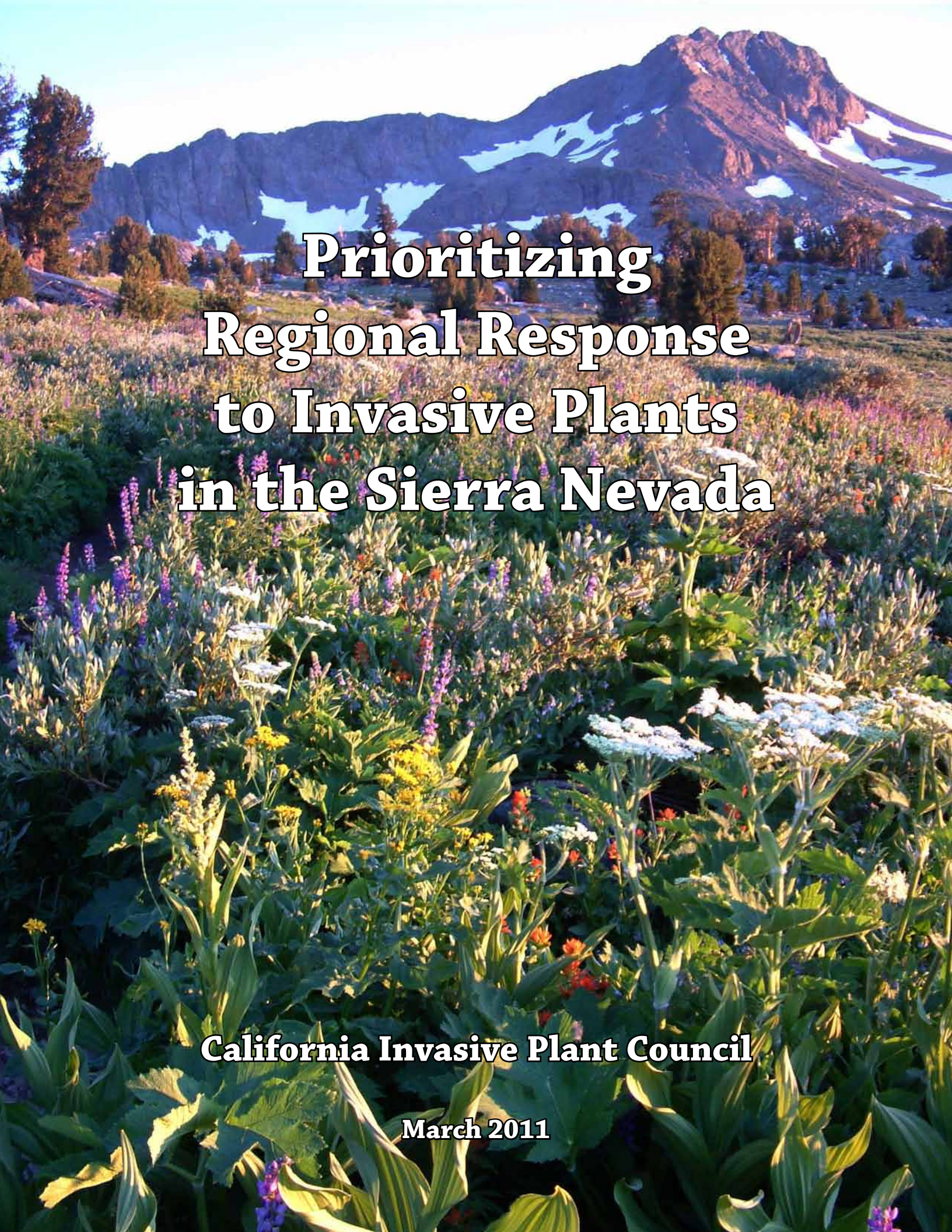

Prioritizing Regional Response to Invasive Plants in the Sierra Nevada

California Invasive Plant Council

March 2011

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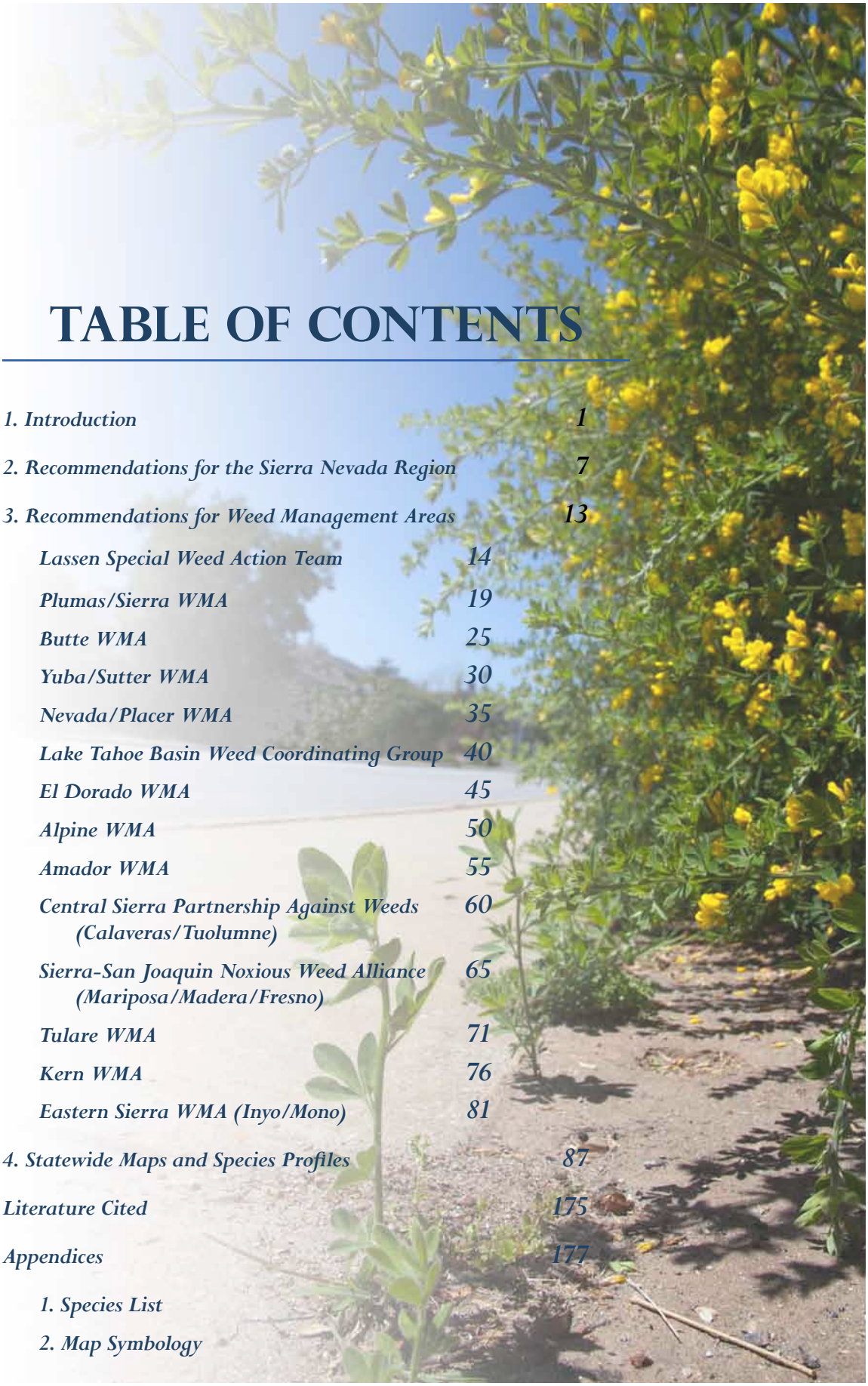
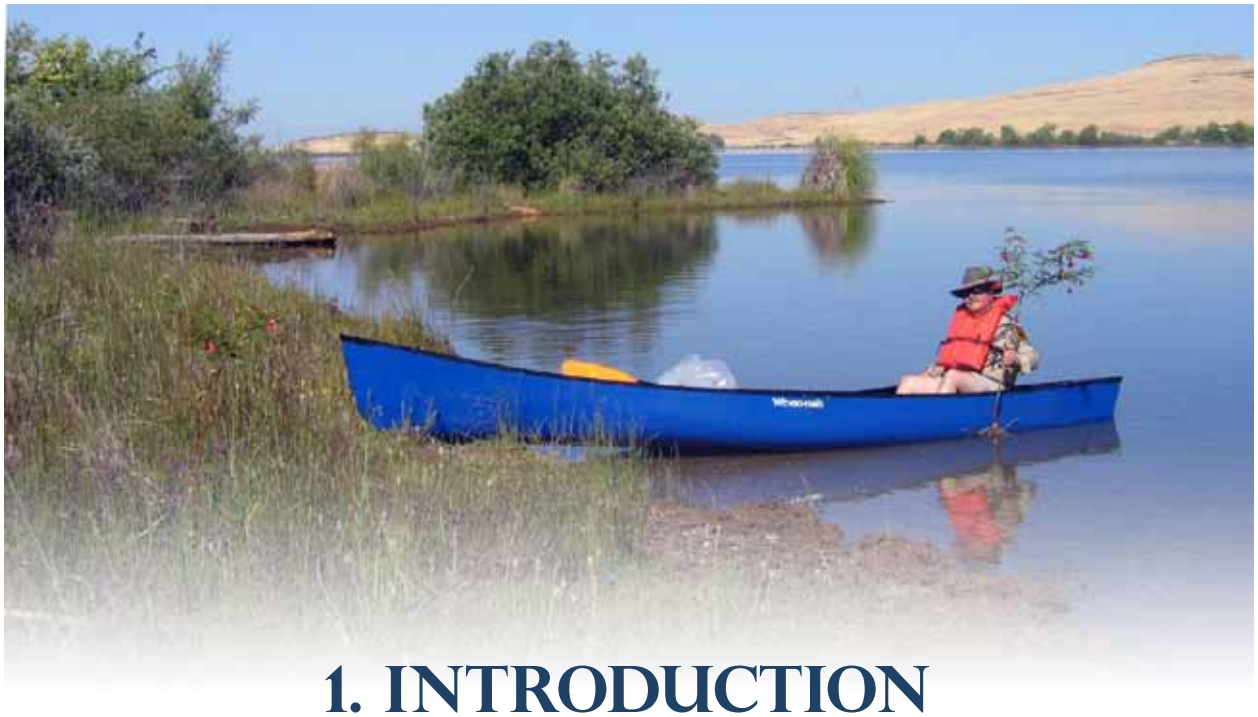


TABLE OF CONTENTS



1. INTRODUCTION

Natural resource managers need maps of invasive plant distribution to most effectively address their impacts. Prevention, eradication, and containment efforts depend upon spatial information. Tracking the spread of a species over time, and evaluating the effectiveness of management, depends on landscape-scale maps that can be updated regularly. However, the number of invasive plant species and their broad distribution make full regional mapping impracticable using typical ground-based occurence reporting alone.

To address this need, Cal-IPC initiated a statewide effort specifically designed to produce complete landscape-scale distribution maps that can be updated regularly. These "risk maps" are necessarily coarse in resolution and depend on expert opinion as much as on field-mapped GIS datasets. The maps support regional prioritization for goals and approaches addressing particular species in particular areas.

This report presents risk maps developed for 43 species selected to be of special importance for the Sierra Nevada region of California. (Approximately 100 plants on the Cal-IPC Inventory (Cal-IPC 2006) occur in the Sierra Nevada; we chose a representative set for the scope of this project.) From the risk maps, priorities are determined for the region as a whole and for each of the 14 Weed Management Areas (WMAs) in the region. These recommendations consider three types of strategic management opportunities: eradication, containment, and surveillance.

As part of this project, Cal-IPC modeled suitable climatic range for 29 of the study species. The resulting maps, overlapping current distribution and suitable range, show uninvaded areas that are most vulnerable to spread. In addition, this modeling lends itself to assessing future suitability based on climate change projections.

The goal of this project is to enhance the long-term effectiveness of strategic invasive plant detection and control in the Sierra Nevada. The results of this project can help natural resource managers secure funding by clearly showing invasive plant distribution to funders and providing a rationale for project strategy. The results also provide a foundation for collaboration on efforts that span the entire region.

Using this Report

This report includes recommendations for the Sierra Nevada region as a whole (chapter 2), recommendations for the 14 WMAs (chapter 3), and species profiles (including statewide risk maps) for each of the 43 species studied (chapter 4). The risk map for a given species shows its abundance, spread trend, and management status by 7.5-minute USGS quadrangles. Many of the maps also show climatic suitability.

For the region as a whole and for each WMA, the report provides statistics and an assessment of management opportunities. Statistics include:

- percent of the quads in the area that are infested with a given species,
- percent of the quads with suitable habitat in that area that are infested with that species,
- percent of the infested quads in the area in which infestations of that species are spreading,
- percent of the infested quads in the area where that species iscurrently under active management,
- percent of the quads in the area in which the species has been eradicated,
- percent of the overall area that is currently suitable for the species,
- percent of the overall area that is expected to be suitable in the year 2050, and
- change in suitability in the overall area between 2010 and 2050.

Management opportunities are identified in three categories – eradication, containment, and surveillance – with the strategic potential for each of these opportunities rated as high, medium or low. Ratings depend on factors such as the impact and invasiveness of the species, whether the particular infestation is spreading, whether the species has a CDFA weed rating, and the evaluation of land managers. In addition, each type of opportunity has spatial factors that help determine its rating:

- **Eradication** – these opportunities entail complete removal of an infestaion, and result from infestations in a small number of quads isolated from other infestations. Strategic potential for eradication opportunities depends on how many contigous quads are infested, how isolated they are, and the suitability of adjoining areas. (The extent of infestation within a quad will dictate the feasibility of eradication; such judgements must be made by local natural resource managers.)
- **Containment** – these opportunities entail limiting spread from an existing infestation, and result from larger areas of infested quads. Strategic potential depends on the geography of the infestation, how isolated it is, and the suitability of adjoining areas.
- **Surveillance** – these opportunities entail regular surveys to detect new infestions of a species that is thought to be absent from an area. Strategic potential depends on the proximity of nearby infestations and the suitability of the area.

For each WMA and the region as a whole, we identify species as top priorities for strategic management based on these ratings. Our recommendations are meant to complement the many management efforts already underway in the region and to aid in planning future efforts. This report can be used to find opportunities to combine new efforts with those that already exist. For example, efforts to contain invasive plant species climbing the foothills from the Centeral Valley may be able to coordinate with the existing Leading Edge Project working to prevent the spread of yellow starthistle to higher elevations (CDFA 2011). A region-wide coordinating body can use these risk maps to establish goals for eradication, containment and surveillance in support of early detection.

This report is meant to be a beginning. As online risk mapping tools are developed to support strategic management in California, it will become simpler to update and improve this information and the recommendations that they inform. Details on development of online tools can be found on the mapping pages of the Cal-IPC website (www.cal-ipc.org). Natural resource managers who collect GIS data are encouraged to help statewide efforts by contributing these datasets to Calflora (www.calflora.org).

Methods

California has historically had few statewide maps of invasive plant distribution beyond those maintained by the state's Department of Food and Agriculture for A-rated noxious weeds. In 2006, Cal-IPC initiated an effort to produce statewide maps that would support strategic management decisions. Cal-IPC surveyed WMAs in Cal-

ifornia for expert knowledge in order to map the distribution of 35 species by county and floristic region. Cal-IPC also used an ecological niche modeling approach to predict suitable range based on climatic factors. Current efforts build upon this basic approach, with the resolution of distribution mapping increased to the USGS quad level and suitability modeling based on a more robust methodology.

Study Area and Species: The study area is the Sierra Nevada ecoregion (see map). We chose the study species by surveying natural resource managers in the region regarding their species of concern from the California Invasive Plant Inventory (Cal-IPC 2006). The final list represents plants with a range of distribution and impacts in the Sierra Nevada; it is not a comprehensive list of all plants invading the region.

Current Distribution: To determine the current distribution of each species, we interviewed WMA participants and other local botanical experts in small group meetings around the state. Experts were chosen based on recommendations from our existing contacts in each county and included county agricultural agents, federal, state and local agency biologists, University of California Cooperative Extension personnel, land preserve stewards, environmental consultants, and knowledgeable amateur botanists. We recorded data by USGS 7.5-degree quadrangle ("quad") because it represents a standardized, widely recognized grid that is familiar to many natural resource managers and lends itself to statistical comparisons. For each species, we recorded in which quad it occurs; at what level of abundance; whether populations are stable, increasing, or decreasing in each quad; and whether populations are currently managed. We augmented expert opinion data with GIS datasets. We have not yet interviewed experts in the San Francisco Bay Area, so that area is based on GIS data only.

Suitable Range: We modeled suitable range for each species in California using current distribution and climate data for the state. We used Maxent, free software developed by a team at Princeton University that has become increasingly popular in habitat modeling, biodiversity research, and invasive plant prediction (Loarie et al. 2008, Strahlberg et al. 2009). Maxent predicts where a species can grow based on known locations combined with environmental variables (Elith et al. 2006, Phillips et al. 2006). It requires precise location data and complete representation of the range of areas where a species currently grows; consequently we needed to compile multiple data sources for each species. We downloaded data from the Calflora (2010) and Consortium of California Herbaria (2010) online databases, and collected additional datasets from agencies and individuals. More than 25 datasets were combined for the final analysis. Because some of our study species are not widely distributed, they necessarily have fewer data available on which to base the models.

For environmental data in the models, we used 19 climatic variables from Bioclim based on temperature and precipitation in a raster grid of 30 arc seconds which is roughly 800 m x 920 m in California. This set of variables is commonly used in ecological modeling and is available at www.worldclim.org. Our results show areas that have the highest statistical probability of being suitable. We used a threshold of 0.10 to define suitable areas. This was chosen so that 90% of all occurrence points fall in an area that is determined as suitable.

Our modeling relied exclusively on data for infestations in California. Thus, suitability maps are most complete for species that are already widespread and for which a significant number of data points have been collected.

From our initial list of 43 species, we chose 29 with sufficient data to develop the models. Suitability maps were reviewed by a panel of statewide invasive plant mapping experts. As part of future efforts, we plan to expand our approach to include information from populations outside of California, which can provide broader information on the full climatic range of a particular species. In addition, we will consider including additional environmental variables such as soil type in our analysis.

Climate Change: The Sierra Nevada is likely to be heavily impacted by climate change (Knowles and Cayan 2002, Cayan et al. 2008, Coats 2010). Suitable habitat for some native plants may shrink, with some areas becoming refugia for particular species (Kueppers et al. 2005, Loarie et al. 2008). Some plants have shifted to higher elevations in recent years, possibly as a response to climate change (Kelly and Goulden 2008). At the same time, invasive plants, which tend to be generalist species with broad ecological tolerances, may be able to colonize new locations (Pauchard et al. 2009). Of course, many invasive plants are still expanding their ranges regardless of climate change.

We based our assessment of future suitability under climate change on scenarios for 2050 because land managers indicated this date would be more useful to them than predictions farther into the future. For this report we used the A2 emission scenario, which is widely used for the assessment of climate change effects informing today's policy decisions (IPCC 2007). Climate change projections for California do not vary widely in temperature predicted for the mid-21st century but do diverge in their precipitation predictions. For this report, we based our suitability modeling on downscaled General Circulation Model (GCM) output from the Canadian Centre for Climate Modeling and Analysis (CCCMA) representing a wetter scenario. We received guidance and support in using this model from the Geospatial Innovation Facility at UC Berkeley. In the future we plan to integrate more models and downscaling algorithms to better address uncertainty.

The results of this report provide an opportunity to collaborate with other projects addressing climate change and conservation. For example, the Southern Sierra Partnership (2010) identified conservation priorities for the Southern Sierras and Tehachapis based on biodiversity, ecosystem services, land use, and projected climate change. PRBO Conservation Science (2011) examined the potential consequences of climate change for wildlife (Strahlberg et al. 2009).

Management Opportunities: Opportunities for the strategic management actions of eradication, containment, and surveillance are based on the risk maps showing current distribution, spread, and suitability. Regional invasive plant experts from the Sierra Nevada reviewed the risk maps and provided guidance for rating the opportunities. We present ratings for the Sierra Nevada region in chapter 2. Ratings are organized by WMA in chapter 3 and by species in chapter 4.

Limitations

This report represents a milestone in a larger effort that covers all regions of California, and all species listed by Cal-IPC as invasive. Cal-IPC lists some 200 plants as invasive in California, so the recommendations for 43 species in this report are by no means a comprehensive assessment of all invasive plant threats in the Sierra Nevada.

The resolution of the risk mapping approach used in this work is necessarily coarse. It is useful for tracking distribution of a given species at a landscape scale. It is not, however, sufficient for planning the details of on-the-ground management, which requires field mapping at a much higher resolution.

The data sources for the maps are not expected to be 100% accurate. Data from expert knowledge has the benefit of drawing on the extensive experience of individual local resource managers, but their best estimates can be incorrect. The online system that will house the data and maps will allow experts to update data, which is expected to improve accuracy significantly over time. Data that we have drawn from GIS datasets, though of higher precision, may not always be accurate, either. Those conducting the mapping may have misidentified the species, the location may not be captured correctly, or the dataset may be out of date.

