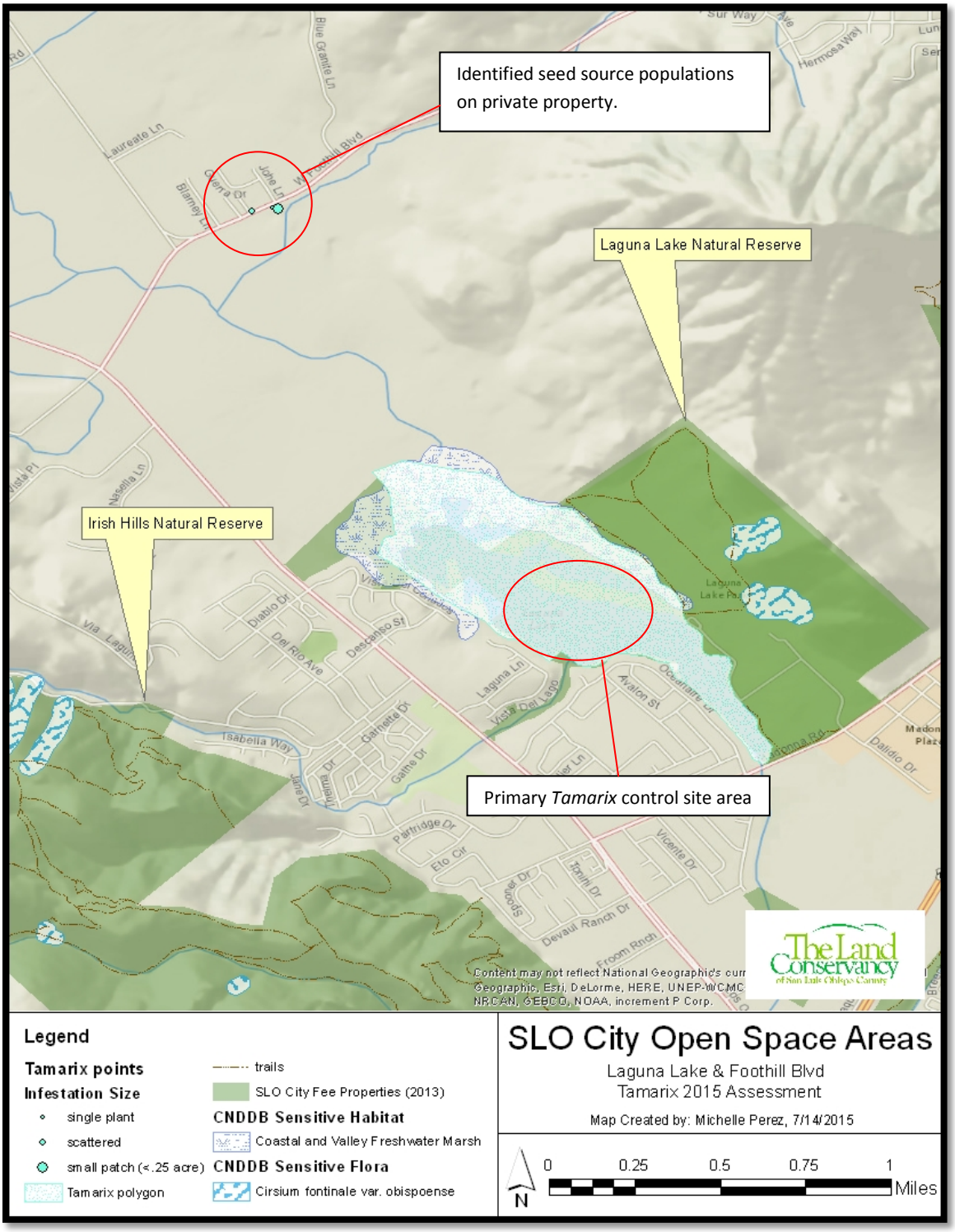
H. ACTIONS PLANNED (Treatments and monitoring)

Laguna Lake Natural Reserve: Presently, tamarisk is restricted to the Laguna Lake Natural Reserve and surrounding drainages (Map 17). As water levels have continued to recede in recent years, there has been an increase in the infestation of Tamarisk on the newly exposed mudflats and lake margins. The densest part of the infestation has been centered in an area best described as the Prefumo "delta", where Prefumo creek drains into Laguna Lake depositing sand and silt in an alluvial fan. It is suspected that the actual species is *Tamarix ramossisima*, although there is currently no vouchered specimen. In 2014 SLO City's Natural Resources Program took a lead role in coordination of the City's efforts to undertake an "early detection, rapid response" approach to this species before it spreads throughout the lake area. About 925 plants were removed in Fall 2014 with another 327 plants removed during spring and summer of 2015. Monitoring and removal occurs bi-monthly. Plants are removed by hand using the sharp point of a pick mattock to loosen the soil around the tree and pull, removing with the tap root intact.

This monitoring and hand removal effort in the lake area will continue through efforts of the SLO City Natural Resources Program, SLO City Ranger's with help from volunteers and groups like the Watershed Stewards Program and California Conservation Corps.

Additional work needs to be done to remove the source population(s) off of Foothill Blvd. First steps, which are currently underway, will gain access and buy-in for the project with the various private property owners involved. Additional support may be provided through the SLO County Weed Management Area and SLO County Department of Agriculture. Although this population is geographically small, the plants appear to be well established. Because the bark on the trees is developed enough to preclude basal bark treatments as an option, it is recommended that a cut-stump approach be taken. Trees removed from the cut-stump approach should be either chipped on-site or removed and chipped elsewhere. Either Triclopyr or Imazapyr would be good options for this. Timing should occur in the Fall with follow-up monitoring happening in Spring. It should be noted that the herbicide Imazapyr takes a long time to work and may damage nearby trees if the roots are grafted to the Tamarisk plants. It would also be beneficial to survey the Prefumo creek watershed for additional seed sources.

Photo 2. Saltcedar removed from Laguna Lake, Sept. 14, 2014



Map 17. *Tamarix sp.* distribution in the Laguna Lake Natural Reserve overlaid on sensitive habitat types identified by the California Natural Diversity Database (CNDDB).

I. HOW ACTIONS WILL BE EVALUATED (Criteria for success)

For the Laguna Lake Natural Reserve, the objective is elimination of *Tamarix sp.* to 0% density within 5 years. This will be evaluated through annual monitoring using the Invasive Plant Assessment Forms (Appendix C). Evaluation for eradication will not be possible until the source population has been eliminated.

For the source population on Foothill Blvd. the goal is eradication. Because of the short-lived seed bank this is possible within a 5 year time-frame. This will be evaluated through annual monitoring using the Invasive Plant Assessment Forms (Appendix C). Eradication is determined by three years of monitoring revealing no new *Tamarix sp.* detected.

J. RESOURCE NEEDS

Time and cost estimates will be inserted later upon consultation with the SLO City Natural Resource Manager, Robert Hill.

Permits Required: All herbicides sprayed should be done by a licensed and insured pesticide applicator. Reporting requirements exist through the California Department of Pesticide Regulation and are submitted through the local County Department of Agriculture.

State Water Resources Control Board National Pollution Elimination System (NPDES) Pesticide Permit for Weed Control - The State Water Resources Control Board adopted the Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications, Water Quality Order 2013-0002-DWQ, for the reissuance of General NPDES Permit CAG990005 in June 2013. Order 2013-0002-DWQ became effective on December 1, 2013.

This General Permit covers the point source discharge to waters of the United States of residues resulting from pesticide applications using products containing 2,4-D, acrolein, copper, diquat, endothall, fluridone, glyphosate, imazamox, imazapyr, penoxsulam, sodium carbonate peroxyhydrate, and triclopyr-based algaecides and aquatic herbicides, and adjuvants containing ingredients represented by the surrogate nonylphenol.