Mapping climatic suitability for a given plant species is an inexact science. The maps are based on existing distribution as evidence of the climatic range of the species. Some species may be able to grow in climates beyond where they currently grow in California, either because they adapt or because they have not yet been transported to a region.

These are all innate challenges of providing useful information at the scale and breadth we are addressing, and we believe this approach takes a significant step forward by aggregating existing information into a useful structure.

2. RECOMMENDATIONS FOR THE SIERRA NEVADA REGION

This chapter presents recommendations for high-priority invasive plant management opportunities in the Sierra Nevada ecoregion. Based on risk maps and assessment by regional experts, we chose a subset of the species examined for this project as the best opportunities for long-term resource protection. Chapter 3 presents recommendations specific to each Weed Management Area (WMA).

Recommendations are based on both quantitative and qualitative measures. Quantitative measures include statistics based on our mapping and suitability modeling, such as the proportion of the region currently infested, the proportion of the region predicted to be suitable, and whether infestations are spreading. The table in this chapter lists these quantitative measures for all 43 species. Qualitative measures include the Cal-IPC and CDFA ratings for each plant (listed in Appendix 1) as well as feedback provided by natural resource managers.

Of the 43 species examined for this project, we chose 15 as the highest priority opportunities for the region as a whole. Some of these species exist in scattered quads while others are more widespread. For each species see statewide maps in chapter 4 for distribution, trend and suitable range in the Sierra Nevada ecoregion. Accompanying tables rate opportunities for eradication, containment, and surveillance. (The species profiles also include short summaries of the biology and ecology of the species, as well as maps showing change in climatic suitability between now and 2050.) Some species have both eradication and containment opportunities, based on their distribution in different parts of the Sierra Nevada ecoregion.

The species and their abundances vary throughout the region. In general, the northern and central Sierra contain more of the species we considered, while the southern and eastern Sierra Nevada have fewer of these species and lower abundances. Therefore, the north and central regions have many opportunities for eradication of some species as well as opportunities for containment of those species too widespread to eradicate, while the southern and eastern Sierra can focus more on eradication of small populations before they expand.

Opportunities are described below for the species determined to have the top priority management opportunities in the Sierra Nevada. As elsewhere in this report, the species are organized by botanical family (see Appendix 1 for additional details on the plants). Refer to the map of each species in chapter 4. For specific management recommendations by WMA, refer to chapter 3.

Russian knapweed (*Acroptilon repens*): Russian knapweed is a high priority for **eradication** in isolated quads, primarily in the central, southern, and eastern Sierra, and a medium priority for **containment** where populations are too large for eradication. The southernmost population, in Madera County, is a prime eradication target. One population in Inyo County, directly adjacent to the Sierra, is not under management, and presents another prime eradication target. In the south, the major infestation in the Central Valley section of Tulare County should be prevented from moving eastward into the foothills. In the north, the spreading populations in Lassen and Plumas counties should be prevented from moving south. Our modeling suggests that the amount

of suitable range for Russian knapweed in the Sierra Nevada will increase with future climate change.

Musk thistle (*Carduus nutans*): Musk thistle is a high-priority for **containment**, with potential for **eradication** if current management by WMAs can be increased. Its distribution is focused in the northeastern Sierra in Plumas, Sierra, Nevada, and Placer counties. Areas to the north, west and south are vulnerable to spread. Our modeling suggests that the amount of suitable range for musk thistle in the Sierra Nevada will decrease with future climate change.

Spotted knapweed (*Centaurea maculosa*): Spotted knapweed is a high-priority species for **eradication** in isolated quads and **containment** elsewhere. It is distributed in many quads but in low abundance. Of the three knapweeds studied, this species is the hardest to control. Land managers named this species as their highest priority of the three knapweeds considered. Our modeling suggests that the amount of suitable range for spotted knapweed in the Sierra Nevada will remain relatively unchanged with future climate change.

Yellow starthistle (*Centaurea solstitialis*): Possibly the most widely-distributed invasive plant in California, and the focus of an existing multi-county leading edge project in the region (CDFA 2011), yellow starthistle is a high priority for **containment**, focusing on preventing its spread eastward into higher elevations. It is still spreading in many quads. Our modeling suggests that the amount of suitable range for yellow starthistle in the Sierra Nevada will remain relatively unchanged with future climate change.

Rush skeletonweed (*Chondrilla juncea*): Rush skeletonweed is widespread and spreading in several central and northern counties but infrequent in the southern and eastern Sierra. It is a high priority for **containment** to prevent its spread north, east and south, and a medium priority for **eradication** of isolated populations in the northern Sierra and adjoining the southern Sierra in Inyo County. Continued management of the population in Fresno County's valley area is important to prevent spread into the foothills. Our modeling suggests that the amount of suitable range for trush skeletonweed in the Sierra Nevada will increase with future climate change.

Stinkwort (*Dittrichia graveolens*): Stinkwort is a relatively new weed in California and one that has been reported spreading from the San Francisco Bay Area into the Sacramento area, and from there into the foothills along roadsides. Because it is very difficult to remove entirely, it is a high priority for **containment** in the areas where it occurs, especially El Dorado County. Because stinkwort spreads along highways, working with transportation agencies on Best Management Practices for highway maintenance could slow its spread. Our modeling suggests that the amount of suitable range for stinkwort in the Sierra Nevada will increase considerably with future climate change.

Scotch thistle (*Onopordum acanthium*): Scotch thistle is a high priority for **eradication** in isolated quads and a high priority for **containment** to prevent spread into the Sierra Nevada from major infestations in Lassen County to the north. Containment of the infestation in the Central Valley portion of Tulare County is important to keep Scotch thistle from moving into the foothills.

Our modeling suggests that the amount of suitable range for Scotch thistle in the Sierra Nevada will increase with future climate change.

Dyer's woad (*Isatis tinctoria*): Dyer's woad, present in scattered quads, is a high priority for **eradication** to prevent these populations from spreading. It has become widespread in far northern counties, where it is a serious problem. Our modeling suggests that the amount of suitable range for species name in the Sierra Nevada will decrease with future climate change.

Brooms: Scotch broom (*Cytisus scoparius*), French broom (*Genista monspessulana*), and Spanish broom (*Spartium junceum*) all grow in the Sierra Nevada. Their relative distributions are uncertain because many managers do not distinguish between them for the purposes of management. More precise mapping would be helpful. Brooms are a high priority for **eradication** in the southern Sierra where there are fewer infestations, and high priorities for **containment** further north to prevent their continued spread. Our modeling suggests that the amount of suitable range for all species in the Sierra Nevada will increase considerably with future climate change.

Red sesbania (*Sesbania punicea*): Red sesbania is a relatively new invader to riparian areas in California and thus far grows only to the western edge of the Sierra Nevada. It is a high priority for **eradication** where possible and **containment** to prevent its spread further east and to higher elevations, particularly in Nevada, Placer, El Dorado, and Fresno counties. It was mapped in detail in much of the state in summer 2010 so its distribution is well-documented. Our modeling suggests that the amount of suitable range for red sesbania in the Sierra Nevada will increase considerably with future climate change.

Giant reed (*Arundo donax*): Giant reed is widespread in California. It is present at the western edge of many Sierra Nevada counties and is spreading in some of them. It is also in scattered quads in Inyo County. Giant reed is a

high priority for **containment** to prevent its spread into more watersheds. Our modeling suggests that the amount of suitable range for giant reed in the Sierra Nevada will increase with future climate change.

Toadflaxes: Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*) and yellow toadflax (*Linaria vulgaris*) are high priorities for **eradication** in isolated quads or **containment** of larger infestations. Their current distributions are centered near Lake Tahoe. Our modeling suggests that the amount of suitable range for both species in the Sierra Nevada will increase with future climate change.

Management opportunities for the Sierra Nevada region

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability change
	Family Apiaceae											
	Poison-hemlock	L	M	-	27	53	29	2	0	21	9	↓
	Family Asteraceae											
●	**Russian knapweed**	**H**	**M**	**-**	**8**	**8**	**13**	**11**	**1**	**76**	**90**	↑
●	**Musk thistle**	**H**	**H**	**-**	**5**	**19**	**19**	**27**	**0**	**13**	**3**	↓
	Italian thistle & slenderflower thistle	-	M	-	26	-	91	0	0	-	-	-
	Woolly distaff thistle	L	-	-	1	40	25	0	0	0	5	↑↑
	Diffuse knapweed	M	M	-	10	10	4	2	1	62	56	-
●	**Spotted knapweed**	**H**	**H**	**-**	**26**	**30**	**4**	**15**	**5**	**62**	**71**	**-**
	Tocalote	-	M	-	42	-	46	1	0	-	-	-
●	**Yellow starthistle**	**H**	**H**	**-**	**57**	**61**	**64**	**16**	**3**	**78**	**85**	**-**
●	**Rush skeletonweed**	**M**	**H**	**-**	**22**	**32**	**67**	**5**	**1**	**42**	**67**	↑
	Canada thistle	M	M	-	20	27	24	12	1	41	27	↓
	Bull thistle	-	L	-	84	85	42	4	0	80	92	-
●	**Stinkwort**	**-**	**H**	**-**	**4**	**39**	**30**	**30**	**0**	**3**	**8**	↑↑
	Ox-eye daisy	L	M	-	16	23	24	0	0	38	28	↓
●	**Scotch thistle**	**H**	**H**	**-**	**9**	**23**	**26**	**10**	**1**	**16**	**27**	↑
	Family Boraginaceae											
	Houndstongue	-	-	L	0	-	0	0	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	M	M	-	11	-	23	6	0	-	-	-
●	**Dyer's woad**	**H**	**-**	**-**	**5**	**8**	**4**	**22**	**1**	**33**	**20**	↓
	Charlock mustard	-	L	-	15	-	3	0	0	-	-	-
	Family Dipsacaceae											
	Common teasel & fuller's teasel	M	M	-	11	16	18	4	1	26	25	-
	Family Fabaceae											
●	**Scotch broom**	**H**	**H**	**-**	**24**	**44**	**45**	**19**	**0**	**33**	**60**	↑
●	**French broom**	**H**	**H**	**-**	**22**	**64**	**38**	**3**	**0**	**19**	**41**	↑↑
●	**Spanish broom**	**H**	**H**	**-**	**22**	**40**	**57**	**5**	**0**	**28**	**68**	↑↑
	Black locust	L	L	-	15	-	18	0	0	-	-	-
●	**Red sesbania**	**H**	**H**	**-**	**4**	**16**	**24**	**0**	**0**	**11**	**28**	↑↑
	Gorse	L	-	-	1	100	0	0	0	0	23	↑↑
	Family Poaceae											
●	**Giant reed**	**L**	**H**	**-**	**13**	**28**	**36**	**2**	**0**	**23**	**38**	↑
	Annual false-brome	-	L	-	12	34	43	0	0	21	18	-
	Japanese brome	L	L	-	8	-	0	0	0	-	-	-
	Red brome	-	M	-	62	77	25	0	0	59	47	↓
	Jubatagrass	-	L	-	9	-	0	0	0	-	-	-
	Pampasgrass	-	L	-	14	100	0	0	0	2	10	↑↑
	Orchardgrass	-	L	-	58	60	6	0	0	84	91	-

	Common velvet grass	-	M	-	34	39	11	1	0	60	82	↑
	Mediterranean barley	-	M	-	45	-	7	0	0	-	-	-
	Hare barley	-	M	-	54	-	15	0	0	-	-	-
	Italian ryegrass	-	M	-	40	66	28	0	0	37	35	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	L	-	-	0	-	0	0	0	-	-	-
	Giant knotweed	L	-	-	0	-	0	0	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**H**	**H**	**-**	**7**	**8**	**31**	**28**	**1**	**60**	**77**	**↑**
●	**Yellow toadflax**	**H**	**H**	**-**	**5**	**6**	**52**	**22**	**0**	**62**	**85**	**↑**
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	L	M	-	37	55	83	2	0	44	62	↑
	FAMILY SOLANACEAE											
	Tree tobacco	L	L	-	17	69	5	0	0	9	12	↑

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

3. RECOMMENDATIONS FOR WEED MANAGEMENT AREAS

This chapter includes sections for 14 WMAs, ranging from Lassen County Special Weed Action Team in the north to Kern WMA in the south, and including the Eastern Sierra WMA. For each WMA, we recommend a set of top priority opportunities based on statewide risk maps. Species selected as region-wide recommendations in chapter 2 are included as priorities for each WMA unless there are no nearby infestations. Other species with particular spatial opportunities in the WMA may be included. For instance, the southernmost reach of a particular species in the Sierra Nevada may represent an important opportunity to prevent spread.

Each section includes a table showing statistics and opportunity ratings for all species considered in this report as well as maps for top priority species for that WMA. These recommendations are not meant to be definitive. WMAs should refer to the table and full species maps in chapter 4 to determine additional local priorities. (In addition, as described in chapter 1, this study does not include every invasive plant species of potential concern in the Sierra Nevada.) Some species may be judged a top priority in a given WMA based on local impacts. Others may be judged a top priority by specific natural resource management entities within a WMA. For instance, common velvet grass (*Holcus lanatus*) is a top priority for managers in Sequoia-Kings Canyon National Park, but may be less of a priority for natural resource managers at lower elevation in the foothills.

Some WMAs fall completely within the Sierra Nevada ecoregion, while others are only partly within it. Sacramento WMA and Northern San Joaquin Valley WMA are not included although small portions fall within the Sierra Nevada. (See map in chapter 1.) Statistics for each WMA are calculated for the entire WMA, including any portion outside the Sierra Nevada region. Maps follow the species order of the table.

These recommendations focus on the southern portion of Lassen SWAT that is within the Sierra Nevada region (see map in chapter 1). Statistics in the table are based on all of Lassen County.

Eradication is recommended for species that have limited occurrence within the WMA. Of the species examined, the following are priority eradication opportunities for Lassen SWAT:

diffuse knapweed (*Centaurea diffusa*)

rush skeletonweed (*Chondrilla juncea*) – one quad on the southern edge

dyer's woad (*Isatis tinctoria*)

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for Lassen SWAT:

Russian knapweed (*Acroptilon repens*)

musk thistle (*Carduus nutans*) – population in southeast part of Lassen WMA, in coordination with efforts in Plumas/Sierra WMA

spotted knapweed (*Centaurea maculosa*) – present in low abundance

yellow starthistle (*Centaurea solstitialis*) – several quads are under management and others have been eradicated

Scotch thistle (*Onopordum acanthium*) – prevent spread from the north and east

Scotch broom (*Cytisus scoparius*) – work with Plumas/Sierra WMA

Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

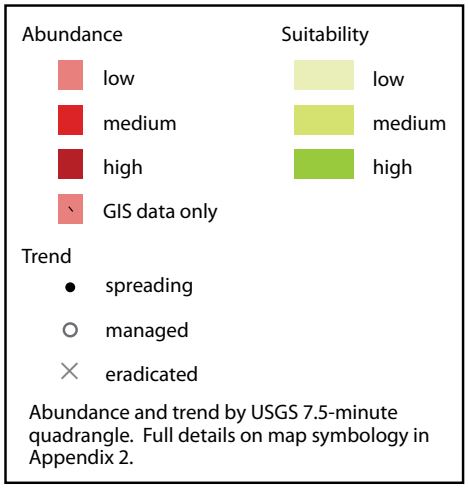
Surveillance is recommended to prevent spread into the Sierra region of Lassen SWAT:

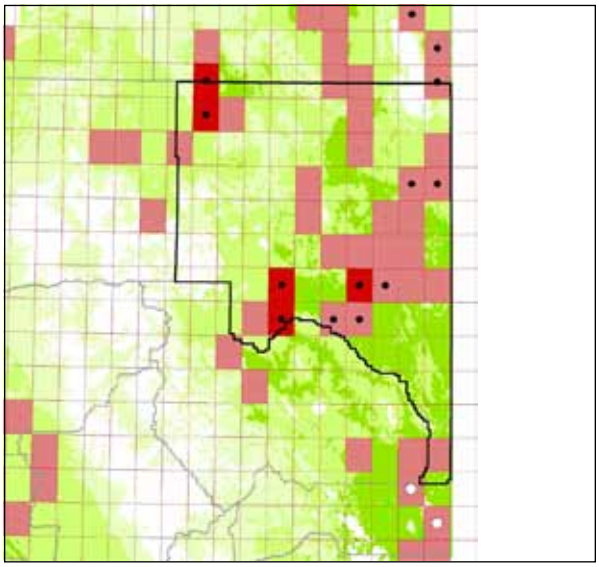
stinkwort (*Dittrichia graveolens*) – prevent new populations in the northern Sierra

French broom (*Genista monspessulana*)

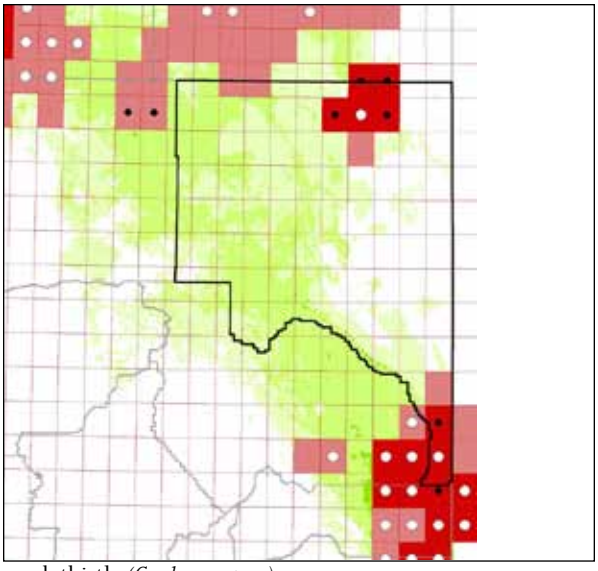
Spanish broom (*Spartium junceum*)

yellow toadflax (*Linaria vulgaris*)

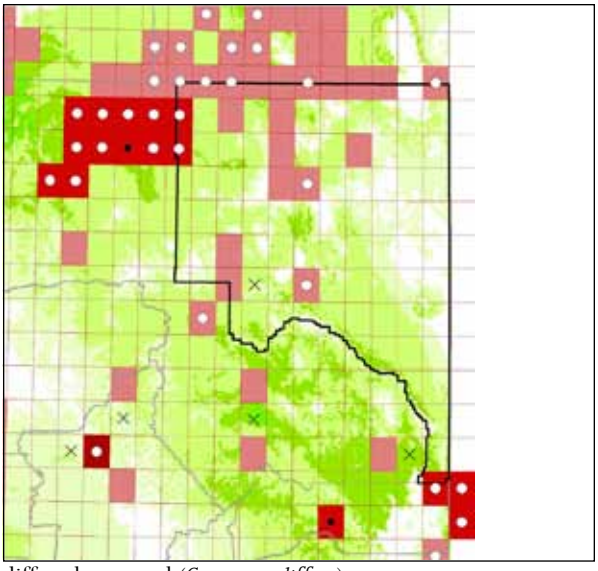




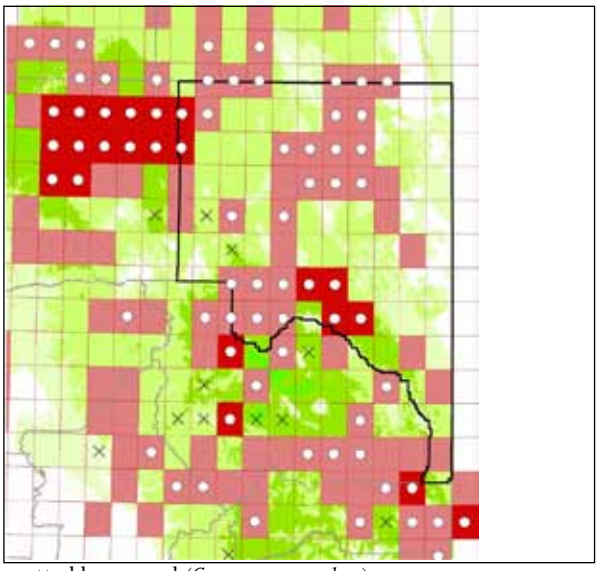
Russian knapweed (*Acroptilon repens*)



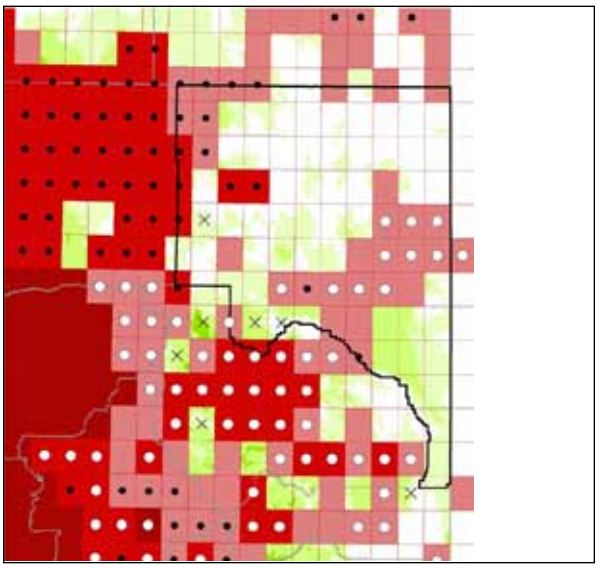
musk thistle (*Carduus nutans)*



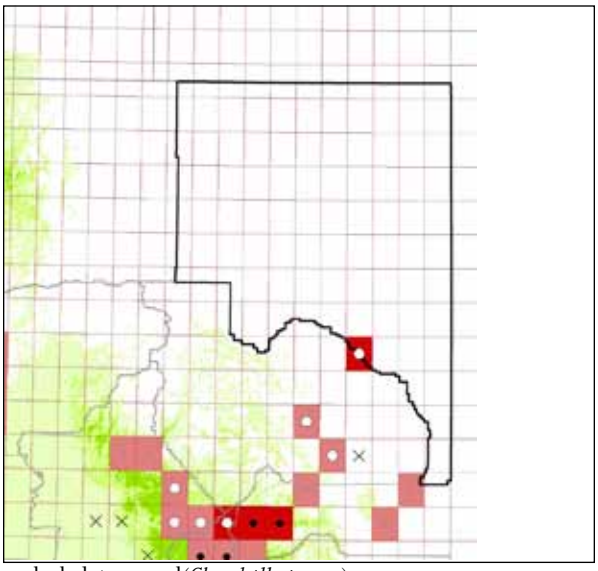
diffuse knapweed (*Centaurea diffusa*)



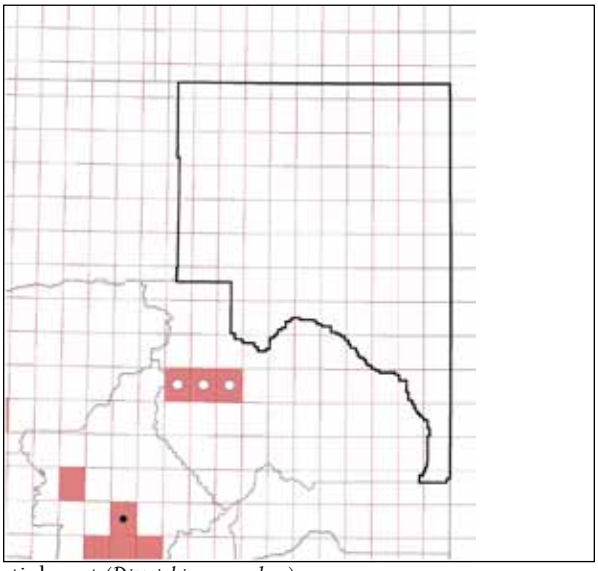
spotted knapweed (*Centaurea maculosa*)



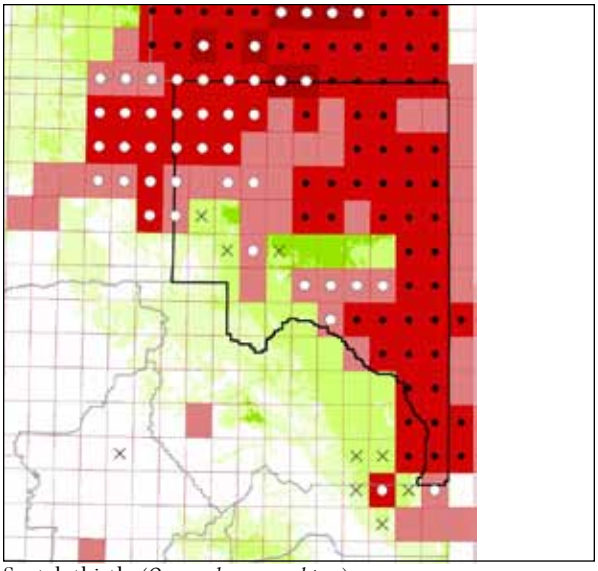
yellow starthistle (*Centaurea solstitialis*)



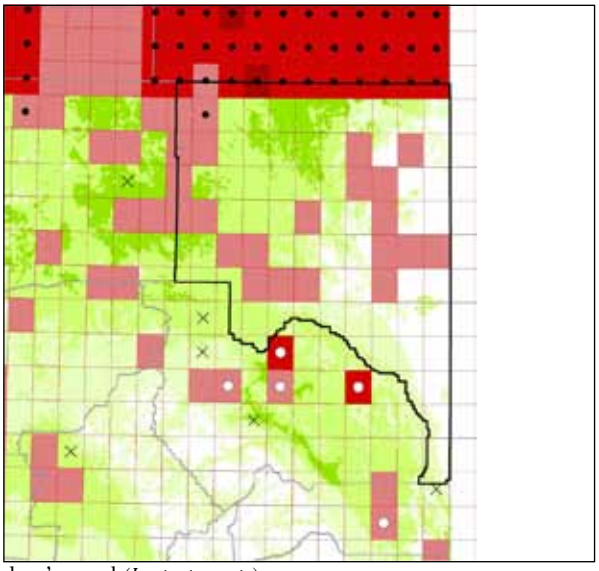
rush skeletonweed(*Chondrilla juncea*)



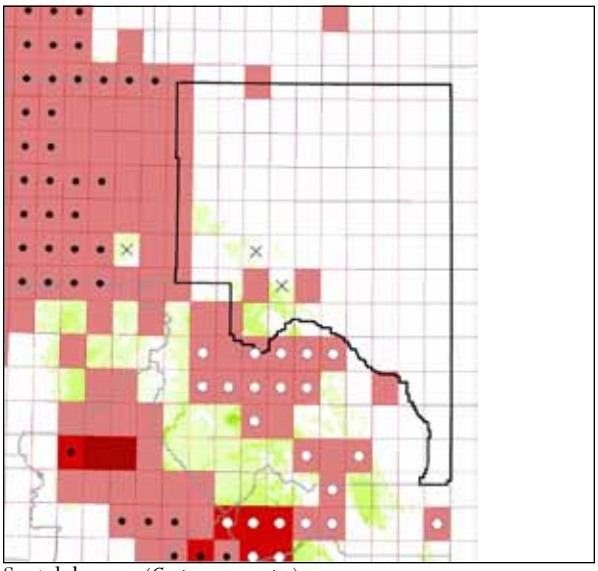
stinkwort (*Dittrichia graveolens*)



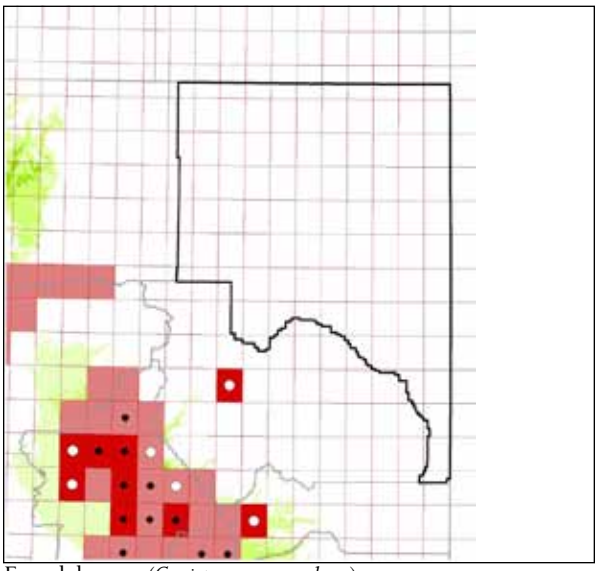
Scotch thistle (*Onopordum acanthium*)



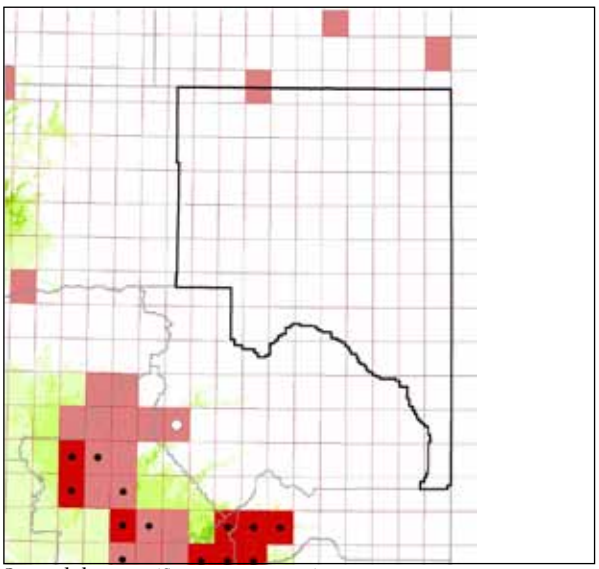
dyer's woad (*Isatis tinctoria*)



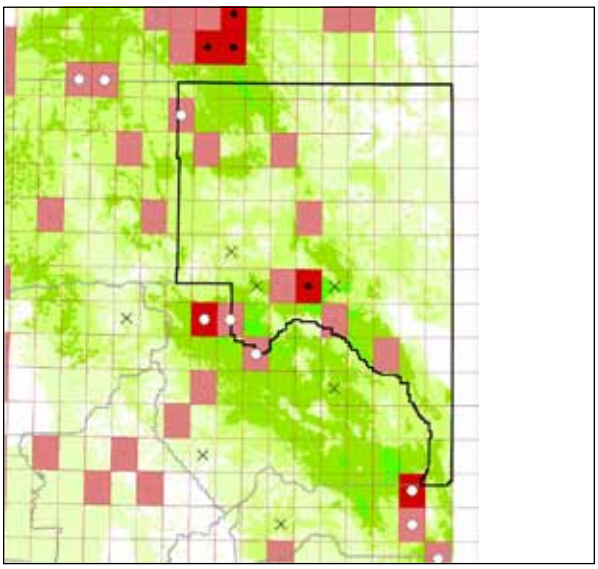
Scotch broom (*Cytisus scoparius*)



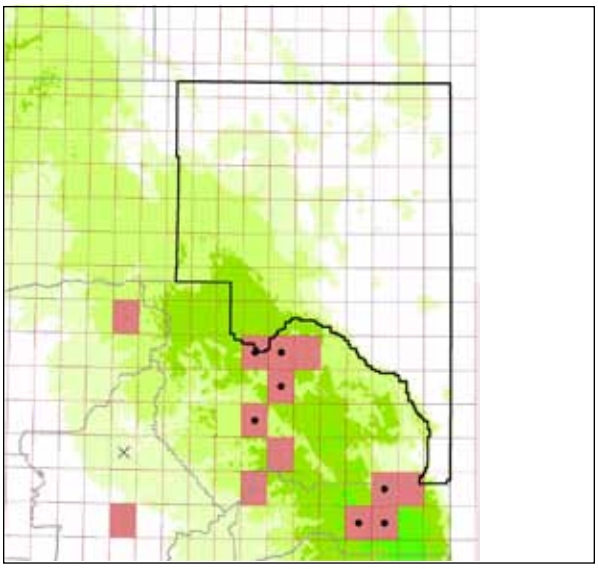
French broom (*Genista monspessulana*)



Spanish broom (*Spartium junceum*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica)*



yellow toadflax (*Linaris vulgaris*)

Management opportunities and statistics for the Lassen SWAT

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
	Family Apiaceae											
	Poison-hemlock	-	M	-	24	100	48	0	0	3	41	↑↑
	Family Asteraceae											
●	**Russian knapweed**	**-**	**H**	**-**	**28**	**28**	**34**	**3**	**0**	**94**	**98**	**-**
●	**Musk thistle**	**-**	**H**	**-**	**15**	**16**	**41**	**18**	**0**	**71**	**56**	**↓**
	Italian thistle & slenderflower thistle	-	-	M	1	-	0	0	0	-	-	-
	Woolly distaff thistle	-	-	M	0	-	-	-	0	0	0	-
●	**Diffuse knapweed**	**H**	**-**	**-**	**20**	**20**	**9**	**9**	**1**	**85**	**100**	**↑**
●	**Spotted knapweed**	**-**	**H**	**-**	**40**	**41**	**0**	**9**	**2**	**90**	**100**	**-**
	Tocalote	-	-	M	0	-	-	-	0	-	-	-
●	**Yellow starthistle**	**-**	**H**	**-**	**36**	**38**	**46**	**12**	**4**	**55**	**97**	**↑**
●	**Rush skeletonweed**	**H**	**-**	**-**	**2**	**50**	**0**	**0**	**0**	**1**	**14**	**↑↑**
	Canada thistle	-	M	-	82	82	35	0	0	99	96	-
	Bull thistle	-	L	-	100	100	0	0	0	61	99	↑
●	**Stinkwort**	**-**	**-**	**M**	**0**	**-**	**-**	**-**	**0**	**0**	**0**	**-**
	Ox-eye daisy	-	M	-	9	29	20	0	0	16	43	↑↑
●	**Scotch thistle**	**-**	**H**	**-**	**78**	**78**	**49**	**1**	**4**	**98**	**89**	**-**
	Family Boraginaceae											
	Houndstongue	-	-	M	3	-	67	0	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	-	M	-	61	-	7	0	0	-	-	-
●	**Dyer's woad**	**H**	**-**	**-**	**30**	**32**	**35**	**3**	**1**	**76**	**97**	**↑**
	Charlock mustard	-	-	L	0	-	-	-	0	-	-	-

	FAMIY DIPSACACEAE	M	-	-								
	Common teasel & fuller's teasel				9	71	0	0	1	1	9	↑↑
	FAMILY FABACEAE	-	H	-								
●	**Scotch broom**				**14**	**59**	**13**	**19**	**2**	**9**	**41**	**↑↑**
●	**French broom**	**-**	**-**	**M**	**0**	**-**	**-**	**-**	**0**	**0**	**0**	**-**
●	**Spanish broom**	**-**	**-**	**H**	**1**	**100**	**0**	**0**	**0**	**0**	**21**	**↑↑**
	Black locust	-	L	-	10	-	0	0	0	-	-	-
	Red sesbania	-	-	L	0	-	-	-	0	0	0	-
	Gorse	-	-	-	0	-	-	-	0	0	0	-
	FAMILY POACEAE											
	Giant reed	-	-	L	0	-	-	-	0	0	0	-
	Annual false-brome	-	-	L	0	-	-	-	0	0	0	-
	Japanese brome	L	-	-	17	-	45	0	0	-	-	-
	Red brome	-	M	-	64	100	3	0	0	23	60	↑↑
	Jubatagrass	-	-	L	2	-	0	0	0	-	-	-
	Pampasgrass	-	-	L	3	-	0	0	0	0	0	-
	Orchardgrass	-	L	-	64	100	0	0	0	26	65	↑↑
	Common velvet grass	-	M	-	4	11	0	0	0	17	72	↑↑
	Mediterranean barley	-	M	-	24	-	0	0	0	-	-	-
	Hare barley	-	M	-	25	-	0	0	0	-	-	-
	Italian ryegrass	-	M	-	12	-	0	0	0	0	0	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**-**	**H**	**-**	**10**	**10**	**18**	**27**	**3**	**90**	**100**	**-**
●	**Yellow toadflax**	**-**	**-**	**H**	**3**	**3**	**67**	**0**	**0**	**47**	**70**	**↑**
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	-	L	3	38	0	0	0	2	25	↑↑
	FAMILY SOLANACEAE											
	Tree tobacco	-	-	L	0	-	-	-	0	0	0	-

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

Plumas/Sierra Weed Management Area

These recommendations focus on the portion of Plumas/Sierra WMA that is within the Sierra Nevada region (see map in chapter 1). Statistics are based on all of the Plumas and Sierra counties.

Eradication is recommended for species that have limited occurrence within the WMA. Of the species examined, the following are priority eradication opportunities for Plumas/Sierra WMA:

diffuse knapweed (*Centaurea diffusa*)

Scotch thistle (*Onopordum acanthium*) – guard against incursion from the northeast

dyer's woad (*Isatis tinctoria*) – prevent spread further south

Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

stinkwort (*Dittrichia graveolens*) – prevent new populations in the northern Sierra

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for Plumas/Sierra WMA:

Russian knapweed (*Acroptilon repens*)

musk thistle (*Carduus nutans*) – much of the county has suitable climate

spotted knapweed (*Centaurea maculosa*) – climate is highly suitable

yellow starthistle (*Centaurea solstitialis*) – prevent spread to higher elevations and into Nevada as part of the YST Leading Edge Project

rush skeletonweed (*Chondrilla juncea*) – coordinate with Nevada/Placer WMA

Scotch broom (*Cytisus scoparius*)

French broom (*Genista monspessulana*)

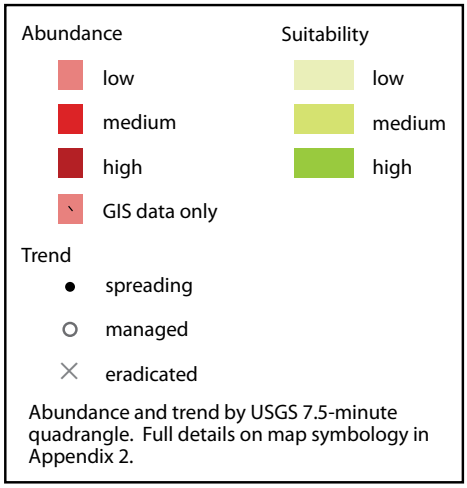
Spanish broom (*Spartium junceum*)

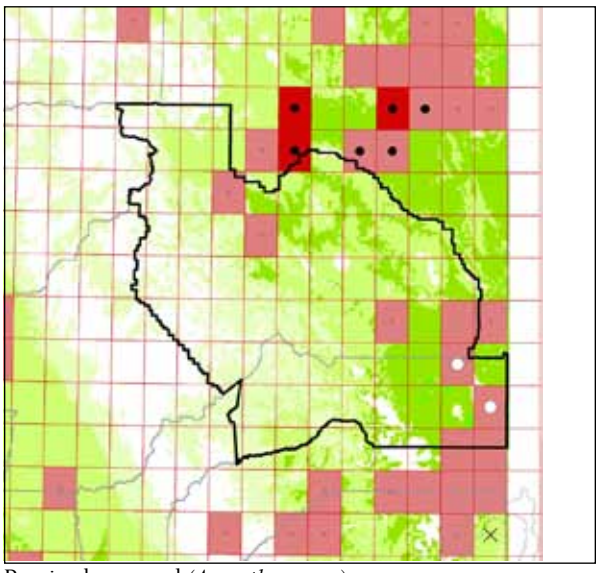
yellow toadflax (*Linaria vulgaris*)

Surveillance is recommended to prevent spread into Plumas/Sierra WMA:

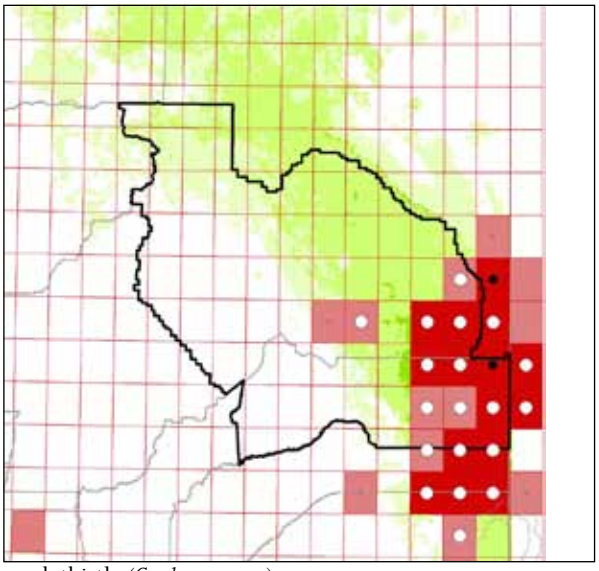
red sesbania (*Sesbania punicea*) – present in Yuba County

giant reed (*Arundo donax*)

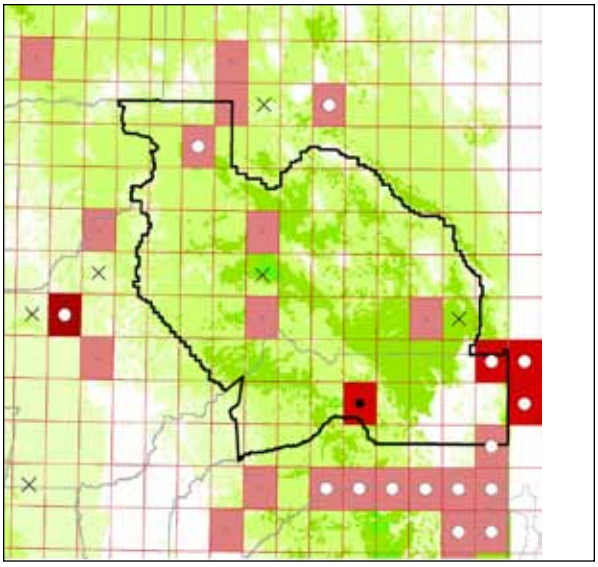




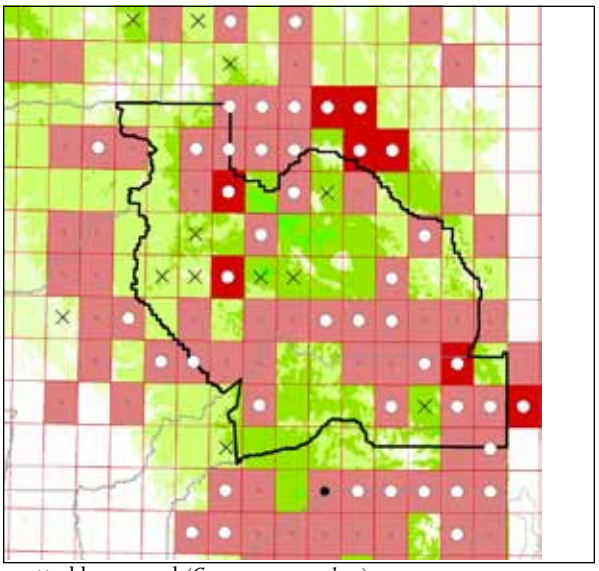
Russian knapweed (*Acroptilon repens*)