It is possible this permit would be needed for control of *Tamarix sp.* in Laguna Lake or the drainages containing the source populations if applications are made when there is water in the creek/drainage or lake and there will be a point source discharge to the water column through direct application or drift. If this permit is needed, a corresponding “Aquatic Pesticide Application Plan” or APAP must be prepared. Yearly fees are also associated with this permit. A cut-stump technique of herbicide application would eliminate the chance for drift into the water column.

K. RESULTS OF EVALUATION

(This section is to be filled in later, preferably within 1 year, when monitoring data has been taken and evaluated, at least preliminarily. The evaluation should be used to determine whether any of the sections B-K above should be modified.)

Scientific name: *Genista monspessulana* **Common name:** French broom

Updated : June 31, 2015

A. PRIORITY High

B. DESCRIPTION

French broom invades grasslands, coastal scrub and chaparral, oak woodlands, forest margins, riparian corridors and disturbed sites. It is a perennial evergreen shrub tolerating varied soil moisture regimes. Reproduction is by seed. Seeds can remain viable in the soil for up to 30 years. Large soil seedbanks often accumulate making long term control difficult. Seeds get spread when seed pods dehisce propelling seeds several feet from the parent plant. French broom is native to the Mediterranean region of Europe and was introduced as a horticultural plant.

C. CURRENT DISTRIBUTION ON THE SITE

French Broom can be found throughout SLO City Open Space Areas, but it is not yet widespread. Invasions are typically expanding from neighboring properties. It is expanding in the Irish Hills Natural Reserve, Cerro San Luis Natural Reserve, Reservoir Canyon Natural Reserve, Terrace Hill Open Space and the South Hills Natural Reserve (Map 18).

D. DAMAGE & THREATS

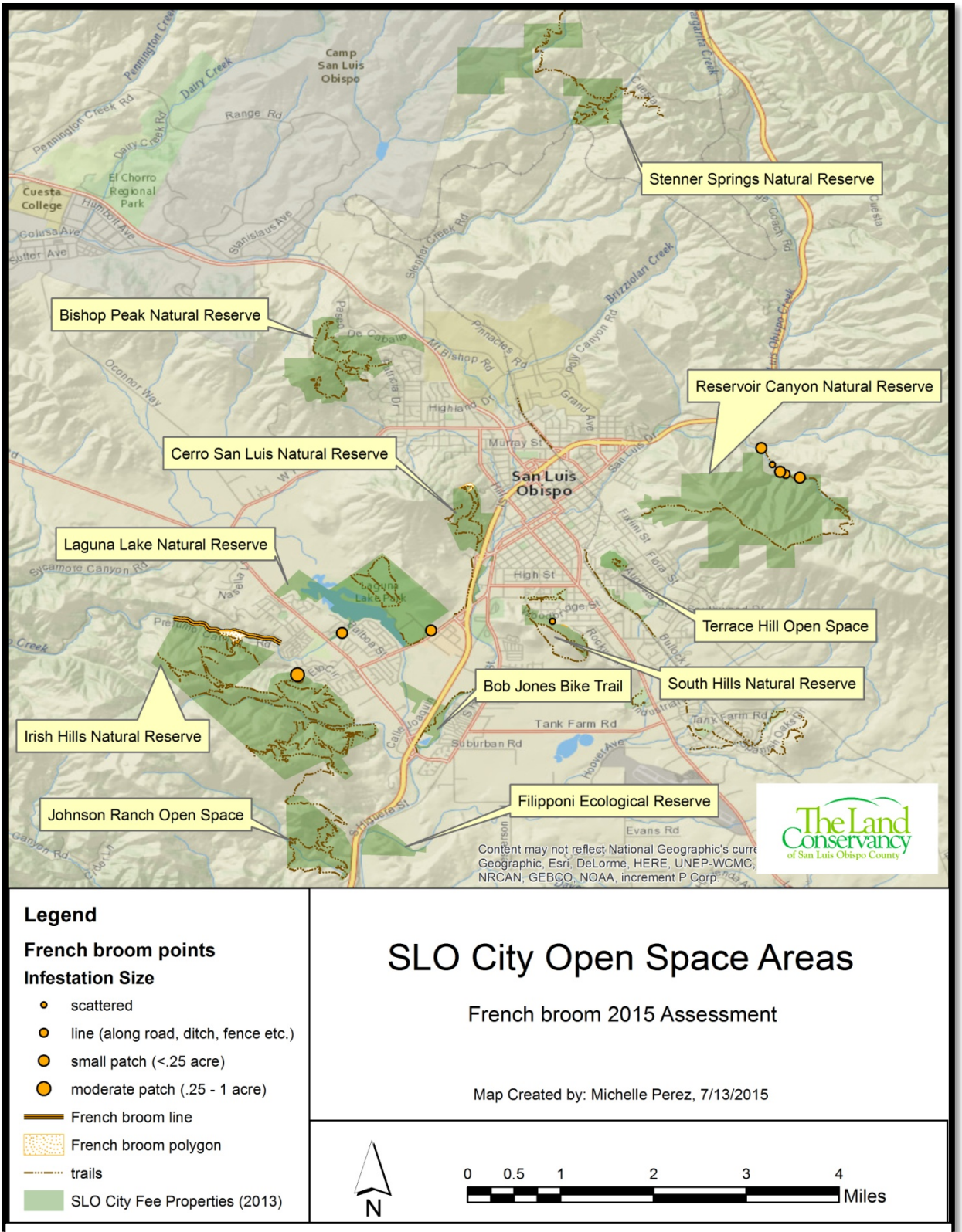
French broom grows rapidly and can form dense impenetrable thickets. The dense growth habit outcompetes native vegetation, can exclude larger wildlife and is extremely flammable. French broom is thought to have fueled the devastating 1991 Oakland Berkeley Hills Fire. French broom has the ability to fix atmospheric nitrogen into soil. This aids in its own colonization of marginal soils and also benefits other weedy species. This can be a particular problem for the regions serpentine soil communities. These communities are unique and fairly resistant to invasion because they are low fertility. An invasion of French broom to these areas could convert these ecosystems from a native grass dominated ecosystem to a shrub dominated one.

E. GOALS

The long-term goal for this species is to contain its spread through outlier and perimeter control.

F. OBJECTIVES (Measurable)

Reduce *G. monspessulana* infestations on Terrace Hills Natural Reserve to a zero (0) % density within 5 years. For all other infested SLO City Open Space Areas, maintain a 100 ft. buffer zone around 2015 infestation levels with only a 5% or less cover in the buffer zones.



Map 18. 2015 Invasive Plant Assessment showing *Genista monspessulana* distribution in SLO City Open Space Areas.

Viable control options are:

(1) No treatment;

Photo 3. *Uresiphita reversalis* moth on French broom.

(2) (Biological); The native pyralid moth (*Uresiphita reversalis*) defoliates some French broom, but plants grow new leaves after the larvae metamorphose. Larvae of this moth have been observed at the South Hills Natural Reserve (Photo 3).

(3) (Cultural);
Grazing - Goats confined to a small area can help control stands that re-sprout after cutting or burning.

Burning – burning can remove above ground biomass, release nutrients into the soil, and cause a flush of seed germination from the seedbank. Alone, it is not an effective treatment, but can be used to reduce the seedbank if followed up with herbicide applications and/or revegetation with desirable species. It is important to employ a control strategy following a burn; otherwise the broom population in subsequent years may become worse than before.

Flaming – good success has been seen on seedlings using a propane torch to wilt the leaves and rupture the cells. Due to the fire danger, this is best done during a rain.

(4) (Mechanical); Hand pulling can be done on small seedlings, but for larger plants a weed extraction tool such as a “weed wrench” must be employed. This has proven effective and is a suitable control strategy for use by volunteers. Cutting plants in the Spring can reduce flowering and repeated cutting can deplete the plant’s energy reserves, but resprouts will occur and must be sprayed with herbicide.

(5) (Chemical); The use of herbicides should always follow the label. There are numerous herbicides that have been shown to be effective at controlling French broom.