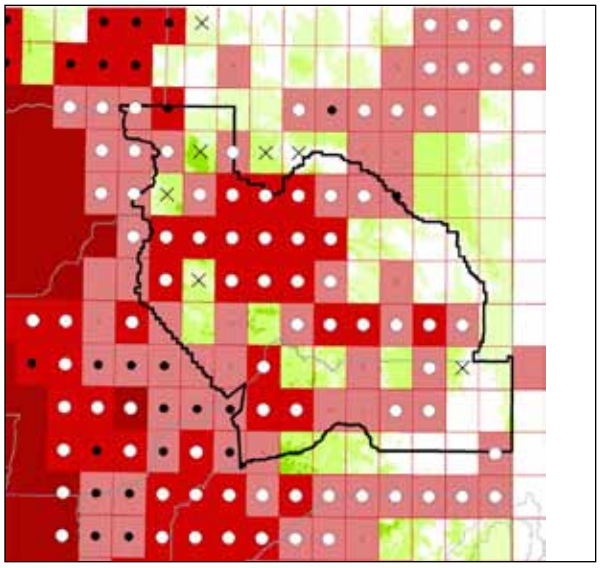
musk thistle (*Carduus nutans*)



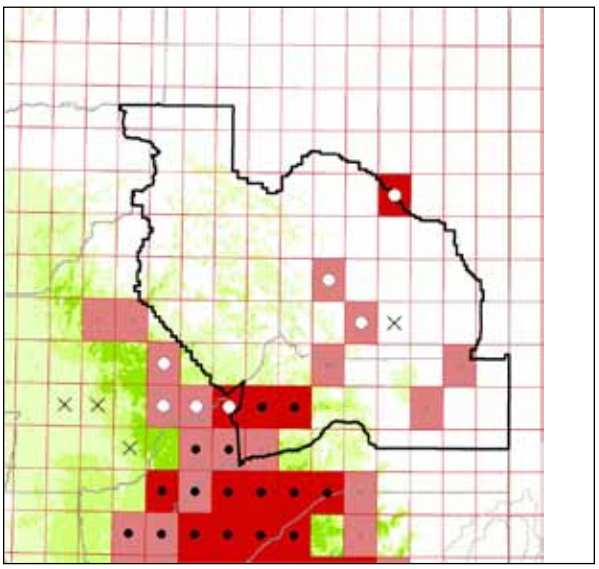
diffuse knapweed (*Centaurea diffusa*)



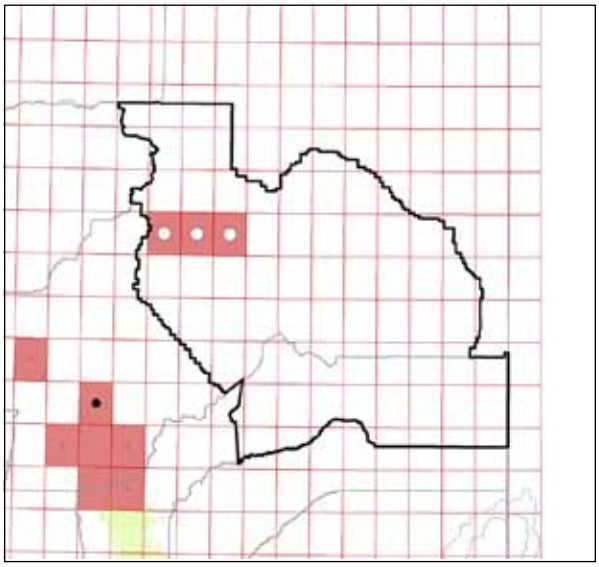
spotted knapweed (*Centaurea maculosa*)



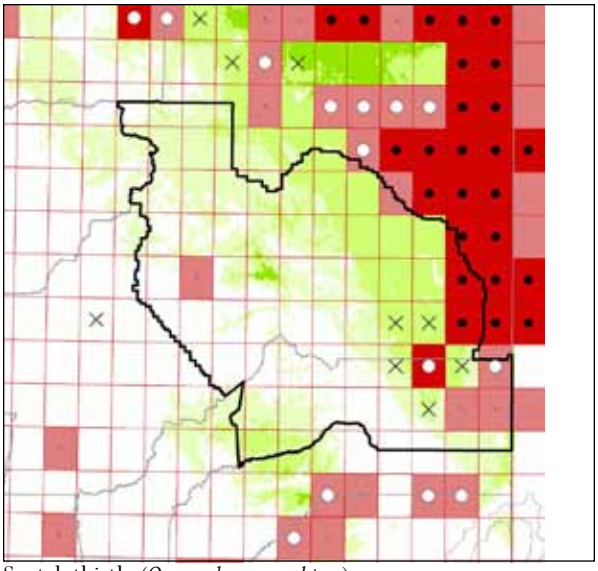
yellow starthistle (*Centaurea solstitialis*)



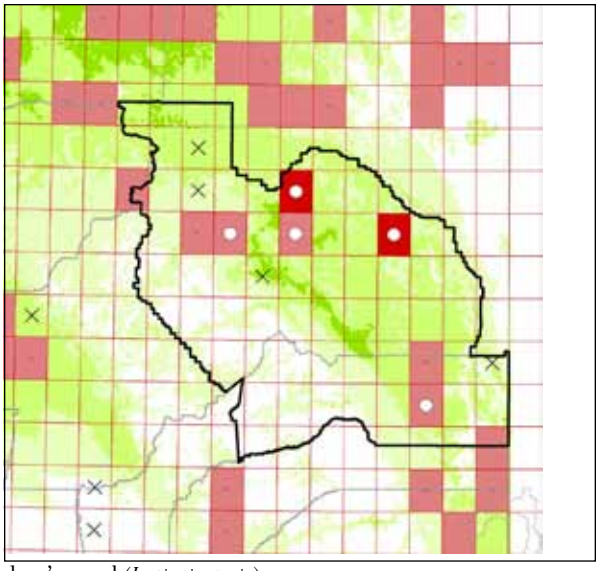
rush skeletonweed (*Chondrilla juncea*)



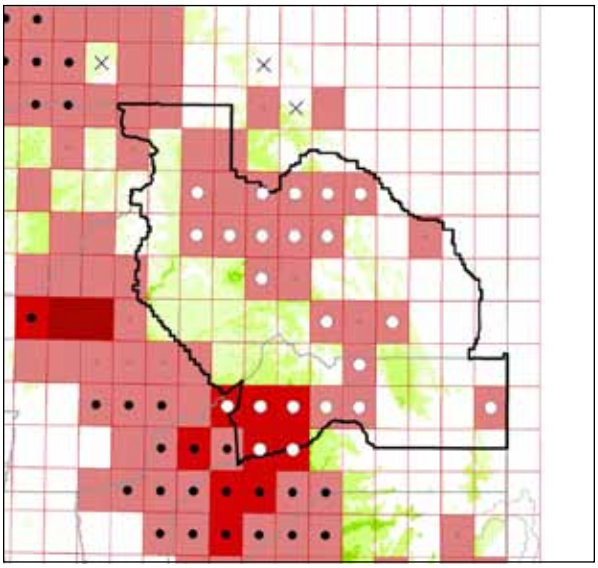
stinkwort (*Dittrichia graveolens*)



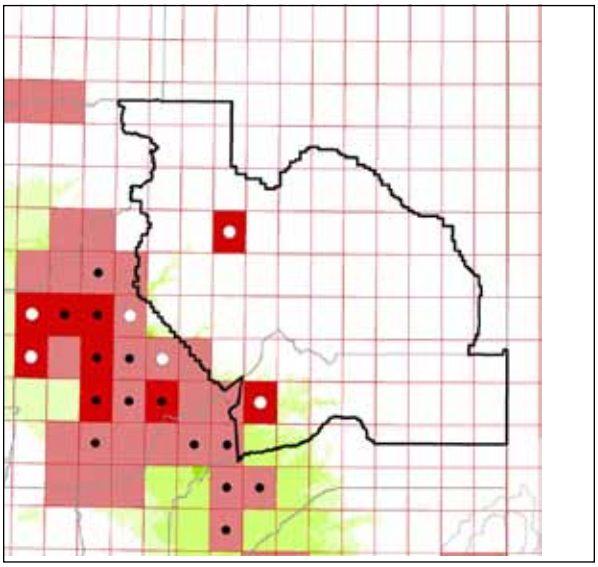
Scotch thistle (*Onopordum acanthium*)



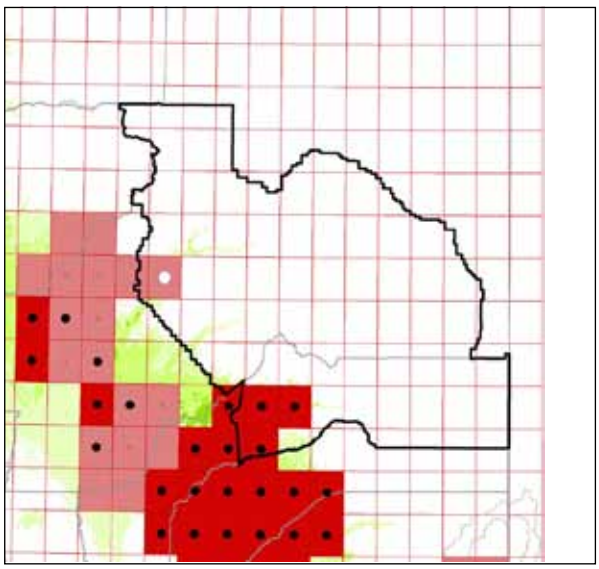
dyer's woad (*Isatis tinctoria*)



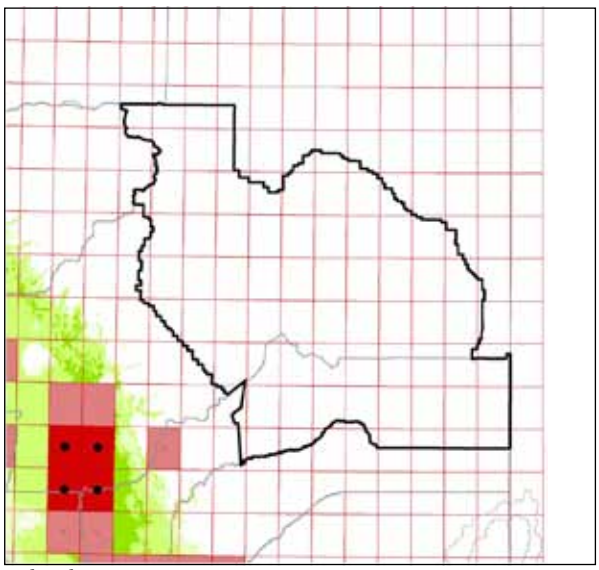
Scotch broom (*Cytisus scoparius*)



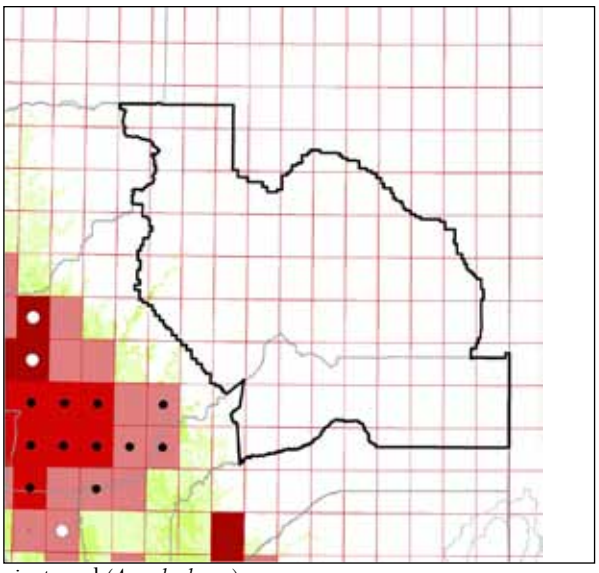
French broom (*Genista monspessulana*)



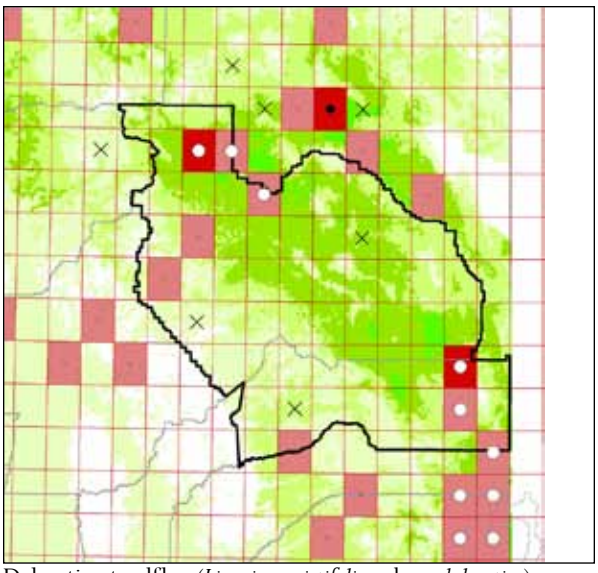
Spanish broom (*Spartium junceum*)



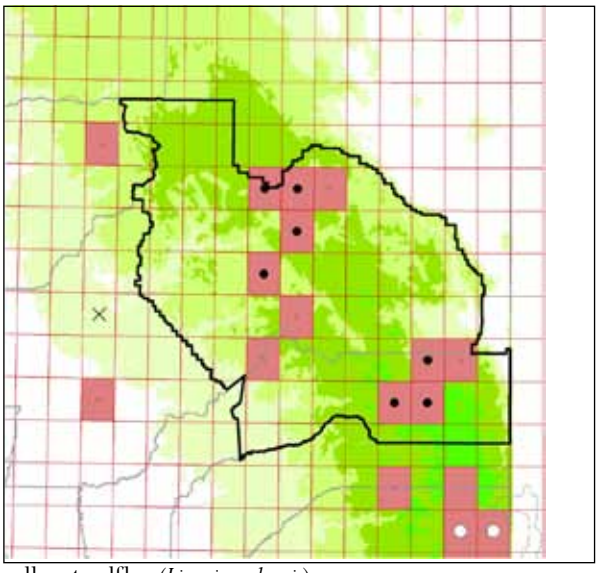
red sesbania (*Sesbania punicea*)



giant reed (*Arundo donax*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)

Management opportunities for the Plumas/Sierra WMA

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability change
	Family Apiaceae											
	Poison-hemlock	-	M	-	26	100	5	5	0	3	25	↑↑
	Family Asteraceae											
●	**Russian knapweed**	**-**	**H**	**-**	**13**	**13**	**18**	**18**	**0**	**82**	**98**	**↑**
●	**Musk thistle**	**-**	**H**	**-**	**21**	**28**	**39**	**50**	**0**	**58**	**13**	**↓**
	Italian thistle & slenderflower thistle	-	-	M	2	-	50	0	0	-	-	-
	Woolly distaff thistle	-	-	M	0	0			0	0	2	-
●	**Diffuse knapweed**	**H**	**-**	**-**	**12**	**12**	**40**	**40**	**2**	**94**	**99**	**-**
●	**Spotted knapweed**	**-**	**H**	**-**	**47**	**47**	**5**	**38**	**8**	**99**	**100**	**-**
	Tocalote	-	-	M	1	-	0	0	0	-	-	-
●	**Yellow starthistle**	**-**	**H**	**-**	**62**	**62**	**42**	**53**	**6**	**81**	**100**	**↑**
●	**Rush skeletonweed**	**-**	**H**	**-**	**14**	**23**	**33**	**25**	**1**	**26**	**85**	**↑↑**
	Canada thistle	-	M	-	80	80	25	12	0	100	77	↓
	Bull thistle	-	L	-	100	100	20	9	0	93	99	-
●	**Stinkwort**	**M**	**-**	**-**	**4**	**-**	**0**	**100**	**0**	**0**	**3**	**-**
	Ox-eye daisy	-	M	-	27	29	22	0	0	78	59	↓
●	**Scotch thistle**	**H**	**-**	**-**	**16**	**17**	**50**	**14**	**6**	**66**	**73**	**-**
	Family Boraginaceae											
	Houndstongue	-	-	M	2	-	0	0	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	-	M	-	23	-	60	5	1	-	-	-
●	**Dyer's woad**	**H**	**-**	**-**	**11**	**11**	**11**	**56**	**5**	**79**	**67**	**-**
	Charlock mustard	M	-	-	1	-	100	0	0	-	-	-
	Famiy Dipsacaceae											
	Common teasel & fuller's teasel	-	M	-	13	33	55	0	0	6	0	↓
	Family Fabaceae											
●	**Scotch broom**	**-**	**H**	**-**	**41**	**49**	**51**	**66**	**0**	**53**	**93**	**↑**
●	**French broom**	**-**	**H**	**-**	**8**	**32**	**14**	**29**	**0**	**10**	**29**	**↑↑**
●	**Spanish broom**	**-**	**H**	**-**	**8**	**27**	**71**	**14**	**0**	**9**	**65**	**↑↑**
	Black locust	-	L	-	13	-	0	0	0	-	-	-
●	**Red sesbania**	**-**	**-**	**M**	**0**	**-**	**-**	**-**	**0**	**0**	**0**	**-**
	Gorse	-	-	L	0	-	-	-	0	0	8	-
	Family Poaceae											
●	**Giant reed**	**-**	**-**	**H**	**0**	**0**	**0**	**0**	**0**	**1**	**8**	**↑↑**
	Annual false-brome	-	-	L	1	50	0	0	0	0	1	↑↑
	Japanese brome	-	L	-	17	-	0	0	0	-	-	-
	Red brome	-	M	-	34	66	48	0	0	18	18	-
	Jubatagrass		-	M	0	-	-	-	0	-	-	-
	Pampasgrass	M	-	-	2	-	0	0	0	0	1	-
	Orchardgrass	-	L	-	99	100	0	0	0	88	98	-

	Common velvet grass	-	M	-	19	20	0	0	0	72	97	↑
	Mediterranean barley	-	M	-	93	-	0	0	0	-	-	-
	Hare barley	-	M	-	94	-	0	0	0	-	-	-
	Italian ryegrass	-	M	-	35	100	7	0	0	3	3	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	L	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**H**	**-**	**-**	**13**	**13**	**9**	**36**	**4**	**94**	**100**	**-**
●	**Yellow toadflax**	**-**	**H**	**-**	**13**	**13**	**64**	**0**	**0**	**95**	**99**	**-**
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	M	-	11	41	100	0	0	3	31	↑↑
	FAMILY SOLANACEAE											
	Tree tobacco	-	-	L	0	-	-	-	0	0	0	-

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

Butte Weed Management Area

These recommendations focus on the portion of Butte WMA within the Sierra Nevada ecoregion, which is approximately the eastern half of the county (see map in chapter 1). Statistics are based on all of Butte County.

Eradication is recommended for species that have limited occurrence within the Sierra portion of the WMA. Of the species examined, the following are priority eradication opportunities for Butte WMA:

dyer's woad (*Isatis tinctoria*)

red sesbania (*Sesbania punicea*)

Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

yellow toadflax (*Linaria vulgaris*)

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for Butte WMA:

spotted knapweed (*Centaurea maculosa*)

yellow starthistle (*Centaurea solstitialis*) – widespread, focus on preventing spread to uninvaded sensitive habitats

rush skeletonweed (*Chondrilla juncea*) – watch for spread from the south

stinkwort (*Dittrichia graveolens*)

Scotch broom (*Cytisus scoparius*)

French broom (Genista monspessulana)

Spanish broom (Spartium junceum)

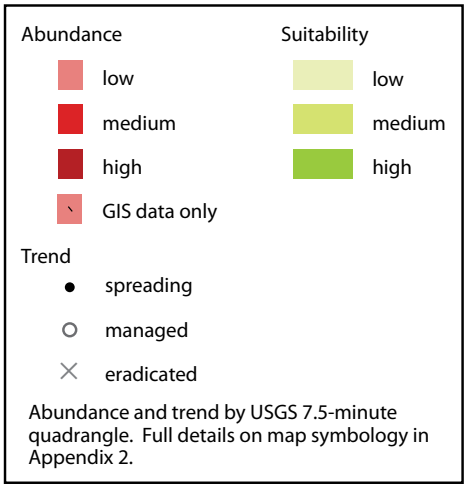
giant reed (*Arundo donax*)

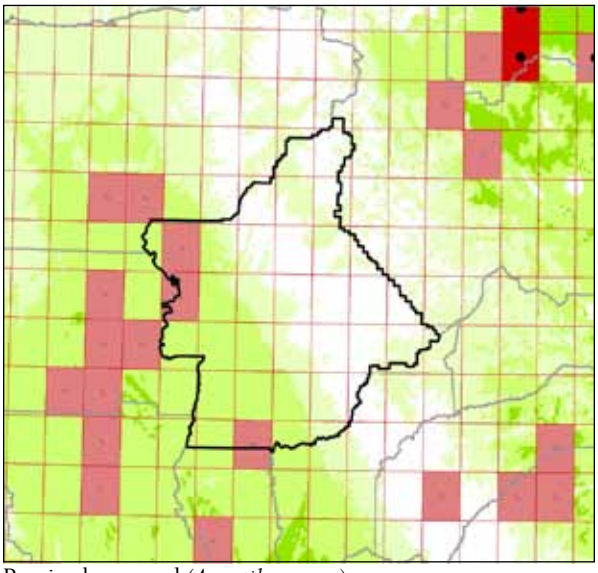
Surveillance is recommended to prevent spread into the Sierra portion of WMA:

Russian knapweed (*Acroptilon repens*) – GIS data indicates one quad to the southwest

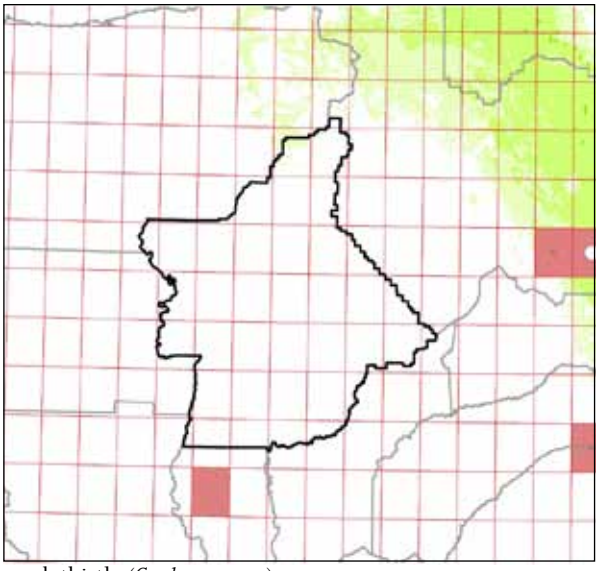
musk thistle (*Carduus nutans*) – one quad infested in northern Sutter County

Scotch thistle (*Onopordum acanthium*) – not yet in Sierra portion of WMA

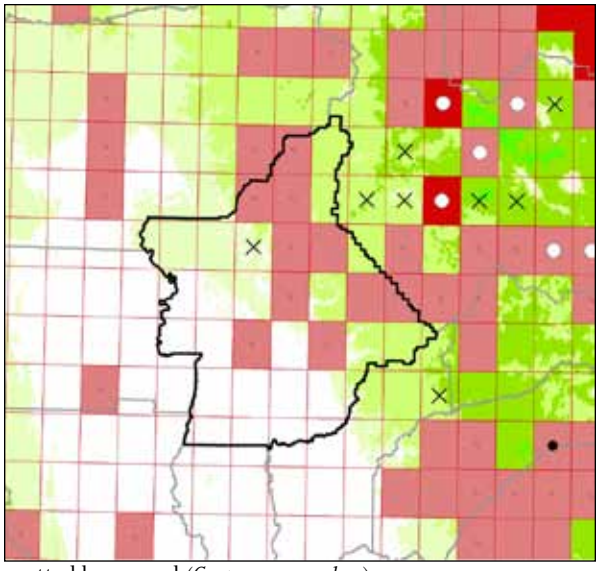




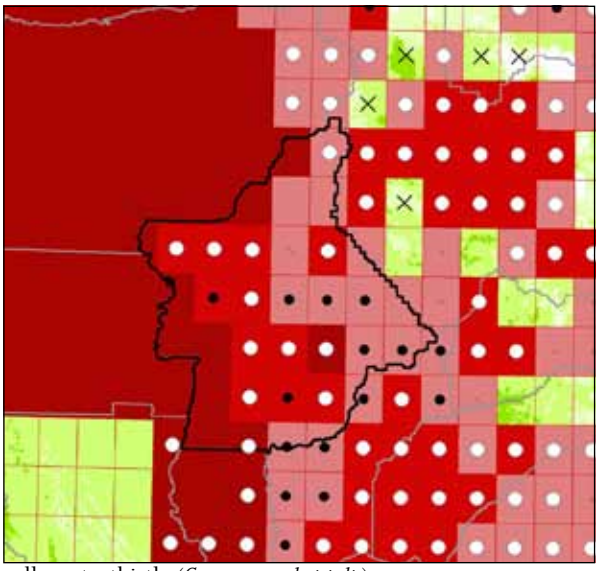
Russian knapweed (*Acroptilon repens*)



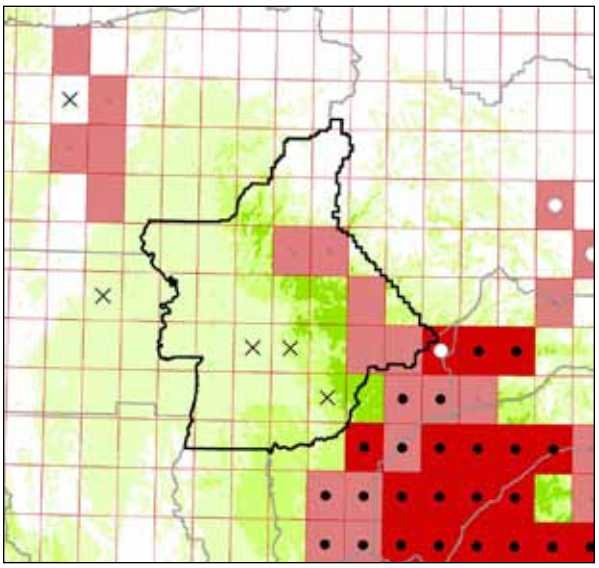
musk thistle (*Carduus nutans*)



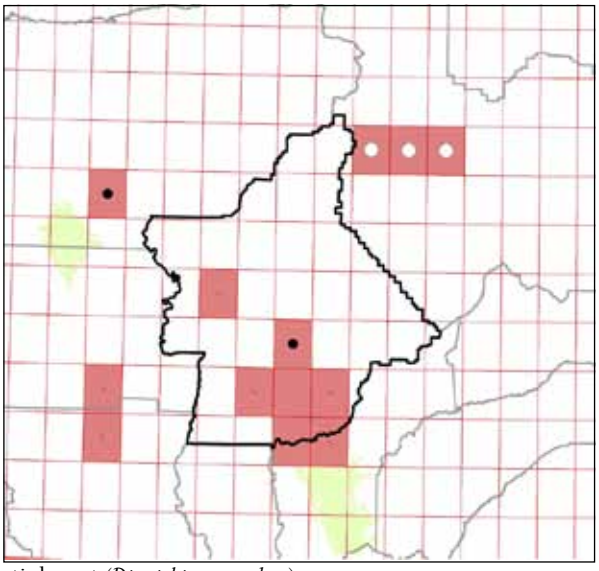
spotted knapweed (*Centaurea maculosa*)



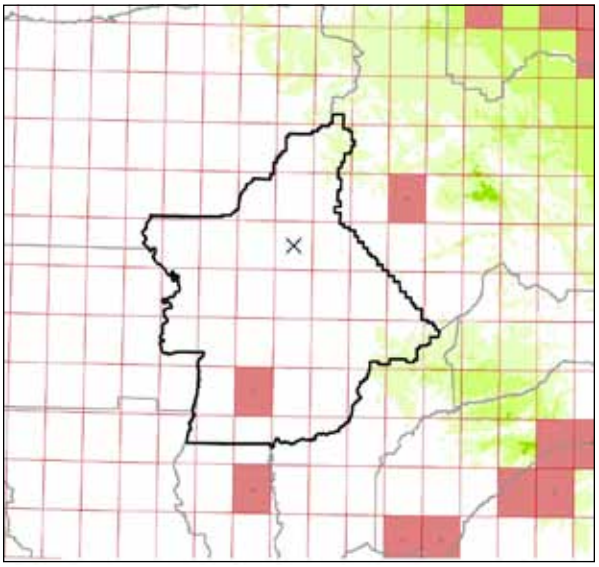
yellow starthistle (*Centaurea solstitialis*)



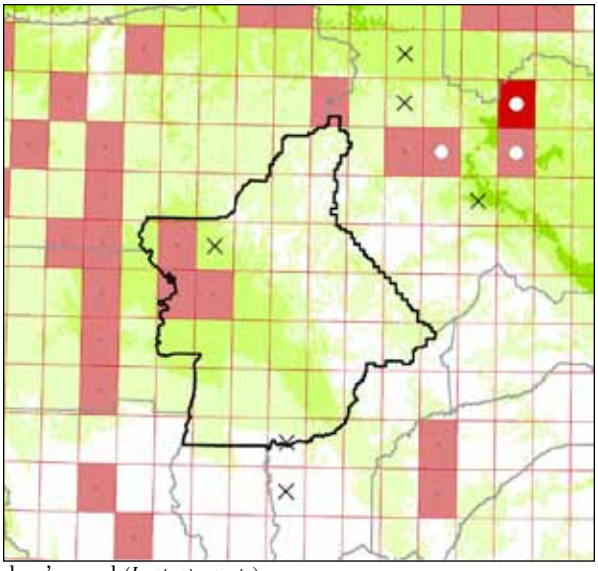
rush skeletonweed (*Chondrilla juncea*)



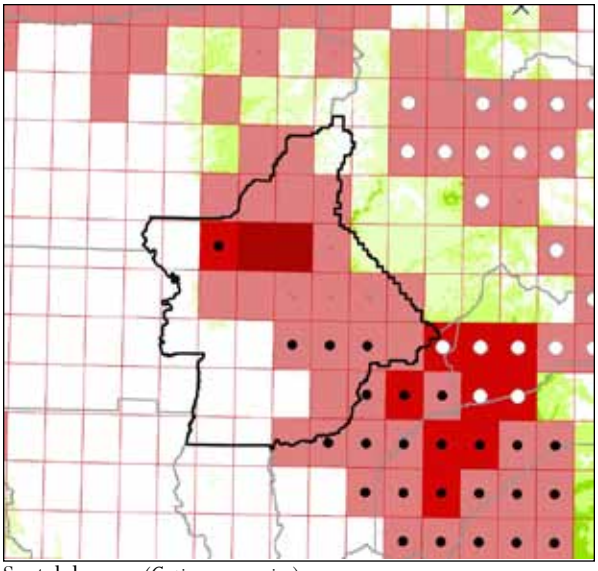
stinkwort (*Dittrichia graveolens*)



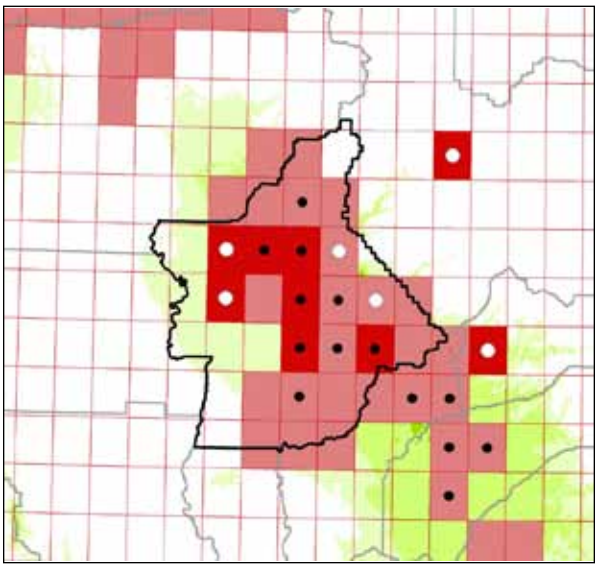
Scotch thistle (*Onopordum acanthium*)



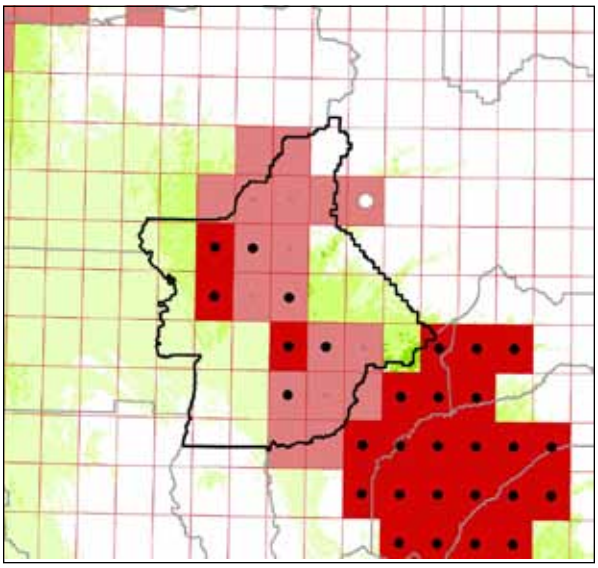
dyer's woad (*Isatis tinctoria*)



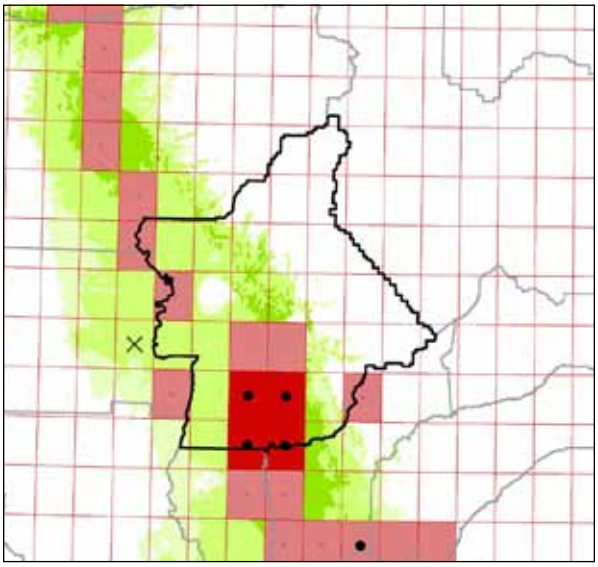
Scotch broom (*Cytisus scoparius*)



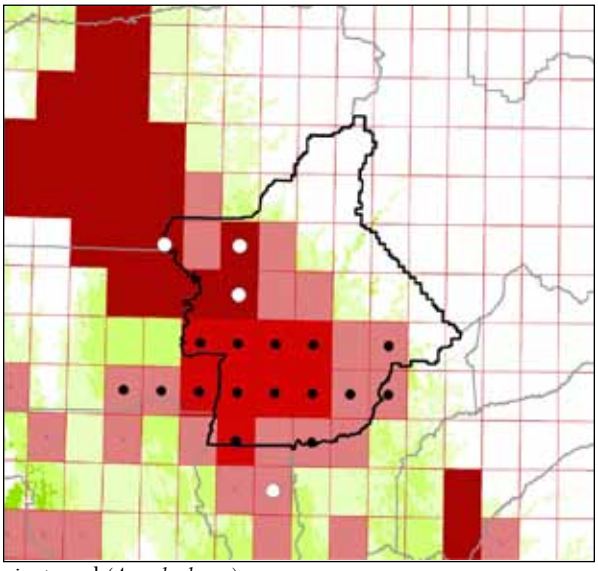
French broom (*Genista monspessulana*)



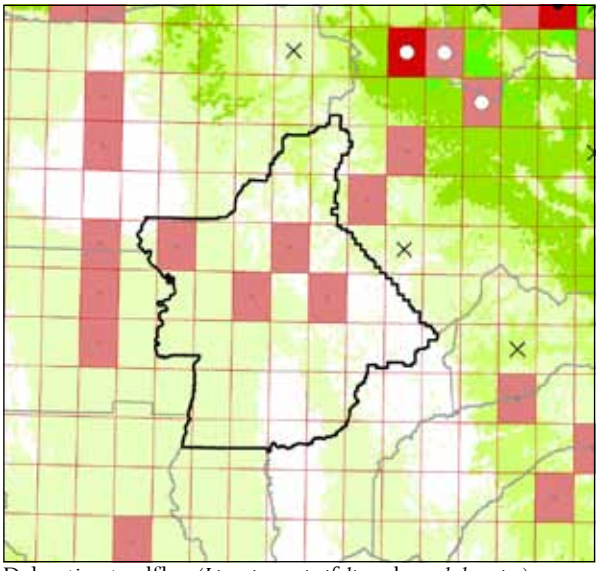
Spanish broom (*Spartium junceum*)



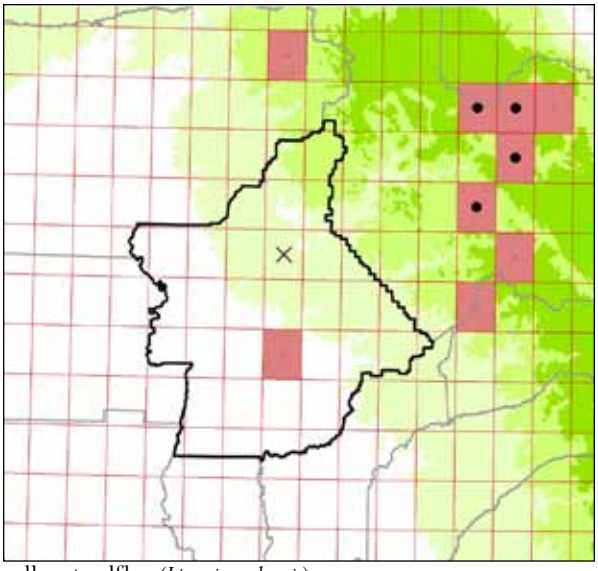
red sesbania (*Sesbania punicea*)



giant reed (*Arundo donax*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)

Management opportunities for the Butte WMA

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability change
	Family Apiaceae											
	Poison-hemlock	-	M	-	46	60	14	0	0	51	20	↓
	Family Asteraceae											
●	**Russian knapweed**	**-**	**-**	**M**	**10**	**19**	**0**	**0**	**0**	**66**	**100**	**↑**
●	**Musk thistle**	**-**	**-**	**M**	**0**	**0**	**-**	**-**	**0**	**1**	**0**	**-**
	Italian thistle & slenderflower thistle	-	M	-	60	-	38	0	0	-	-	-
	Woolly distaff thistle	-	-	L	0	0	-	-	0	1	34	↑↑
	Diffuse knapweed	-	-	M	6	6	33	0	4	83	37	↓
●	**Spotted knapweed**	**-**	**H**	**-**	**27**	**35**	**0**	**0**	**2**	**58**	**59**	**-**
	Tocalote	-	M	-	44	-	5	0	0	-	-	-
●	**Yellow starthistle**	**-**	**H**	**-**	**98**	**98**	**21**	**4**	**0**	**100**	**100**	**-**
●	**Rush skeletonweed**	**-**	**H**	**-**	**15**	**15**	**29**	**14**	**6**	**87**	**100**	**-**
	Canada thistle	-	M	-	27	50	0	0	2	41	10	↓
	Bull thistle	-	L	-	100	100	2	0	0	100	100	-
●	**Stinkwort**	**-**	**M**	**-**	**17**	**89**	**13**	**13**	**0**	**5**	**0**	**↓**
	Ox-eye daisy	-	M	-	94	100	0	0	0	41	39	-
●	**Scotch thistle**	**-**	**-**	**M**	**2**	**8**	**0**	**0**	**2**	**6**	**33**	**↑↑**
	Family Boraginaceae											
	Houndstongue	-	-	M	2	-	0	0	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	-	M	-	46	-	41	0	0	-	-	-
●	**Dyer's woad**	**H**	**-**	**-**	**10**	**11**	**0**	**0**	**2**	**75**	**16**	**↓**
	Charlock mustard	L	-	-	23	-	0	0	0	-	-	-

	FAMILY DIPSACACEAE											
	Common teasel & fuller's teasel	-	M	-	52	53	0	0	0	75	62	↓
	FAMILY FABACEAE											
●	**Scotch broom**	**-**	**H**	**-**	**54**	**74**	**27**	**4**	**0**	**52**	**100**	**↑**
●	**French broom**	**-**	**H**	**-**	**58**	**67**	**32**	**0**	**0**	**64**	**96**	**↑**
●	**Spanish broom**	**-**	**H**	**-**	**46**	**49**	**41**	**0**	**0**	**73**	**98**	**↑**
	Black locust	-	L	-	58	-	11	0	0	-	-	-
●	**Red sesbania**	**H**	**-**	**-**	**23**	**33**	**36**	**0**	**2**	**54**	**66**	**↑**
	Gorse	-	-	L	2	50	0	0	0	1	84	↑↑
	FAMILY POACEAE											
●	**Giant reed**	**-**	**H**	**-**	**56**	**66**	**63**	**0**	**0**	**67**	**81**	**↑**
	Annual false-brome	-	M	-	44	57	14	0	0	64	63	-
	Japanese brome	-	L	-	46	-	0	0	0	-	-	-
	Red brome	-	M	-	90	90	58	0	0	88	84	-
	Jubatagrass	-	M	-	17	-	0	0	0	-	-	-
	Pampasgrass	-	M	-	48	85	0	0	0	21	64	↑↑
	Orchardgrass	-	L	-	98	100	0	0	0	100	100	-
	Common velvet grass	-	M	-	46	46	0	0	0	99	99	-
	Mediterranean barley	-	M	-	88	-	0	0	0	-	-	-
	Hare barley	-	M	-	90	-	0	0	0	-	-	-
	Italian ryegrass	M	-	-	94	98	4	0	0	77	72	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	L	2	-	0	0	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**H**	**-**	**-**	**8**	**9**	**0**	**0**	**2**	**67**	**79**	**↑**
●	**Yellow toadflax**	**H**	**-**	**-**	**2**	**3**	**0**	**0**	**2**	**47**	**100**	**↑↑**
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	M	-	67	71	44	0	0	74	88	↑
	FAMILY SOLANACEAE											
	Tree tobacco	-	-	M	35	90	0	0	0	12	17	↑

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

The recommendations below focus on the portion of Yuba/SutterWMA within the Sierra Nevada ecoregion, which is approximately the eastern half of Yuba County (see map in chapter 1). Statistics are based on all of Yuba and Sutter counties.