GROWTH REGULATORS	
Triclopyr *Garlon 3A, Garlon 4 Ultra, Pathfinder II* Aminopyralid + triclopyr *Capstone, Milestone Vm Plus*	**Application type(s):** High-volume spray-to-wet spot treatment; Low volume treatment: Cut stump treatment: Basal bark treatment: **Timing**: Postemergence when plants are growing rapidly. Cut stump and basal bark treatments can be applied anytime although are optimal if not applied when sap is rising in early spring. **Remarks:** Triclopyr is a selective herbicide for broadleaf species. Plants treated with basal bark technique should not be cut for at least 1 month following application.
AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup, Rodeo, Aquaneat, others*	**Application type(s):** High-volume spray-to-wet spot treatment; Low volume treatment: Cut stump treatment: **Timing:** Postemergence when plants are growing rapidly. Treatments should be made in late summer or early fall. **Remarks:** Glyphosate is a nonselective herbicide. It gives good control with some resprouts. Treated plants should not be cut for at least 4 months after foliar treatment.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapyr *Habitat, Polaris*	**Application type(s):** Cut stump treatment: **Timing:** Best when applied in late summer to early fall, but before leaf drop. **Remarks:** Imazapyr is a soil residual herbicide and may result in bare ground around trees for some time after treatment.

H. ACTIONS PLANNED (Treatments and monitoring)

Actions for specific Open Space Areas –

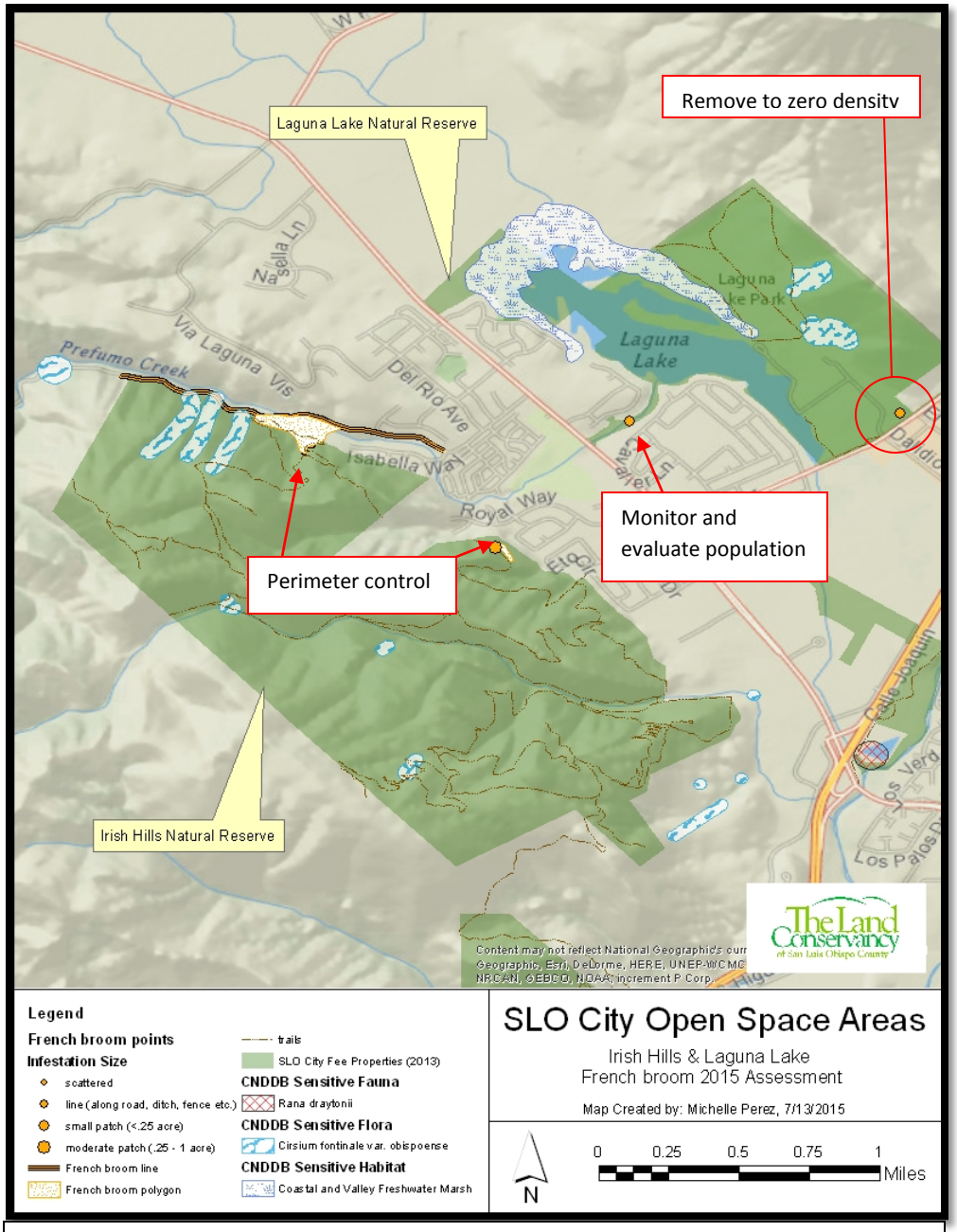
Irish Hills Natural Reserve: At the Irish Hills Natural Reserve French broom is spreading predominantly down Prefumo creek and migrating to upland areas from there (Map 19). Although, by no means widespread at the Irish Hills, there is a clear outward migration of French broom onto the Reserve from neighboring properties. It is expected that infestation could greatly expand throughout the Irish Hills Natural Reserve. Currently there is no management for French broom in Prefumo Canyon or on neighboring properties. The size and distribution of this infestation lends it towards the *Category III Control Action:*

Present as large infestations in parts of SLO City Open Space Areas. Native plant communities are disrupted and native species displaced from infested areas. Remove outliers first. If possible, eliminate the exotic seed bank in outlier areas after mature plants have been removed to deter re-establishment. Map large infestations. Plan larger attack projects. Resources permitting, implement one or more large-scale projects, aimed as follows:

a. *Contain spread to within infested areas.*
b. *Reduce the number and size of infestations, restore native species to bared sites, and follow a strategy that minimizes dispersal and re-infestation. In general, treat the smallest, furthest outlying areas first.*

c. Eliminate the larger infestations, moving from the fringes toward the source of seed dispersal.

A 100 foot buffer should be delineated along the perimeter of the existing infestation as a target zone for management. Surrounding areas should be searched for satellite population which would be mapped and removed immediately. The buffer zone should be managed to allow no more than 5% cover of French broom. Removal by volunteers using a weed extraction tool such as the "weed wrench" can be used to good effect to minimize the spread. Herbicide application using a basal bark technique, cut-stump or a low volume high concentration "drizzle" technique can be employed for larger or well established populations not possible with hand removal. Due to the longevity of the seed bank, any control actions taken will need consistent follow-up for up to 30 years.



Map 19. French broom (*Genista monspessulana*) 2015 population assessment in Irish Hills Natural Reserve and Laguna Lake Natural Reserve overlaid with locations of the federally and state listed Chorro Creek Bog Thistle (*Cirsium fontinale* var. obispoense).