Eradication is recommended for species that have limited occurrence within the Sierra portion of the WMA. Of the species examined, the following are priority eradication opportunities for Yuba/Sutter WMA:

red sesbania (*Sesbania punicea*) – one quad in Sierra, more in Valley region

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for Yuba/Sutter WMA:

yellow starthistle (*Centaurea solstitialis*) – widespread, focus on preventing spread to uninvaded sensitive habitats

rush skeletonweed (*Chondrilla juncea*) – prevent further spread

stinkwort (*Dittrichia graveolens*) – GIS data indicates one quad at the edge of the Sierra region

Scotch broom (*Cytisus scoparius*)

French broom (*Genista monspessulana*)

Spanish broom (*Spartium junceum*)

giant reed (*Arundo donax*)

Surveillance is recommended to prevent spread into the Sierra portion of the WMA:

Russian knapweed (*Acroptilon repens*) – present in the Central Valley portion of the WMA

musk thistle (*Carduus nutans*) – one quad infested in northern Sutter County

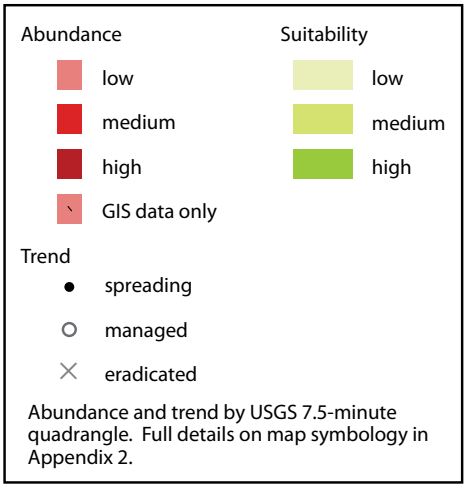
spotted knapweed (*Centaurea maculosa*) – present to the east and south

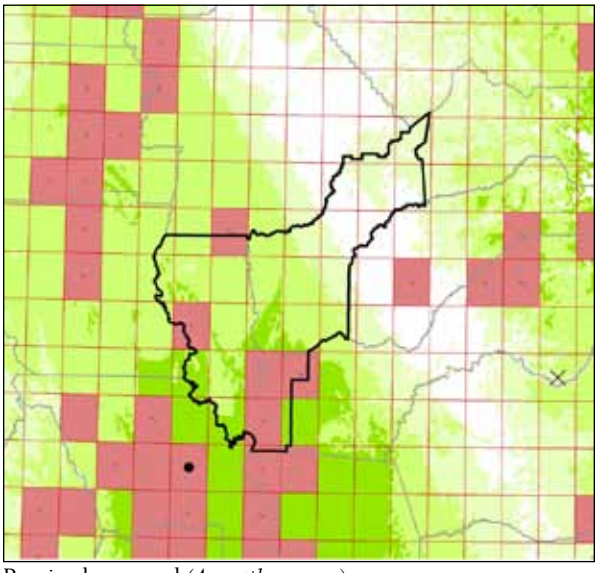
Scotch thistle (*Onopordum acanthium*)

dyer's woad (*Isatis tinctoria*) – GIS data indicates presence to south

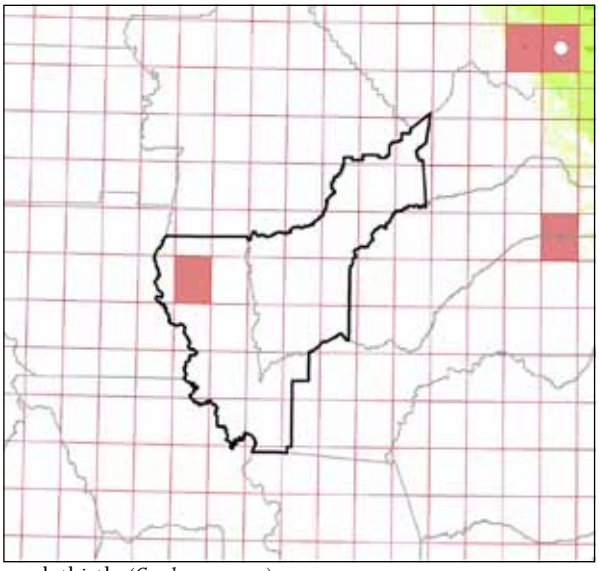
Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

yellow toadflax (*Linaria vulgaris*)

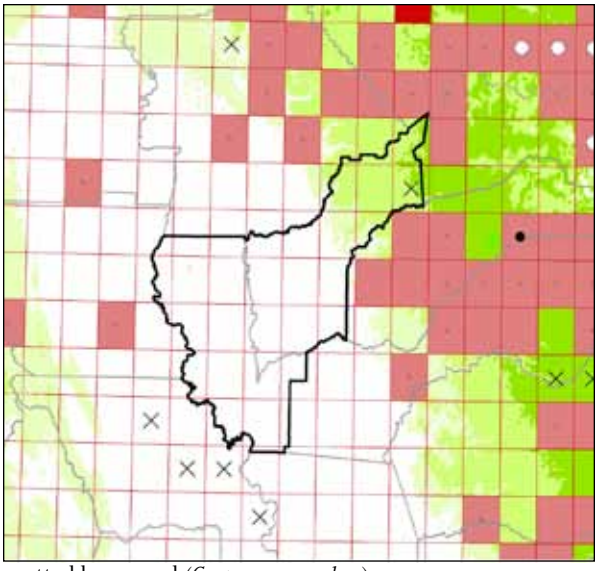




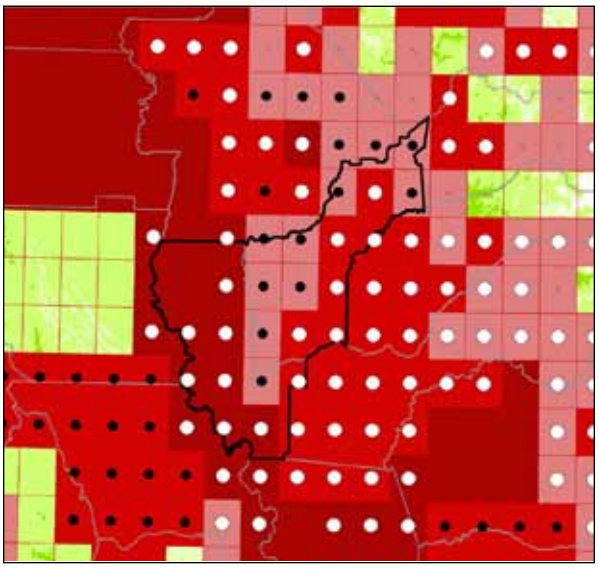
Russian knapweed (*Acroptilon repens*)



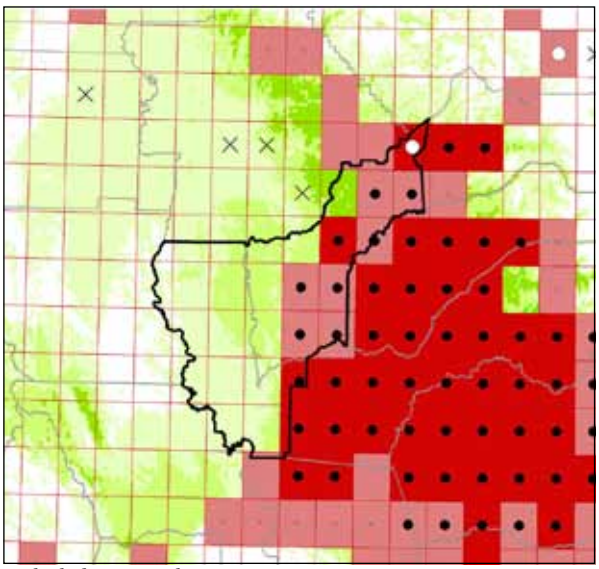
musk thistle (*Carduus nutans*)



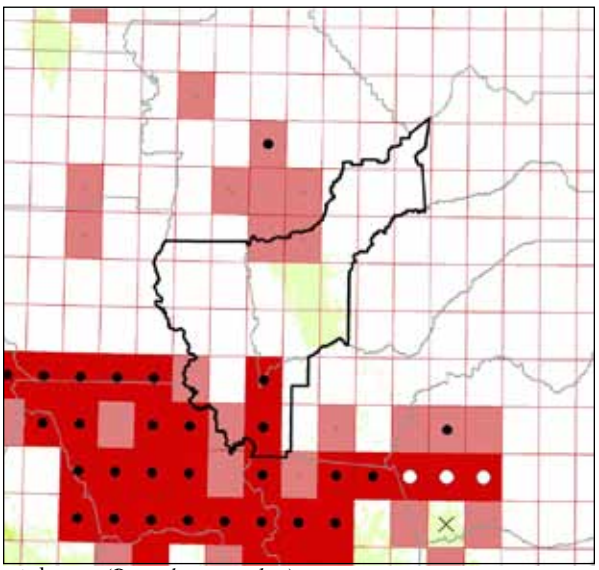
spotted knapweed (*Centaurea maculosa*)



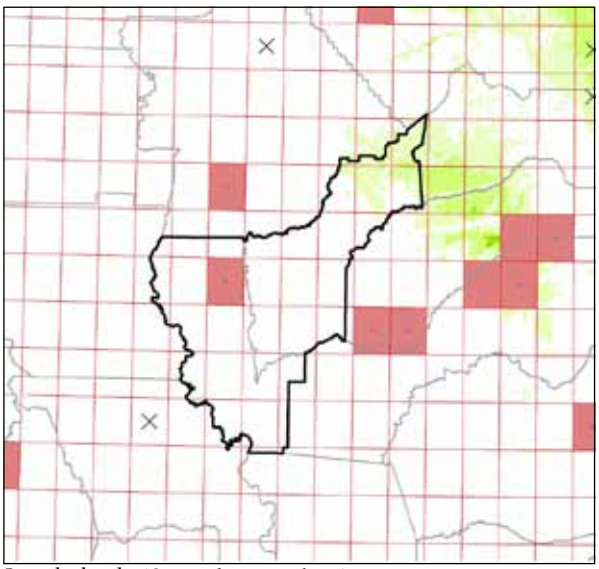
yellow starthistle (*Centaurea solstitialis*)



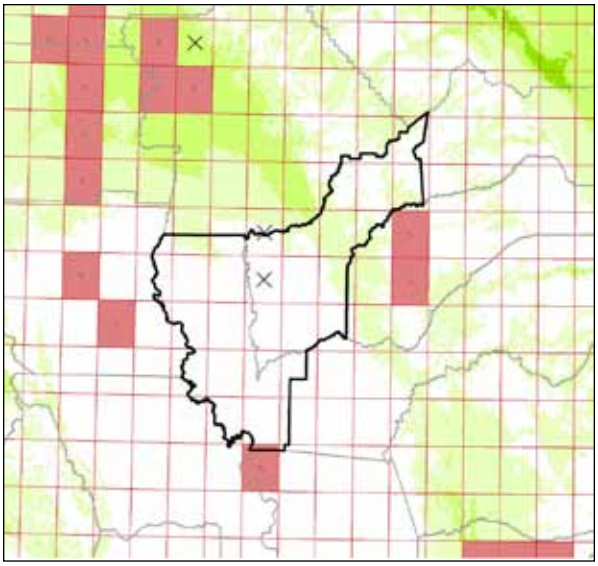
rush skeletonweed (*Chondrilla juncea*)



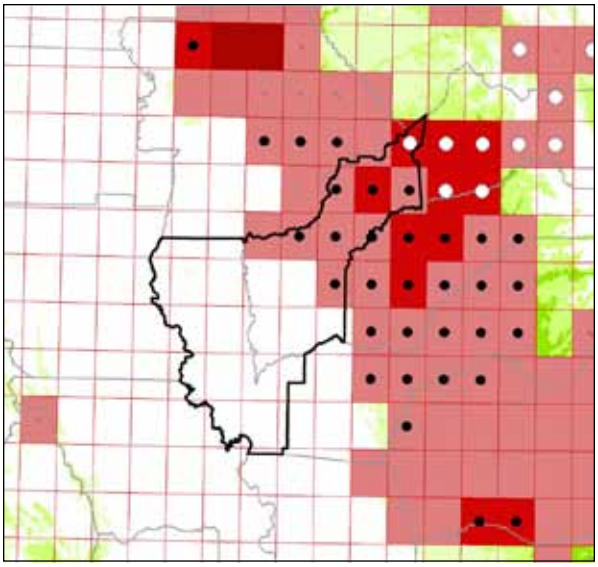
stinkwort (*Dittrichia graveolens*)



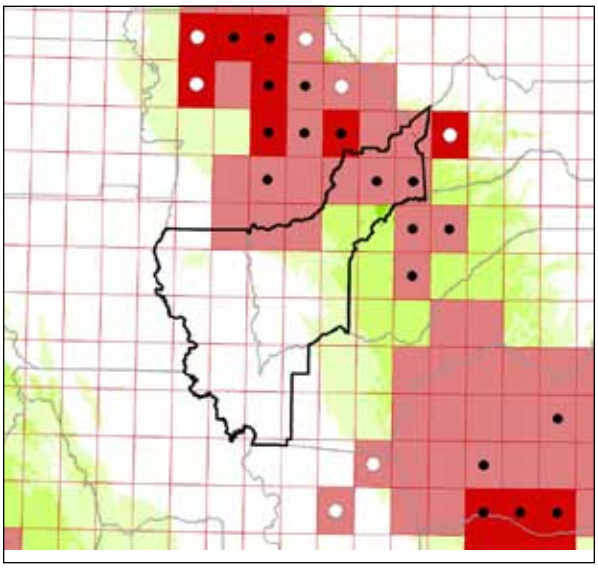
Scotch thistle (*Onopordum acanthium*)



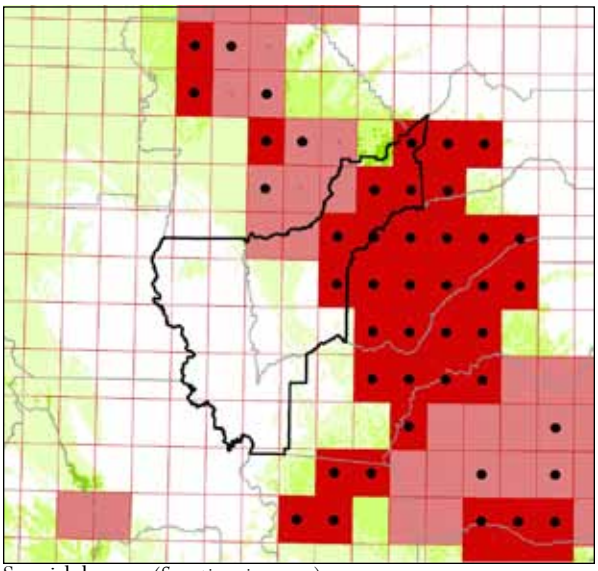
dyer's woad (*Isatis tinctoria*)



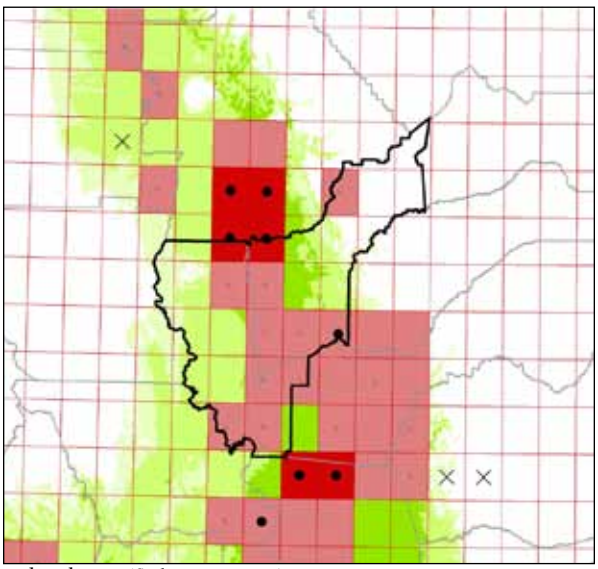
Scotch broom (*Cytisus scoparius*)



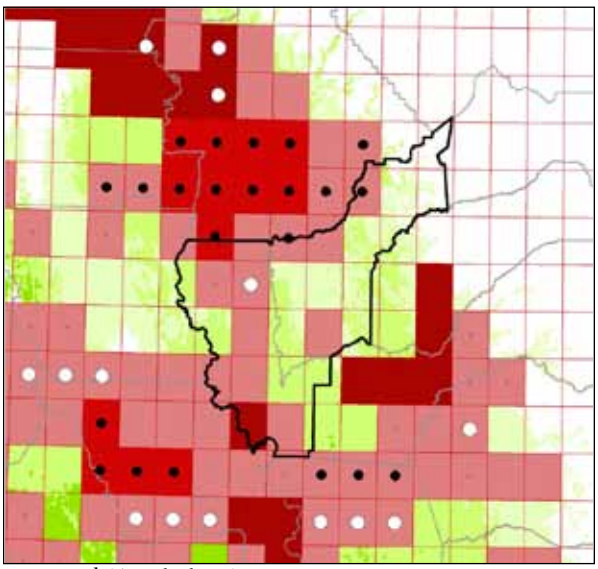
French broom (*Genista monspessulana*)



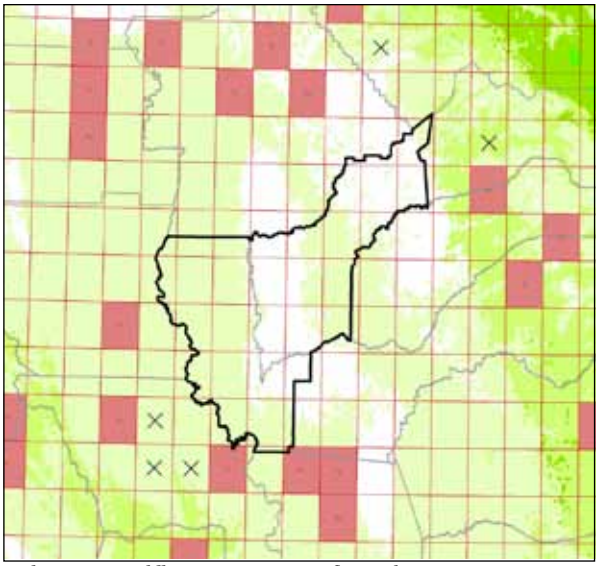
Spanish broom (*Spartium junceum*)



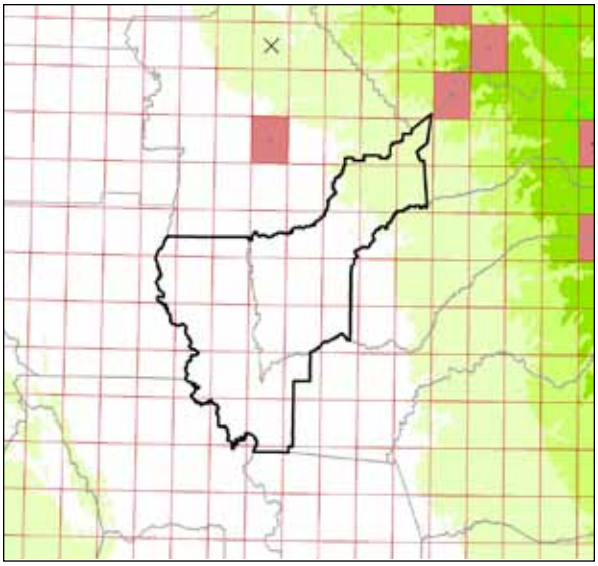
red sesbania (*Sesbania punicea*)



giant reed (*Arundo donax*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)

Management opportunities for the Yuba/Sutter WMA

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
	Family Apiaceae											
	Poison-hemlock	-	M	-	54	91	0	0	0	68	14	↓
	Family Asteraceae											
●	**Russian knapweed**	**-**	**-**	**M**	**19**	**33**	**0**	**0**	**0**	**86**	**100**	**↑**
●	**Musk thistle**	**-**	**-**	**M**	**0**	**-**	**-**	**-**	**0**	**0**	**0**	**-**
	Italian thistle & slenderflower thistle	-	M	-	60	-	55	0	0	-	-	-
	Woolly distaff thistle	-	-	M	0	0	-	-	3	3	23	↑↑
	Diffuse knapweed	-	-	M	3	4	0	0	3	65	27	↓
●	**Spotted knapweed**	**-**	**-**	**H**	**5**	**20**	**0**	**0**	**3**	**31**	**34**	**-**
●	**Tocalote**	**-**	**M**	**-**	**41**	**-**	**60**	**0**	**0**	**-**	**-**	**-**
●	**Yellow starthistle**	**-**	**H**	**-**	**78**	**100**	**59**	**0**	**0**	**100**	**100**	**-**
●	**Rush skeletonweed**	**-**	**H**	**-**	**38**	**54**	**79**	**7**	**0**	**97**	**100**	**-**
	Canada thistle	-	M	-	8	23	0	0	0	32	0	↓
	Bull thistle	-	L	-	76	100	43	0	0	100	100	-
●	**Stinkwort**	**-**	**M**	**-**	**24**	**90**	**33**	**0**	**0**	**13**	**0**	**↓**
	Ox-eye daisy	-	M	-	51	100	0	0	0	15	2	↓
●	**Scotch thistle**	**-**	**-**	**M**	**3**	**13**	**0**	**0**	**0**	**11**	**19**	**↑**
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	-	M	-	27	-	10	0	0	-	-	-
●	**Dyer's woad**	**-**	**-**	**H**	**5**	**13**	**0**	**0**	**0**	**26**	**2**	**↓**
	Charlock mustard	-	-	L	16	-	0	0	0	-	-	-

	FAMIY DIPSACACEAE											
	Common teasel & fuller's teasel	-	M	-	35	50	0	0	0	85	76	-
	FAMILY FABACEAE											
●	**Scotch broom**	**-**	**H**	**-**	**30**	**92**	**73**	**18**	**0**	**36**	**100**	**↑↑**
●	**French broom**	**-**	**H**	**-**	**24**	**56**	**33**	**0**	**0**	**48**	**100**	**↑↑**
●	**Spanish broom**	**-**	**H**	**-**	**27**	**46**	**60**	**0**	**0**	**51**	**100**	**↑**
	Black locust	-	L	-	65	-	4	0	0	-	-	-
●	**Red sesbania**	**H**	**-**	**-**	**35**	**52**	**31**	**0**	**0**	**73**	**81**	**-**
	Gorse	-	-	L	0	0	-	-	3	1	96	↑↑
	FAMILY POACEAE											
●	**Giant reed**	**-**	**H**	**-**	**46**	**63**	**35**	**0**	**0**	**85**	**96**	**-**
	Annual false-brome	-	M	-	24	36	11	0	0	79	79	-
	Japanese brome	-	L	-	19	-	0	0	0	-	-	-
	Red brome	-	M	-	54	77	15	0	0	97	96	-
	Jubatagrass	-	-	M	11	-	0	0	0	-	-	-
	Pampasgrass	-	-	M	46	100	0	0	0	5	78	↑↑
	Orchardgrass	-	L	-	73	100	0	0	0	100	100	-
	Common velvet grass	-	M	-	32	48	0	0	0	89	100	-
	Mediterranean barley	-	M	-	62	-	0	0	0	-	-	-
	Hare barley	-	M	-	65	-	0	0	0	-	-	-
	Italian ryegrass	M	-	-	78	100	35	0	0	88	84	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	L	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**-**	**-**	**H**	**5**	**8**	**0**	**0**	**0**	**62**	**94**	**↑**
●	**Yellow toadflax**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**0**	**24**	**100**	**↑↑**
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	M	-	65	89	71	0	0	87	98	-
	FAMILY SOLANACEAE											
	Tree tobacco	-	-	M	27	83	0	0	0	20	42	↑↑

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

Eradication is recommended for species that have limited occurrence within the WMA. Of the species examined, the following are priority eradication opportunities for Nevada/Placer WMA:

dyer's woad (*Isatis tinctoria*) – prevent spread further south

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for the Nevada/Placer WMA:

Russian knapweed (*Acroptilon repens*) – prevent spread north or south

musk thistle (*Carduus nutans*) – already a main priority in Nevada County

spotted knapweed (*Centaurea maculosa*) – climate is highly suitable

yellow starthistle (*Centaurea solstitialis*) – prevent spread to higher elevations and into Nevada as part of the YST Leading Edge Project

rush skeletonweed (*Chondrilla juncea*) – prevent spread to the north

Scotch thistle (*Onopordum acanthium*) – eradicate existing populations to prevent further spread south

Scotch broom (*Cytisus scoparius*) – spreading

French broom (*Genista monspessulana*) – spreading

Spanish broom (*Spartium junceum*)

red sesbania (*Sesbania punicea*) – only at western edge so far

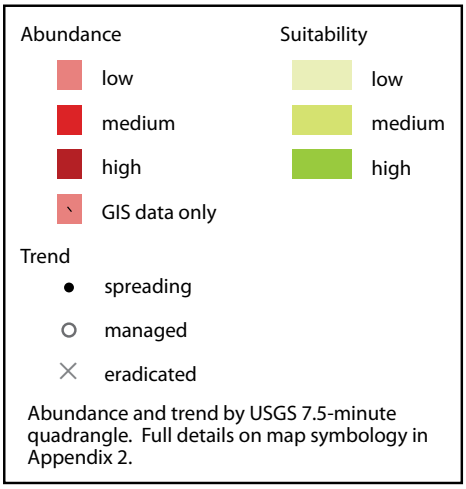
giant reed (*Arundo donax*)

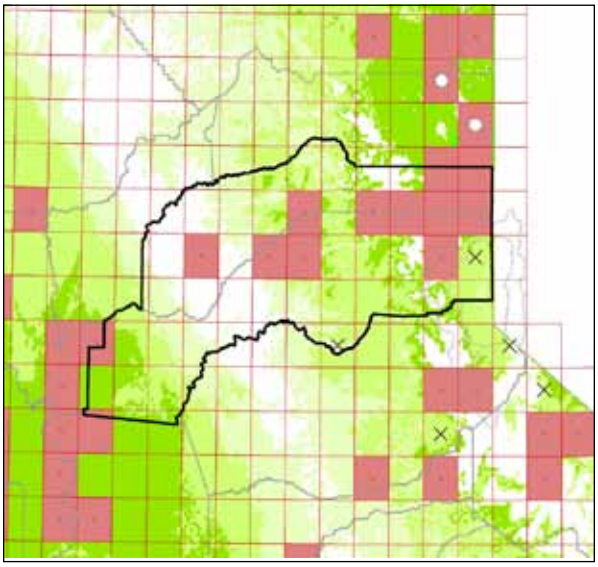
Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

yellow toadflax (*Linaria vulgaris*)

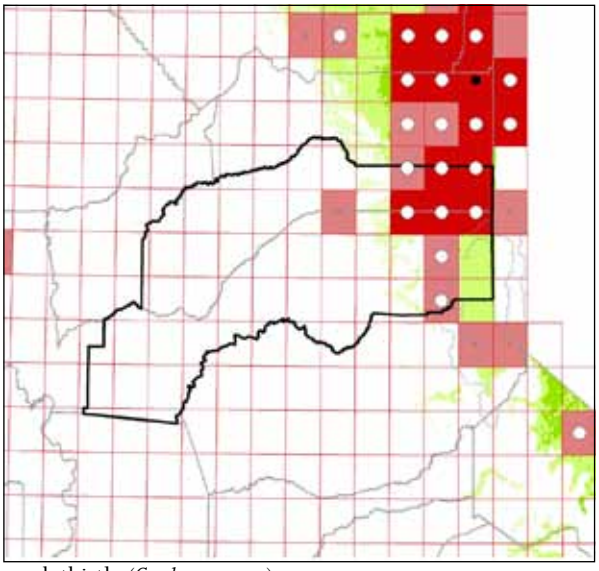
Surveillance is recommended to prevent spread into the Nevada/Placer WMA:

stinkwort (*Dittrichia graveolens*) – present on the western edge of the WMA

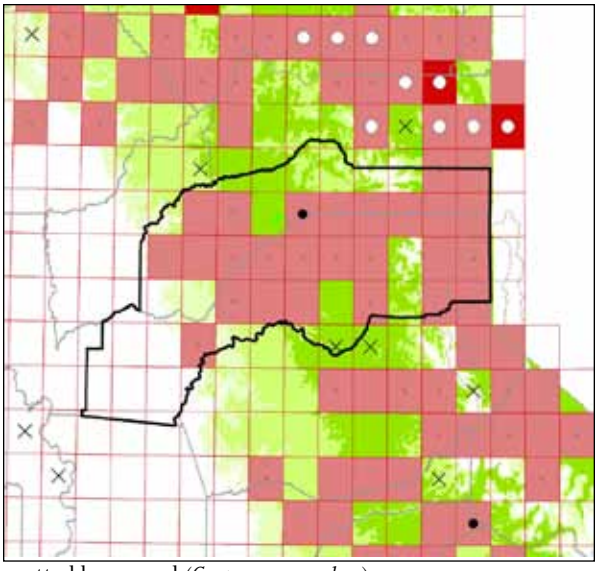




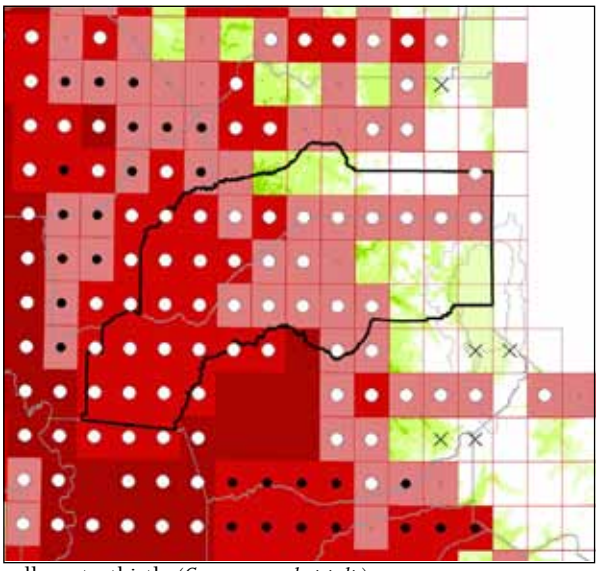
Russian knapweed (*Acroptilon repens*)



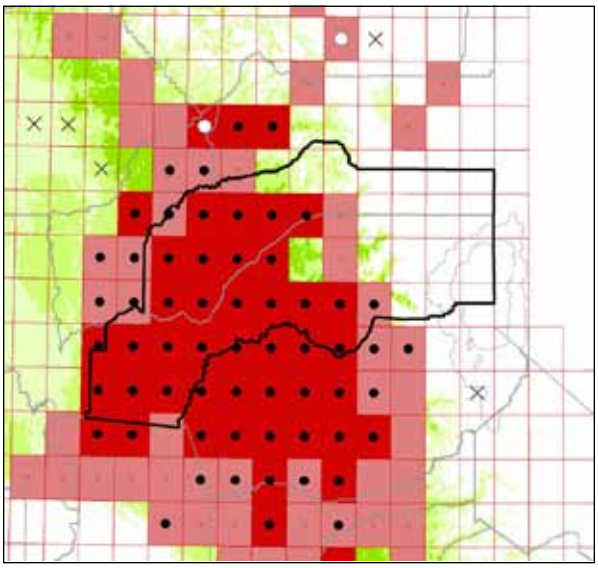
musk thistle (*Carduus nutans*)



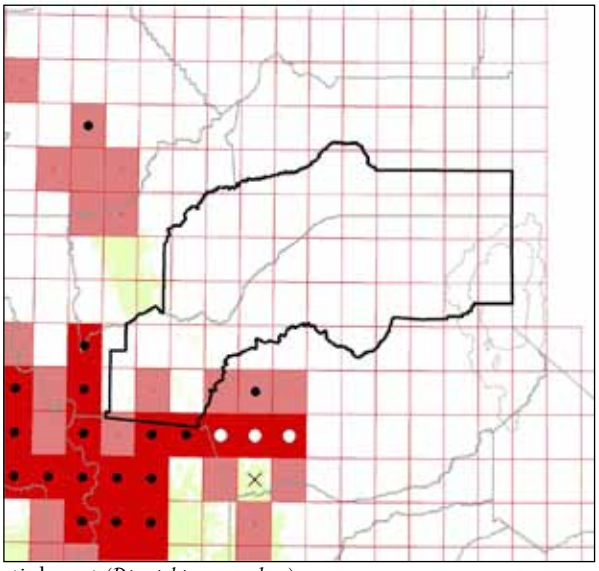
spotted knapweed (*Centaurea maculosa*)



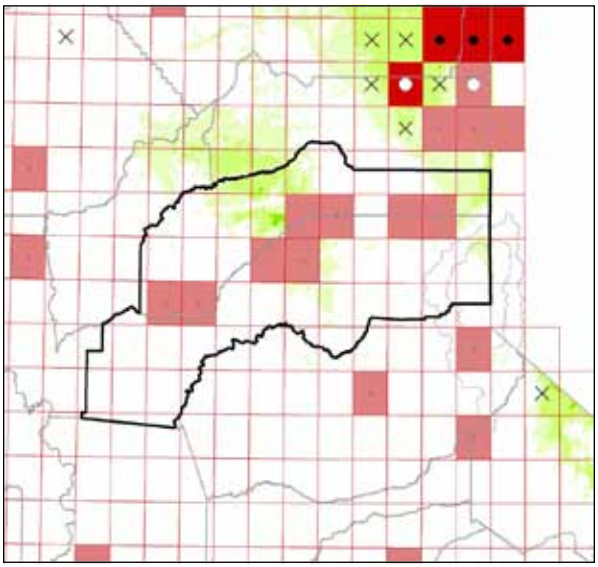
yellow starthistle (*Centaurea solstitialis*)



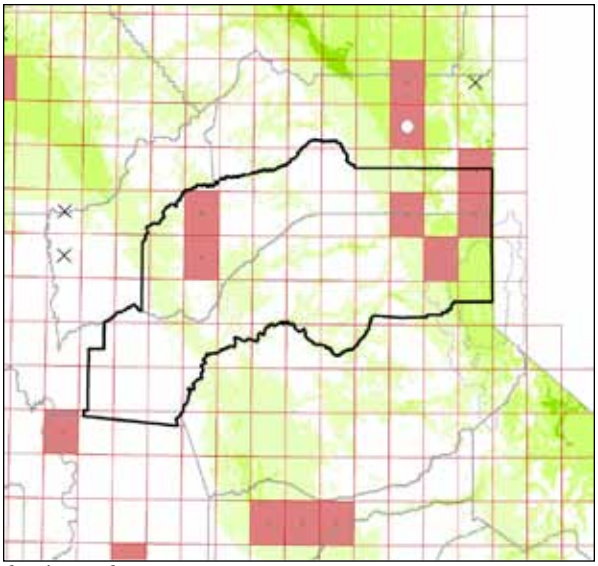
rush skeletonweed (*Chondrilla juncea*)



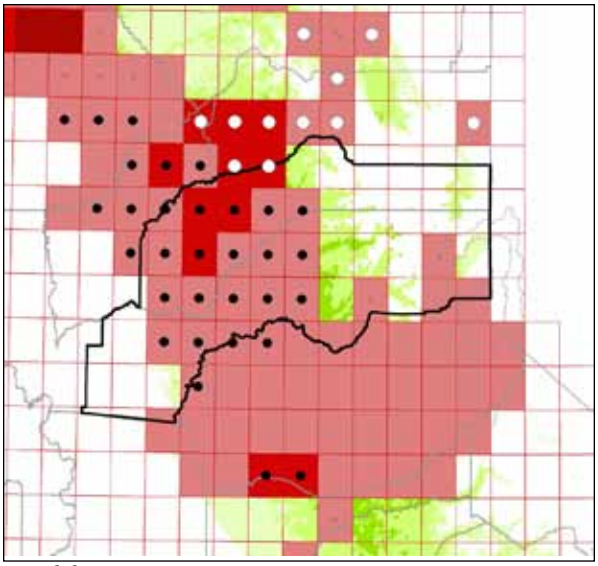
stinkwort (*Dittrichia graveolens*)



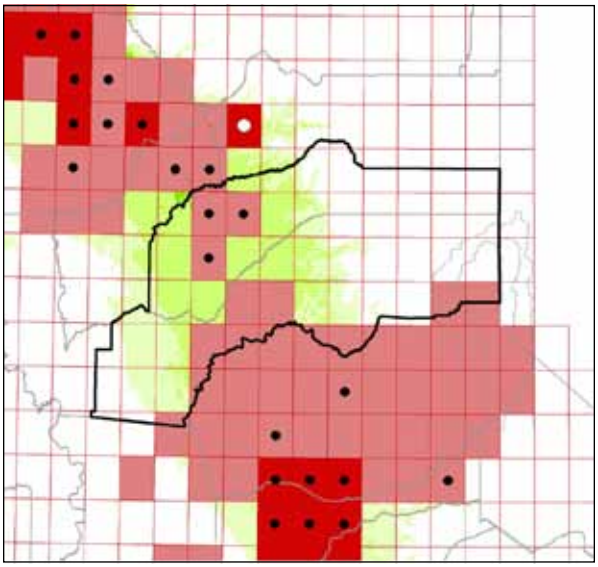
Scotch thistle (*Onopordum acanthium*)



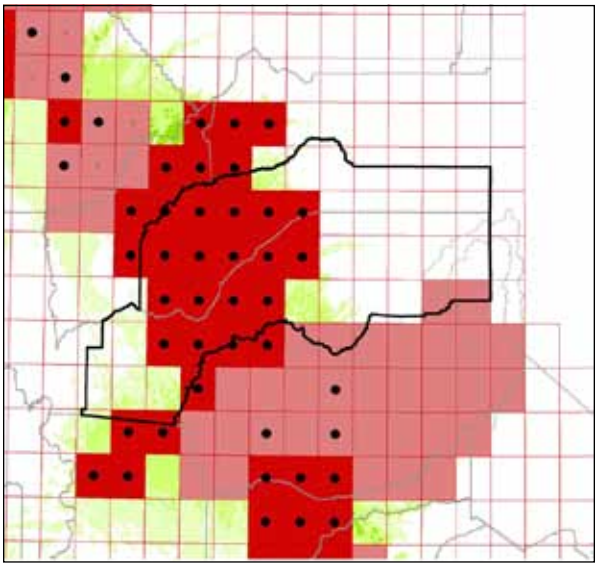
dyer's woad (*Isatis tinctoria*)



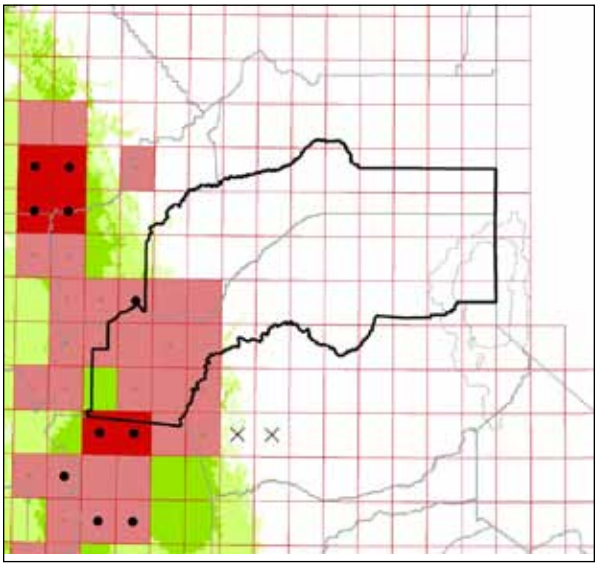
Scotch broom (*Cytisus scoparius*)



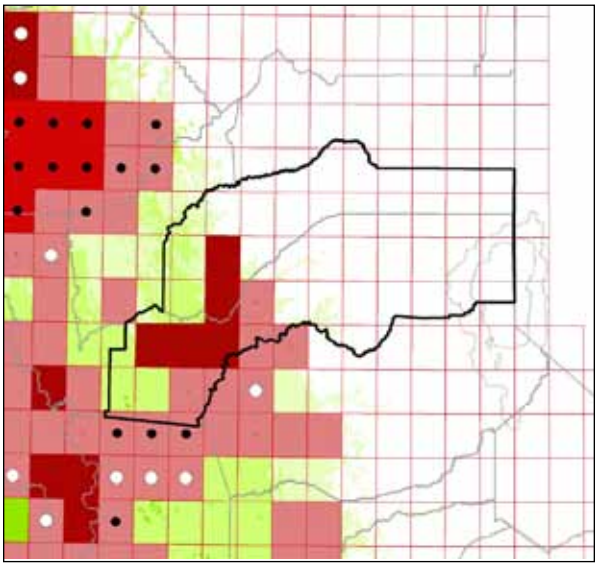
French broom (*Genista monspessulana*)