Laguna Lake Natural Reserve: The geographic distribution of French broom (*G. monspessulana*) is currently restricted to the perimeter near the Madonna Road entrance and populations migrating down Prefumo creek (Map 19). Due to the limited size and geographic distribution of this species, a *Category II Management Action* is recommended:

> *Present in SLO City Open Space Areas as individuals or small, localized populations. Remove by hand or other precision control technique, and maintain a record of actions. Monitor the removal sites, following up with additional removal as needed. This kind of diligence keeps control costs low.*

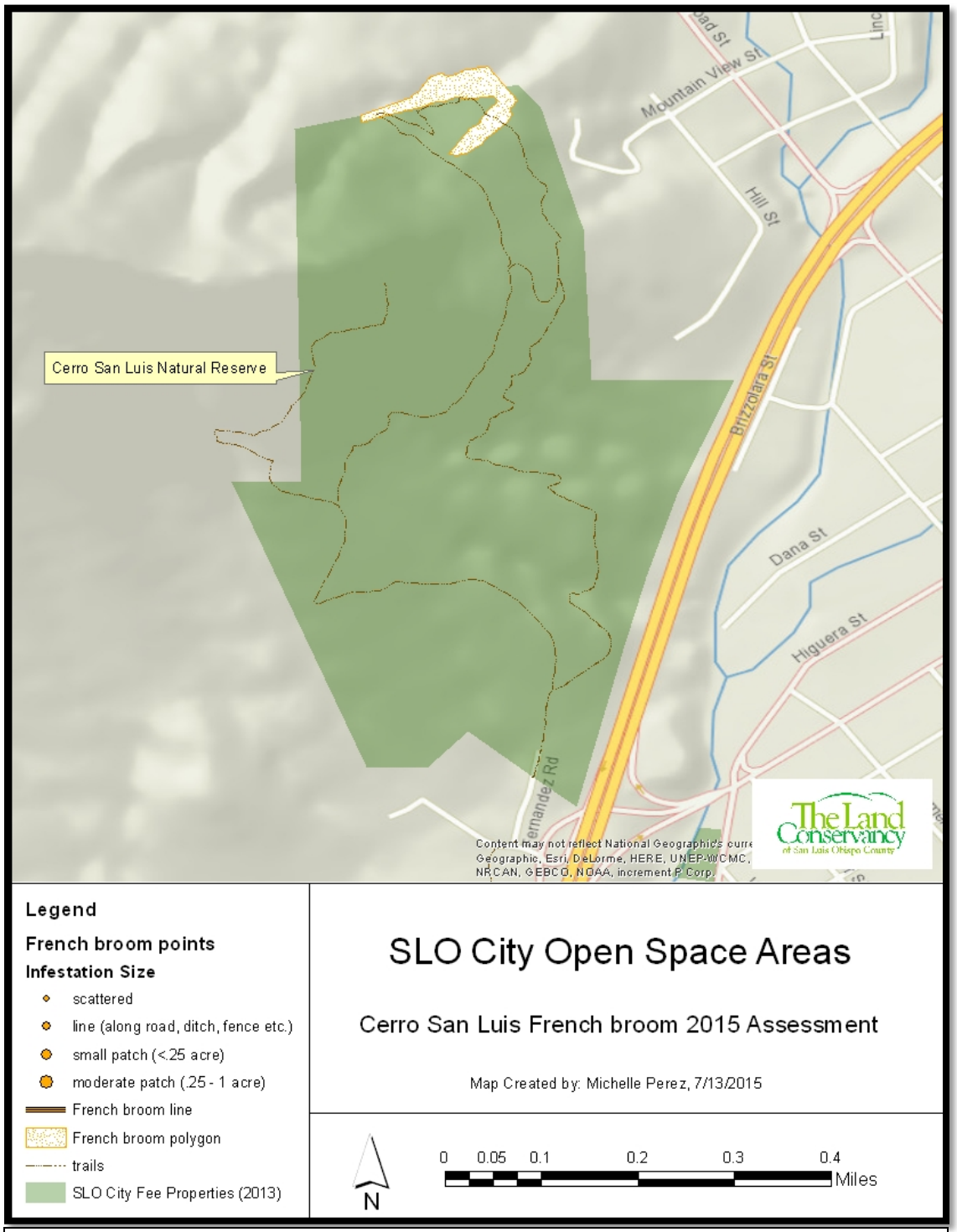
The population near Madonna Road should be controlled to zero density and monitored yearly after that for new plants emerging from the seed bank. Control can be by hand removal or with herbicide in a basal bark, cut-stump or drizzle technique. The population in Prefumo creek should be monitored and the spread assessed yearly to determine if management is necessary. Because there is such a large seed source in Prefumo creek, it is anticipated that there will always be some level of infestation in this part of the Laguna Lake Natural Reserve.

Cerro San Luis Natural Reserve: At the Cerro San Luis Natural Reserve French broom appears to be spreading from the neighboring urban areas. This could possibly be a garden escape from someone's yard. This population is migrating to upland areas near the Hill Street entrance (Map 20). French broom is not geographically widespread in this area, but is spreading rapidly up the more mesic habitats. The infestation has the potential to greatly expand throughout the Cerro San Luis Natural Reserve. The size and distribution of this infestation lends it towards the *Category III Control Action:*

> *Present as large infestations in parts of SLO City Open Space Areas. Native plant communities are disrupted and native species displaced from infested areas. Remove outliers first. If possible, eliminate the exotic seed bank in outlier areas after mature plants have been removed to deter re-establishment. Map large infestations. Plan larger attack projects. Resources permitting, implement one or more large-scale projects, aimed as follows:*
>
> a. *Contain spread to within infested areas.*
> b. *Reduce the number and size of infestations, restore native species to bared sites, and follow a strategy that minimizes dispersal and re-infestation. In general, treat the smallest, furthest outlying areas first.*
> c. *Eliminate the larger infestations, moving from the fringes toward the source of seed dispersal.*

A 100 foot buffer should be delineated along the perimeter of the existing infestation as a target zone for management. Surrounding areas should be searched for satellite population which would be mapped and removed immediately. The buffer zone should be managed to allow no more than 5% cover of French broom. Removal by volunteers using a weed extraction tool such as the "weed wrench" can be used to good effect to minimize the spread. Herbicide application using a basal bark technique, cut-stump or a low volume high concentration "drizzle" technique can be employed for larger or well

established populations not possible with hand removal. Due to the longevity of the seed bank, any control actions taken will need consistent follow-up for up to 30 years.

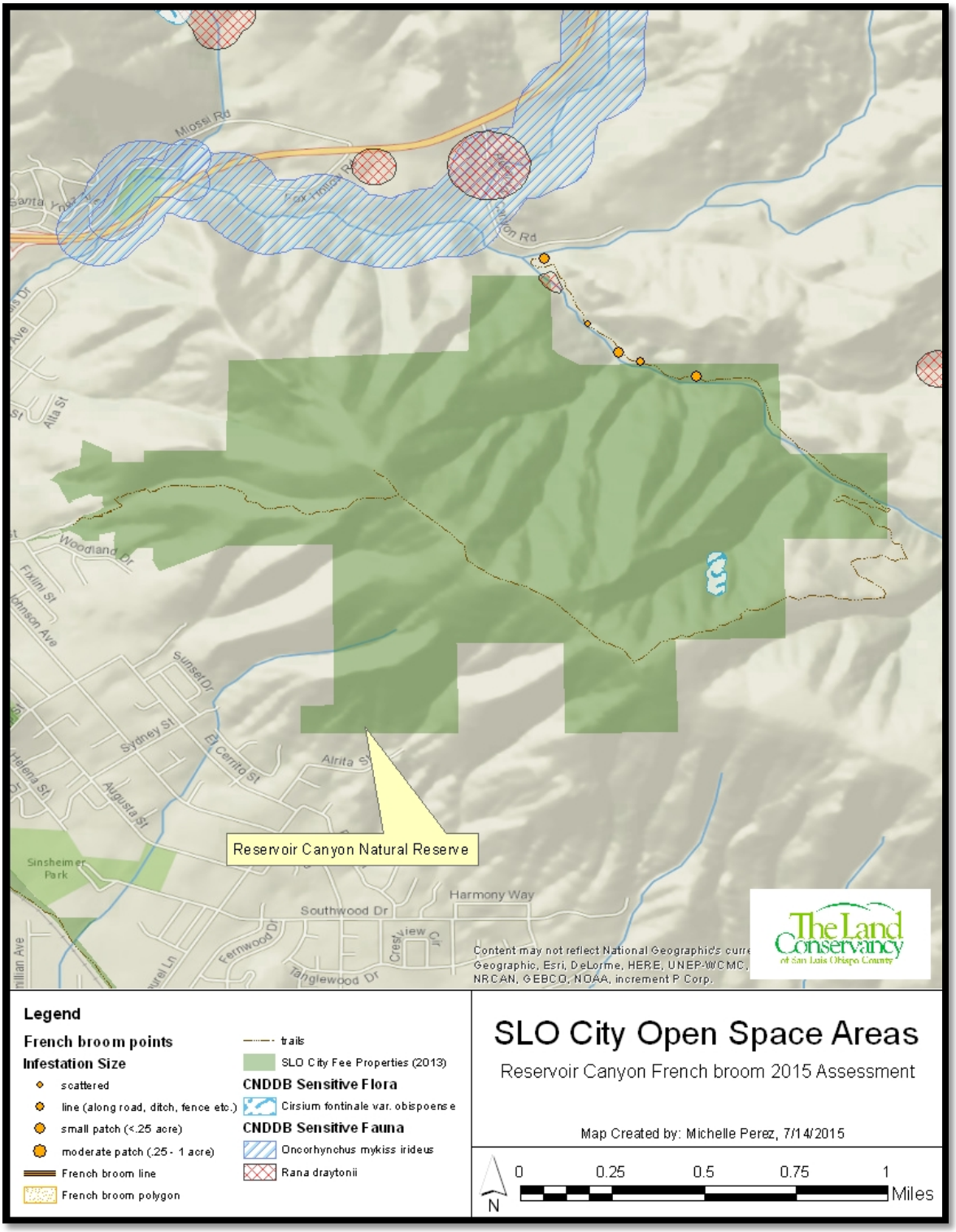


Map 20. French broom (*Genista monspessulana*) 2015 population assessment in Cerro San Luis Natural Reserve.

Reservoir Canyon Natural Reserve: At the Reservoir Canyon Natural Reserve French broom is spreading from the neighboring properties near the Reservoir Canyon Road trailhead. This population is migrating up the habitat surrounding Reservoir Canyon Creek at the North West boundary of the Reserve (Map 21). French broom is widespread at the Reservoir Canyon Road trailhead, but the population becomes more sparse as you head up the Canyon. This infestation has the potential to greatly expand throughout the Reservoir Canyon Natural Reserve. The size and distribution of this infestation lends it towards the *Category III Control Action:*

> *Present as large infestations in parts of SLO City Open Space Areas. Native plant communities are disrupted and native species displaced from infested areas. Remove outliers first. If possible, eliminate the exotic seed bank in outlier areas after mature plants have been removed to deter re-establishment. Map large infestations. Plan larger attack projects. Resources permitting, implement one or more large-scale projects, aimed as follows:*
>
> a. *Contain spread to within infested areas.*
> b. *Reduce the number and size of infestations, restore native species to bared sites, and follow a strategy that minimizes dispersal and re-infestation. In general, treat the smallest, furthest outlying areas first.*
> c. *Eliminate the larger infestations, moving from the fringes toward the source of seed dispersal.*

A 100 foot buffer should be delineated along the perimeter of the existing infestation as a target zone for management. Surrounding areas should be searched for satellite population which would be mapped and removed immediately. The buffer zone should be managed to allow no more than 5% cover of French broom. Removal by volunteers using a weed extraction tool such as the “weed wrench” can be used to good effect to minimize the spread. Herbicide application using a basal bark technique, cut-stump or a low volume high concentration “drizzle” technique can be employed for larger or well established populations not possible with hand removal. Due to the longevity of the seed bank, any control actions taken will need consistent follow-up for up to 30 years.



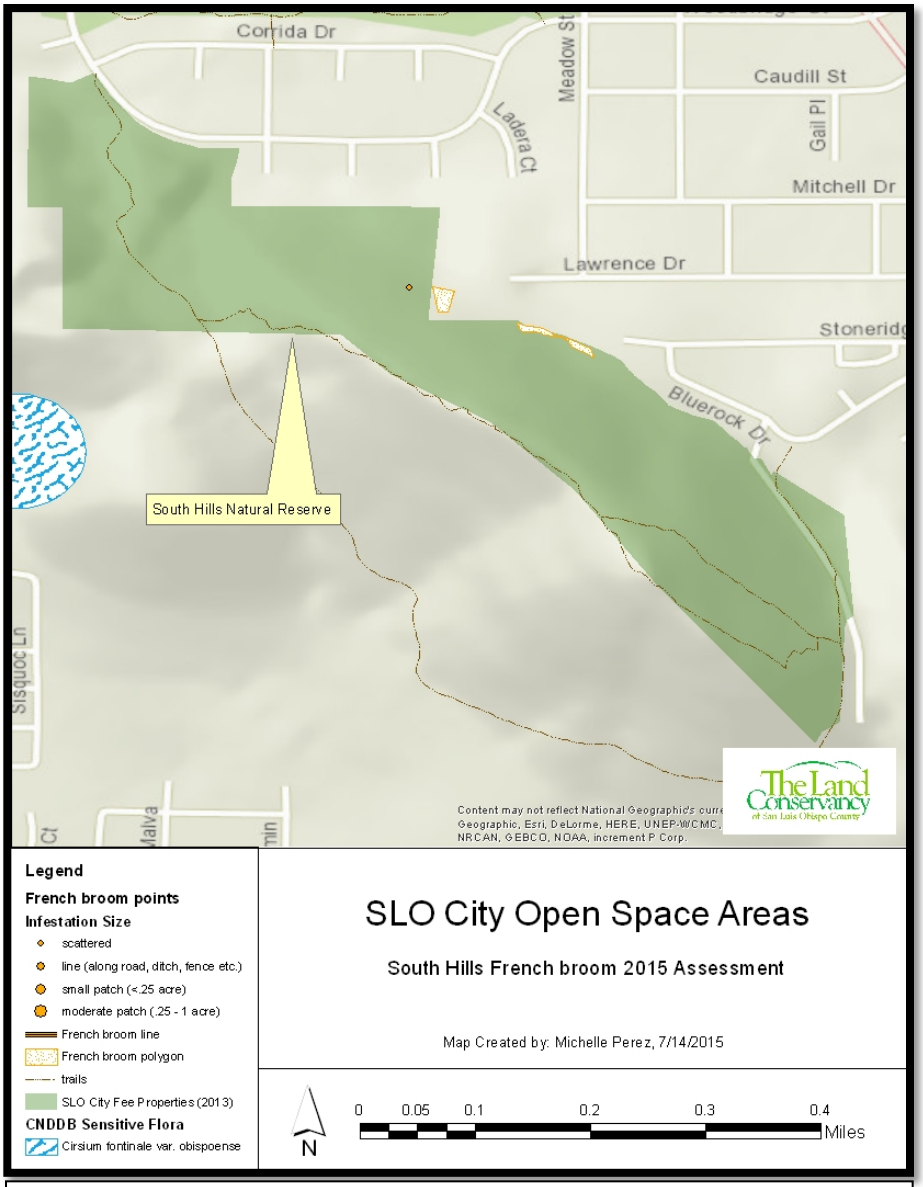
Map 21. French broom (*Genista monspessulana*) 2015 population assessment in Reservoir Canyon Natural Reserve overlaid with State and Federally listed Threatened and Endangered Species locations provided by the California Natural Diversity Database (CNDDB).

South Hills Natural Reserve: At the South Hills Natural Reserve French broom is spreading from the neighboring urban area. This is a garden escape from someone's yard (Picture 4). This population is migrating into the neighboring serpentine grassland habitats (Map 22). French broom is not geographically small and isolated enough that it could qualify as an eradication target, but because the populations directly adjoining the South Hills Natural Reserve are so well established, it is more appropriate to designate it a *Category III Control Action:*

> *Present as large infestations in parts of SLO City Open Space Areas. Native plant communities are disrupted and native species displaced from infested areas. Remove outliers first. If possible, eliminate the exotic seed bank in outlier areas after mature plants have been removed to deter re-establishment. Map large infestations. Plan larger attack projects. Resources permitting, implement one or more large-scale projects, aimed as follows:*
>
> a. *Contain spread to within infested areas.*
> b. *Reduce the number and size of infestations, restore native species to bared sites, and follow a strategy that minimizes dispersal and re-infestation. In general, treat the smallest, furthest outlying areas first.*
> c. *Eliminate the larger infestations, moving from the fringes toward the source of seed dispersal.*

All French broom on the South Hills Natural Reserve should be eliminated to a zero density and subsequently monitored annually to eliminate spread onto the Reserve. Further work should be done to coordinate with neighboring landowners to remove the seed source. Total eradication form this area will prove difficult due to longevity of the established seedbank. Removal by volunteers using a weed extraction tool such as the "weed wrench" can be used to good effect to minimize the spread. Herbicide application using a basal bark technique, cut-stump or a low volume high concentration "drizzle" technique can be employed for larger or well established populations not possible with hand removal. Due to the longevity of the seed bank, any control actions taken will need consistent follow-up for up to 30 years.

Photo 4. This picture shows *G. monspessulana* expanding onto the South Hills Natural Reserve from a neighboring landscape.



Map 22. French broom (*Genista monspessulana*) 2015 population assessment in South Hills Natural Reserve.

I. HOW ACTIONS WILL BE EVALUATED (Criteria for success)

For the South Hills Natural Reserve and Laguna Lake Natural Reserve, the objective is elimination of *G. monspessulana* to 0% density within 5 years. This will be evaluated through annual monitoring using the Invasive Plant Assessment Forms (Appendix C). Evaluation for eradication will not be possible until the source population has been eliminated. Even then, the seed bank can last 30 years under field conditions which extends timeframes for success measurements up to 35 years!

For other populations spreading onto Open Space Areas the objective is to create a 100 ft buffer zone with success being no more than a 5% French broom cover within this zone within five years. This will be

evaluated using GIS shapefiles combined with Invasive Plant Assessment Forms (Appendix C). Monitoring will occur on a yearly basis.

J. RESOURCE NEEDS

Time and cost estimates will be inserted later upon consultation with the SLO City Natural Resource Manager, Robert Hill.

Permits Required:

CA Department of Fish and Wildlife (CDFW) 2081(a) Research and Management Permit – If work is close to or may impact a state listed species under the California Endangered Species Act, CDFW should be consulted on which permits apply to the situation. For work in serpentine seeps around the Chorro Creek Bog thistle (*Cirsium fontinale* var. obispoense), most likely a 2081(a) Research and Management Permit would be recommended.

All herbicides sprayed should be done by a licensed and insured pesticide applicator. Reporting requirements exist through the California Department of Pesticide Regulation and are submitted through the local County Department of Agriculture.

State Water Resources Control Board National Pollution Elimination System (NPDES) Pesticide Permit for Weed Control - The State Water Resources Control Board adopted the Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications, Water Quality Order 2013-0002-DWQ, for the reissuance of General NPDES Permit CAG990005 in June 2013. Order 2013-0002-DWQ became effective on December 1, 2013.

This General Permit covers the point source discharge to waters of the United States of residues resulting from pesticide applications using products containing 2,4-D, acrolein, copper, diquat, endothall, fluridone, glyphosate, imazamox, imazapyr, penoxsulam, sodium carbonate peroxyhydrate, and triclopyr-based algaecides and aquatic herbicides, and adjuvants containing ingredients represented by the surrogate nonylphenol.

It is possible this permit would be needed for control of *G. monspessulana* in Prefumo creek or Reservoir Canyon creek if applications are made when there is water in the creek and there will be a point source discharge to the water column through direct application or drift. If this permit is needed, a corresponding “Aquatic Pesticide Application Plan” or APAP must be prepared. Yearly fees are also associated with this permit. A cut-stump technique or basal bark technique of herbicide application would eliminate the chance for drift into the water column.

K. RESULTS OF EVALUATION

(This section is to be filled in later, preferably within 1 year, when monitoring data has been taken and evaluated, at least preliminarily. The evaluation should be used to determine whether any of the sections B-K above should be modified.)

Scientific name: *Ailanthus altissima* **Common name:** Tree-of-heaven

Updated : June 31, 2015

A. PRIORITY High

B. DESCRIPTION

Tree-of-heaven tolerates shade, many types of pollution, and harsh soil conditions, including acidic soils of mine spoils and phosphorus-poor soils. It is found in a variety of habitats including disturbed areas, roadsides, urban waste areas, landscaped sites, riparian areas, grassland, and woodland. Tree-of-heaven is a fast-growing deciduous tree to nearly 70 ft tall. Fruits mature in late summer and seeds disperse from fall through the spring. Seed transport occurs through wind, water, and possibly birds. Seeds survive about 1 year under field conditions, typically not creating a persistent seed bank. Reproduction also happens vegetatively, through creeping roots. Tree-of-heaven is native to China.

C. CURRENT DISTRIBUTION ON THE SITE

Tree-of-heaven occurs in limited areas around the City of San Luis Obispo. It can currently be found in two isolated populations in the Irish Hills Natural Reserve (Map 23). No other populations are known in City of San Luis Obispo Open Space Areas.

D. DAMAGE & THREATS

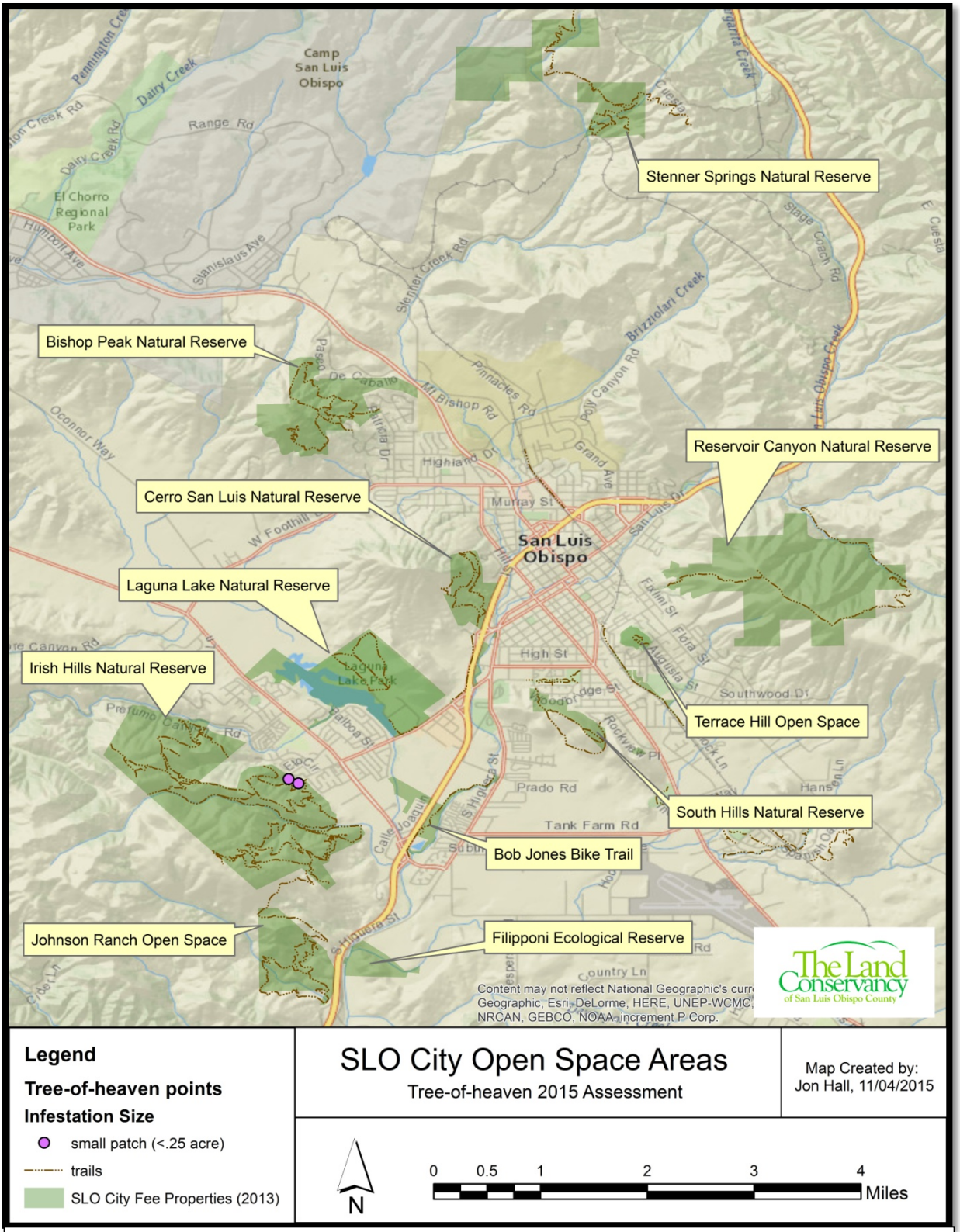
Tree-of-heaven forms dense thickets that compete with native vegetation and reduces wildlife habitat, particularly in riparian areas. Because of its ability to tolerate poor soil conditions, it may become a problem for rare plant communities isolated to serpentine soils.

E. GOALS

The long-term goal for this species is complete eradication from SLO City Open Space Areas. Due to its limited distribution in the San Luis Obispo Area and its short lived seed bank, eradication is an achievable and appropriate goal.

F. OBJECTIVES (Measurable)

Eliminate tree-of-heaven from all Open Space areas within 5 years.



Map 23. 2015 Invasive Plant Assessment showing *Ailanthus altissima* distribution in SLO City Open Space Areas.

G. MANAGEMENT OPTIONS

Viable control options are:

(1) No treatment;

(2) (Biological); There are currently no biological control agents available for *Ailanthus altissima*.

(3) (Cultural); A heavily shaded environment will reduce the establishment of tree-of-heaven.

(4) (Mechanical); Hand pulling or extraction with a weed extracting implement can be effective, but care must be taken to extract the entire root or stump sprouting will occur.

(5) (Chemical); The use of herbicides should always follow the label. There are numerous herbicides that have been shown to be effective at controlling tree-of-heaven.

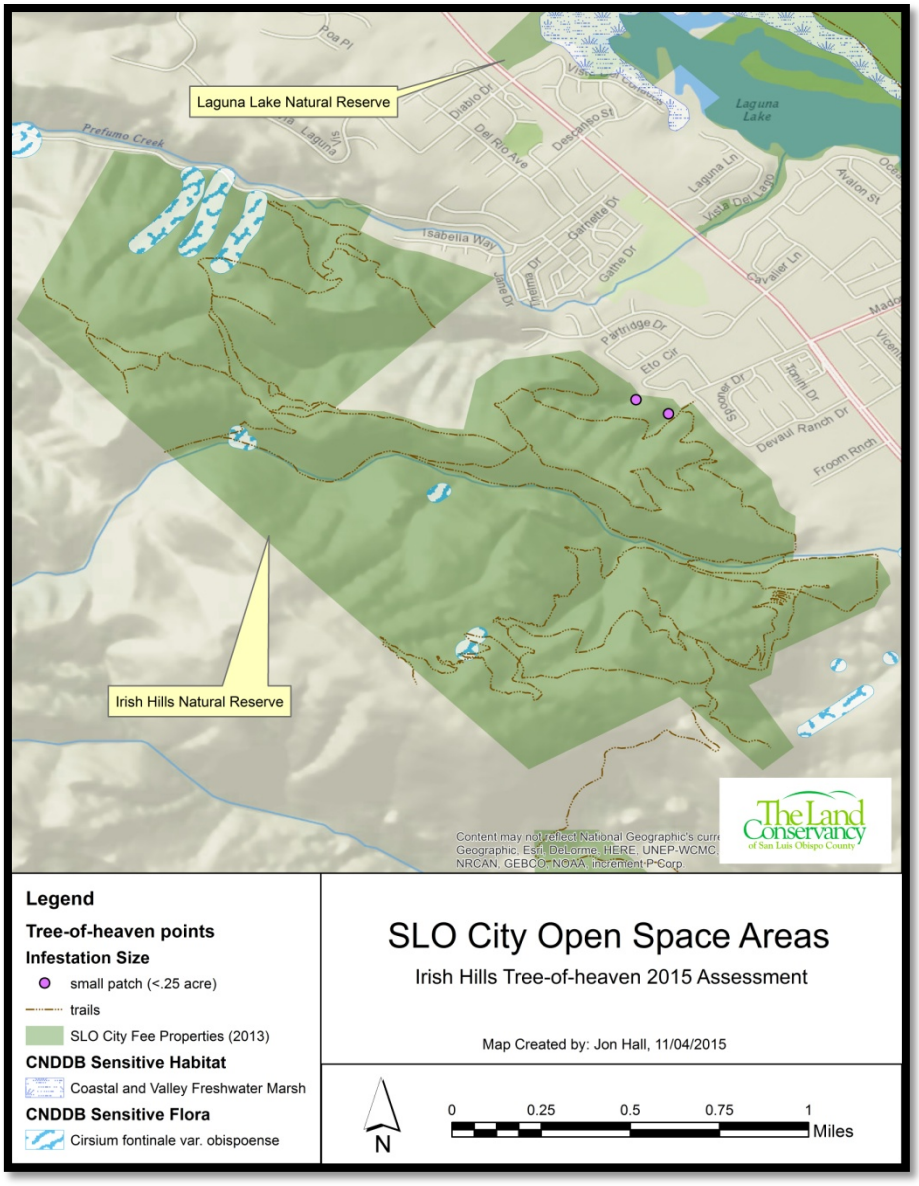
GROWTH REGULATORS	
Triclopyr *Garlon 3A, Garlon 4 Ultra, Pathfinder II* Aminopyralid + triclopyr *Capstone, Milestone Vm Plus*	**Application type(s):** High-volume spray-to-wet spot treatment: Basal cut stump treatment: Cut stump treatment: Basal bark treatment: Stem injection treatment: Hack-and-squirt treatment **Timing**: Foliar treatments best when leaves are fully expanded. Cut stump, basal cut stump, basal bark and stem injection treatments can be used anytime, but work best in late summer or early fall. **Remarks:** Triclopyr is a selective herbicide for broadleaf species. Foliar treatment should only be made on small trees, saplings, or seedlings. Plants treated with basal bark or stem injection technique should not be cut for at least 4 months following application.
AROMATIC AMINO ACID INHIBITORS	
Glyphosate *RoundupPro Conc, Aquaneat, others*	**Application type(s):** High-volume spray-to-wet spot treatment: Stem injection treatment: Hack-and-squirt **Timing:** Foliar treatments best when leaves are fully expanded. For stem injection treatments, root injury is increased when applied mid-June to mid-September (fall color). **Remarks:** Glyphosate is a nonselective herbicide. It gives good control with some resprouts.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapyr *Habitat, Polaris*	**Application type(s):** Cut stump treatment: Stem injection treatment: Hack-and-squirt treatment: Basal bark treatment: **Timing:** Best when applied in late summer to early fall, but before leaf drop. **Remarks:** Imazapyr is a soil residual herbicide and may result in bare ground around trees for some time after treatment. Imazapyr is the most consistent and best stem treatment for tree-of-heaven.

H. ACTIONS PLANNED (Treatments and monitoring)

Irish Hills Natural Reserve: Presently, tree-of-heaven is restricted to two locations in the Irish Hills Natural Reserve (Map 24). The small size and geographic isolation of these populations make them suitable for a Category II Management Action:

> *Present in SLO City Open Space Areas as individuals or small, localized populations. Remove by hand or other precision control technique, and maintain a record of actions. Monitor the removal sites, following up with additional removal as needed. This kind of diligence keeps control costs low.*

The populations are small, but established enough to make mechanical removal difficult. The proposed control method is a "hack-and-squirt" or "stem injection" treatment of the plants in fall 2015 using an undiluted formulation of Imazapyr. Imazapyr takes a long time to have a complete kill. In early summer 2016 dead trees will be removed and any follow-up treatments from initial control will be undertaken with foliar spot spraying of and aminopyralid + triclopyr mix. Full eradication is anticipated by 2017.



Map 24. Tree-of-heaven (*Ailanthus altissima*) 2015 population assessment in Irish Hills Natural Reserve.

I. HOW ACTIONS WILL BE EVALUATED (Criteria for success)

For the Irish Hills Natural Reserve, the objective is eradication of tree-of-heaven within 5 years. This will be evaluated through annual monitoring using the Invasive Plant Assessment Forms (Appendix C) and before and after photos. Eradication will be determined after 3 years of monitoring with no new plants observed.

J. RESOURCE NEEDS

Time and cost estimates will be inserted later upon consultation with the SLO City Natural Resource Manager, Robert Hill.

Permits Required: All herbicides sprayed should be done by a licensed and insured pesticide applicator. Reporting requirements exist through the California Department of Pesticide Regulation and are submitted through the local County Department of Agriculture.

K. RESULTS OF EVALUATION

(This section is to be filled in later, preferably within 1 year, when monitoring data has been taken and evaluated, at least preliminarily. The evaluation should be used to determine whether any of the sections B-K above should be modified.)

4. REFERENCES

Ditomaso, J.M., G.B. Keyser et al. 2013. Weed Control in Natural Areas in the Western United States. Weed Research and information Center, University of California. 544 pp.

Mary Louise Flint, Patricia Gouveia. 2001. IPM in Practice: Principles and Methods of Integrated Pest Management. Publication 3418. Agriculture and Natural Resources Communication Services, University of California. 296 pp.

5. APPENDICES

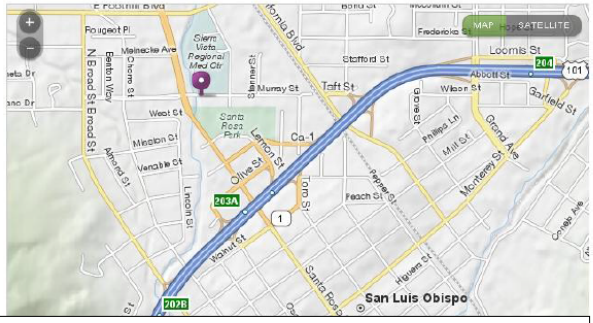
Appendix 1. EMERGENCY INFORMATION: DIRECTIONS AND MAP TO NEARBY HOSPITALS OR CLINICS

Emergency Medical Care

The Land Conservancy of San Luis Obispo County

Arroyo Grande Community Hospital
345 South Halcyon Road
Arroyo Grande, CA 93420
(805) 489-4261

Sierra Vista Regional Medical Center
1010 Murray Ave
San Luis Obispo, CA 93405
(805) 546-7600



Emergency: 9-1-1	**SP Ranger: (805) 473-7220**	**Poison Control: 1-800-222-1222**	**LC Office: (805) 544-9096**

Appendix 2. HERBICIDE SPILL PROTOCOL

Updated 18 May 2011

Herbicide Safety and Spill Plan

Information and Equipment

All individuals applying herbicides will receive training on safety and application procedures prior to any herbicide application.

A copy of **labels** and **Material Safety Data Sheets (MSDS)** for all herbicides will be available at all times during project operations. A copy of The Land Conservancy's **Herbicide Exposure Protocol** will also be available at all times during project operations. Employees will be completely familiar with the information in these documents in case it is needed in the event of a spill or incident.

Required Personal Protective Equipment (PPE) will be worn at all times when herbicides are being mixed, transported, or applied. Label requirements for specific herbicides will be followed. Applicators and handlers must wear the maximum PPE required by the labels or the State of California, whichever is greater, for each herbicide being applied.

An emergency spill kit, with directions for use, will be present when herbicides are being mixed, transported, and applied. Employees will be trained in the use of the spill kit prior to initiation of operations.

The **spill kit** will contain:

- Tyvek Suit
- Chemical Sorbent Socks
- Chemical Absorbent Pads
- large plastic bags
- Nitrile gloves

Procedures for Herbicide Spill

Information in this section is derived from the EPA document "Applying Pesticides correctly: A Guide for Private and Commercial Applicators," and the rules and regulation of the State of California Department of Pesticide Regulation.

Small Spills (Less than 1 gallon of undiluted herbicide or less than 10 gallons of diluted herbicide mix)

- Qualified employees will be present to confine a spill.
- Follow MSDS guidelines for emergency first aid procedures in the event of an accidental exposure.
- Restrict entry to the spill area.
- Contain the spread of the spill with earthen dikes or sorbent socks.

- Cover the spill with absorbent material.
- Place contaminated materials into leak-proof container(s) and label.
- Dispose of contaminated material according to label instructions and State requirements.

Large Spills (More than 1 gallon of undiluted herbicide or more than 10 gallons of diluted herbicide mix)

- Keep people away from the spill.
- Follow MSDS guidelines for emergency first aid procedures in the event of an accidental exposure.
- Contain the spread of the spill with earthen dikes.
- Cover the spill with absorbent material.
- Spread the absorbent material around the perimeter of the spill and sweep toward the center.
- Call the direct supervisor and the local fire department; follow their instructions for further actions.

Procedures for Herbicide Mixing, Loading, and Disposing

1. Mixing of herbicides and adjuvants will be done at least 100 feet from well heads or surface waters.
2. Dilution water will be added to the spray container prior to addition of the herbicide concentrate.
3. Hoses used to add dilution water to spray containers shall be equipped with a device to prevent back-siphoning (a filter is acceptable), or a minimum 2-inch air gap.
4. Workers mixing herbicides will wear the maximum personal protective equipment required by the label.

Empty containers will be triple rinsed. Rinse will be added to the spray mix on the application site at a rate that does not exceed amounts addressed on the label. Unused herbicide will be stored in a locked facility in accordance with herbicide storage instructions provided by the manufacturer, and in accordance with the California Department of Pesticide Regulation. Empty and rinsed herbicide containers will be punctured and disposed of according to label directions.

Procedures for Herbicide Fire

1. Call the fire department (9-1-1).
    a. Inform them that there is a fire involving herbicides.
    b. Provide them with the names of the chemicals contained in the structure or vehicle.
    c. If possible, provide Material Safety Data Sheets to the arriving fire units.
2. Clear the area.
3. Evacuate and isolate the area around and downwind of the fire.

Appendix 3. Invasive Plant Assessment Form

WEED ASSESSMENT FORM

Observer Name:

Date:

Location ID:

GPS Location:

Weed Name:

Growth Stage:

- Seedling
- Rosette
- Bolting
- Flowering
- Fruiting
- Seed set
- Mature
- Dormant
- Dead

Extent of Infestation:

- Single Plant
- Scattered Plants
- Line (Along Road, Ditch, Fence, etc.)
- Small Patch (<.25 acre)
- Moderate Patch (.25 – 1 acre)
- Large Patch (1-5 acres)
- Very Large Patch (>5 acres)

Canopy Cover Class (based on Daubenmire classification):

- <1%
- 1-5%
- 5-25%
- 25-50%
- 50-75%
- 75-95%
- 95-100%

Abundance (abundance is based on the area occupied by a species relative to the area of its ecological niche):

- LOW - represents an infestation that is early on the invasion curve
- MEDIUM - represents the rapid expansion phase
- HIGH - represents an infestation that has filled the available ecological niche and is no longer spreading appreciably.

Trend (overall trend of plant population):

- Spreading Rapidly (doubling in 10 years) explosive growth.
- Spreading
- Stable
- Decreasing - population could be decreasing due to management or other factors.
- Absent - population is not found and presumed eradicated

Notes:

Optional Photo:

Appendix 4. HERBICIDE LABELS

Attach copies of the herbicide label(s) here.