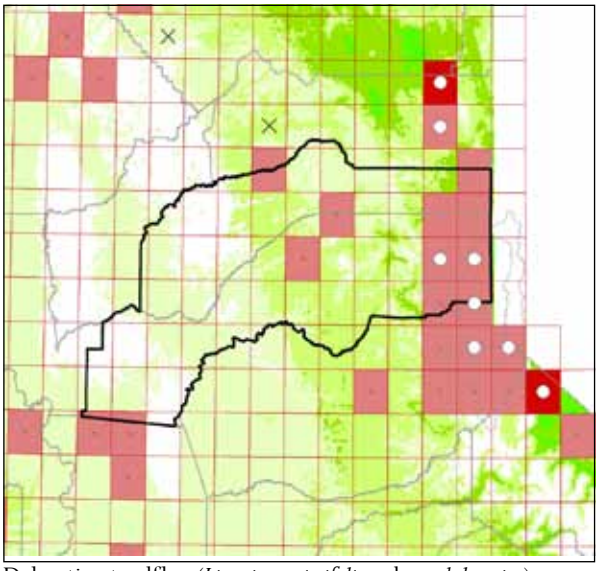
Spanish broom (*Spartium junceum*)



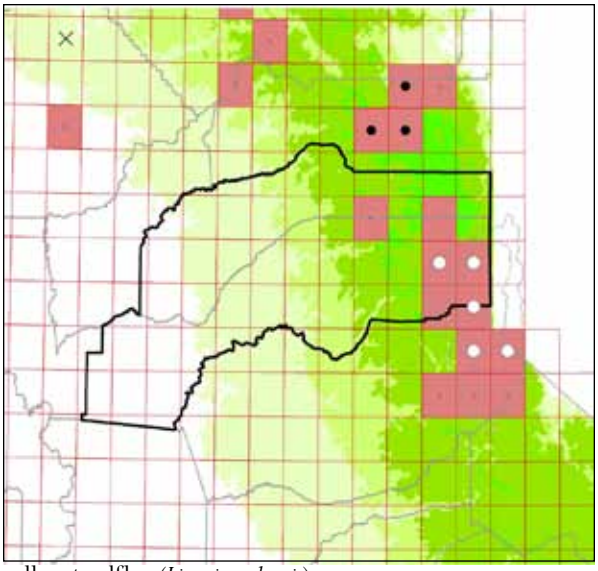
red sesbania (*Sesbania punicea*)



giant reed (*Arundo donax*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)

Management opportunities for the Nevada/Placer WMA

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
	Family Apiaceae											
	Poison-hemlock	-	M	-	51	91	0	0	0	32	3	↓
	Family Asteraceae											
●	**Russian knapweed**	**-**	**H**	**-**	**21**	**21**	**0**	**0**	**3**	**78**	**100**	**↑**
●	**Musk thistle**	**-**	**H**	**-**	**14**	**45**	**0**	**0**	**0**	**17**	**3**	**↓**
	Italian thistle & slenderflower thistle	M	M	-	48	-	97	0	0	-	-	-
	Woolly distaff thistle	M	-	-	3	67	0	0	2	1	16	↑↑
	Diffuse knapweed	-	M	-	22	23	7	0	0	70	68	-
●	**Spotted knapweed**	**-**	**H**	**-**	**43**	**51**	**4**	**0**	**3**	**75**	**75**	**-**
●	**Tocalote**	**-**	**M**	**-**	**37**	**-**	**91**	**0**	**0**	**-**	**-**	**-**
●	**Yellow starthistle**	**-**	**H**	**-**	**79**	**79**	**52**	**0**	**0**	**89**	**99**	**-**
●	**Rush skeletonweed**	**-**	**H**	**-**	**67**	**78**	**91**	**0**	**0**	**76**	**100**	**↑**
	Canada thistle	-	M	-	16	22	0	0	6	60	22	↓
	Bull thistle	-	L	-	100	100	92	0	0	96	100	-
●	**Stinkwort**	**-**	**-**	**M**	**10**	**40**	**50**	**17**	**0**	**4**	**19**	**↑↑**
	Ox-eye daisy	-	M	-	49	59	0	0	0	61	30	↓
●	**Scotch thistle**	**-**	**H**	**-**	**13**	**24**	**0**	**0**	**0**	**19**	**41**	**↑↑**
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	-	M	-	19	-	0	0	0	-	-	-
●	**Dyer's woad**	**H**	**-**	**-**	**10**	**12**	**0**	**0**	**0**	**40**	**16**	**↓**
	Charlock mustard	-	-	L	2	-	0	0	0	-	-	-

	FAMIY DIPSACACEAE											
	Common teasel & fuller's teasel	-	M	-	21	28	23	0	0	45	33	↓
	FAMILY FABACEAE											
●	**Scotch broom**	**-**	**H**	**-**	**59**	**67**	**76**	**14**	**0**	**61**	**99**	**↑**
●	**French broom**	**-**	**H**	**-**	**29**	**39**	**28**	**0**	**0**	**55**	**73**	**↑**
●	**Spanish broom**	**-**	**H**	**-**	**51**	**68**	**81**	**0**	**0**	**54**	**79**	**↑**
	Black locust	-	L	-	56	-	0	0	0	-	-	-
●	**Red sesbania**	**-**	**H**	**-**	**24**	**68**	**20**	**0**	**0**	**27**	**40**	**↑**
	Gorse	-	M	-	5	100	0	0	2	0	48	↑↑
	FAMILY POACEAE											
●	**Giant reed**	**-**	**H**	**-**	**24**	**43**	**20**	**0**	**0**	**40**	**58**	**↑**
	Annual false-brome	-	M	-	18	33	55	0	0	38	39	-
	Japanese brome	-	L	-	10	-	0	0	0	-	-	-
	Red brome	-	M	-	62	98	10	0	0	50	44	-
	Jubatagrass	-		M	14	-	0	0	0	-	-	-
	Pampasgrass	-	M	-	40	100	0	0	0	11	35	↑↑
	Orchardgrass	-	L	-	100	100	0	0	0	100	100	-
	Common velvet grass	-	M	-	41	41	15	0	0	77	93	↑
	Mediterranean barley	-	M	-	57	-	0	0	0	-	-	-
	Hare barley	-	M	-	56	-	0	0	0	-	-	-
	Italian ryegrass	M	-	-	44	67	86	0	0	46	44	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	M	-	-	2	-	0	0	0	-	-	-
	Giant knotweed	-	-	L	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**-**	**H**	**-**	**19**	**19**	**25**	**25**	**0**	**79**	**90**	**-**
●	**Yellow toadflax**	**-**	**H**	**-**	**10**	**12**	**50**	**50**	**0**	**70**	**100**	**↑**
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	M	-	57	75	94	3	0	57	68	↑
	FAMILY SOLANACEAE											
	Tree tobacco	-	-	M	3	17	0	0	0	10	4	↓

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

These recommendations focus on terrestrial species and do not address aquatic invasive plants in the LTBWCG.

Eradication is recommended for species that have limited occurrence within the WMA. Of the species examined, the following are priority eradication opportunities for the Lake Tahoe Basin:

Russian knapweed (*Acroptilon repens*)

yellow starthistle (*Centaurea solstitialis*)

Scotch thistle (*Onopordum acanthium*) – GIS data indicates presence in a couple of quads

dyer's woad (*Isatis tinctoria*)

tree-of-heaven (*Ailanthus altissima*)

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for LTBWCG:

musk thistle (*Carduus nutans*)

spotted knapweed (*Centaurea maculosa*)

Scotch broom (*Cytisus scoparius*)

French broom (*Genista monspessulana*)

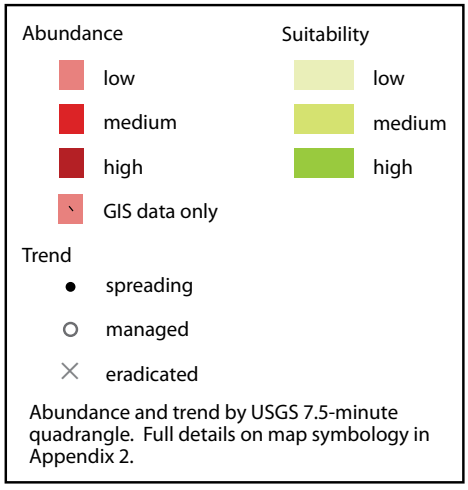
Spanish broom (*Spartium junceum*)

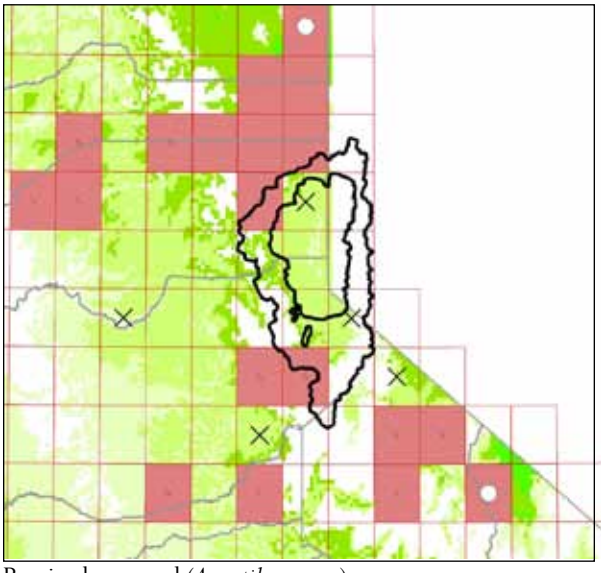
Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

yellow toadflax (*Linaria vulgaris*)

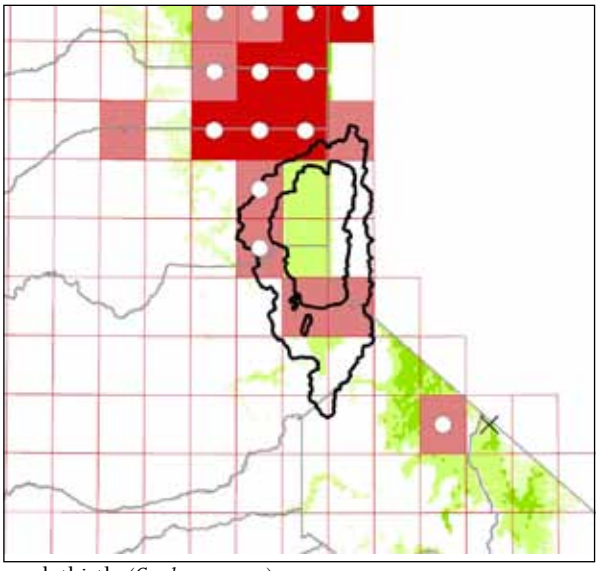
Surveillance is recommended to prevent spread into the WMA:

rush skeletonweed (*Chondrilla juncea*) – spreading just west of the Basin

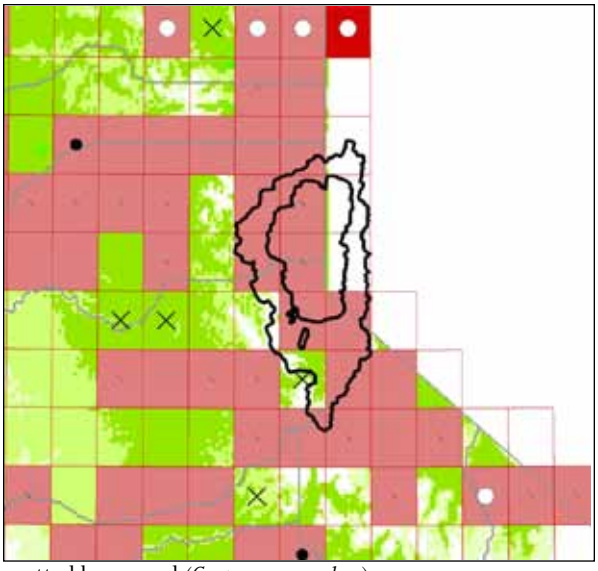




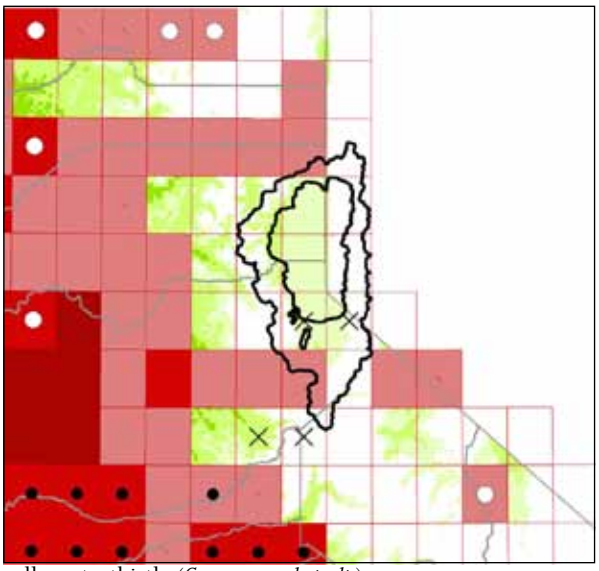
Russian knapweed (*Acroptilon repens*)



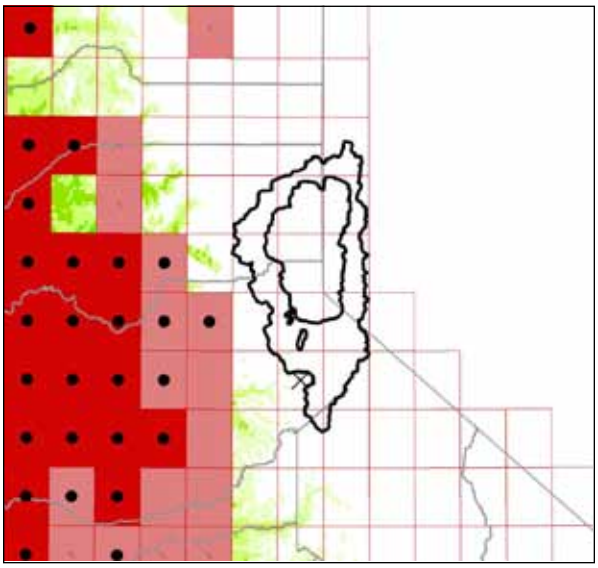
musk thistle (*Carduus nutans*)



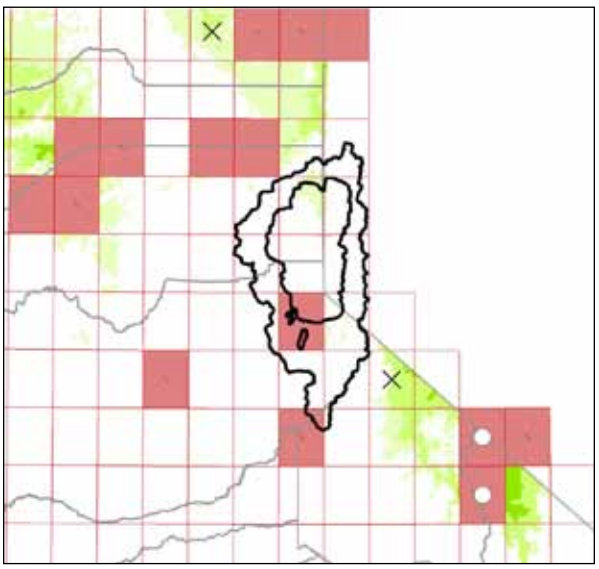
spotted knapweed (*Centaurea maculosa*)



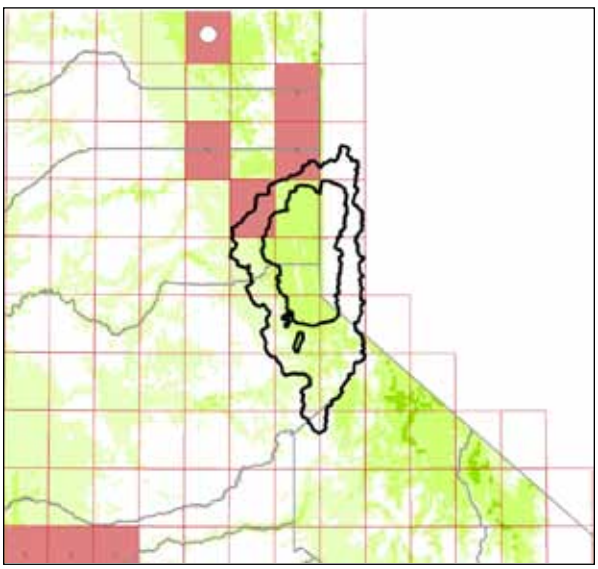
yellow starthistle (*Centaurea solstitalis*)



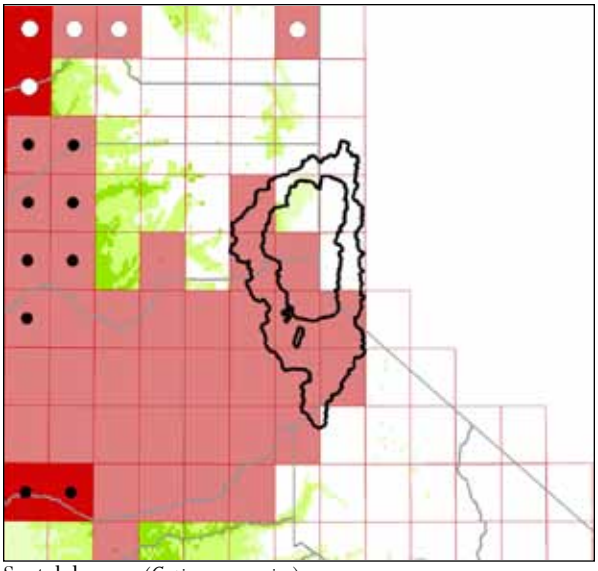
rush skeletonweed (*Chondrilla juncea*)



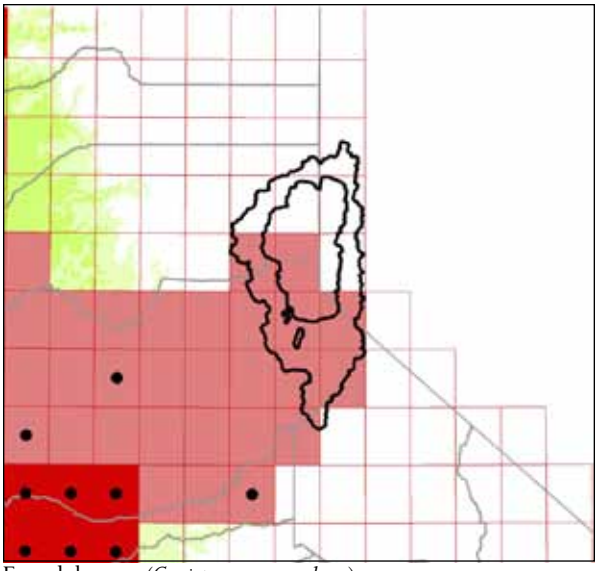
Scotch thistle (*Onopordum acanthium*)



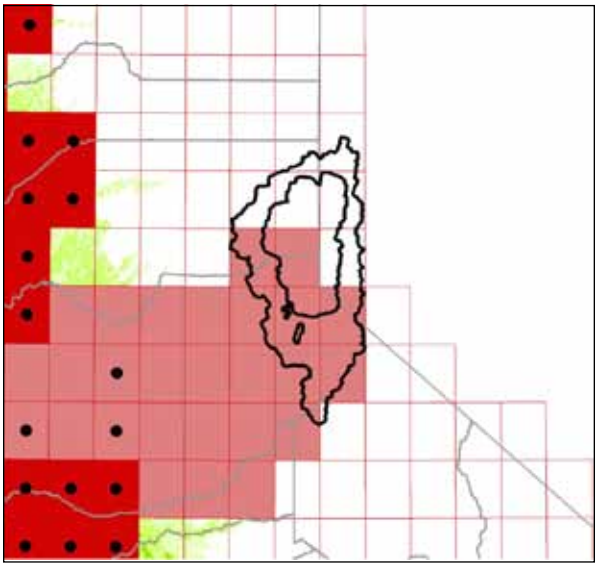
dyer's woad (*Isatis tinctoria*)



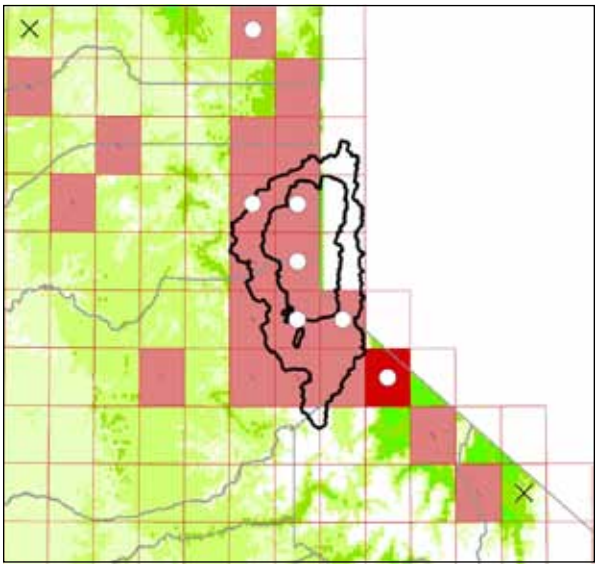
Scotch broom (*Cytisus scoparius*)



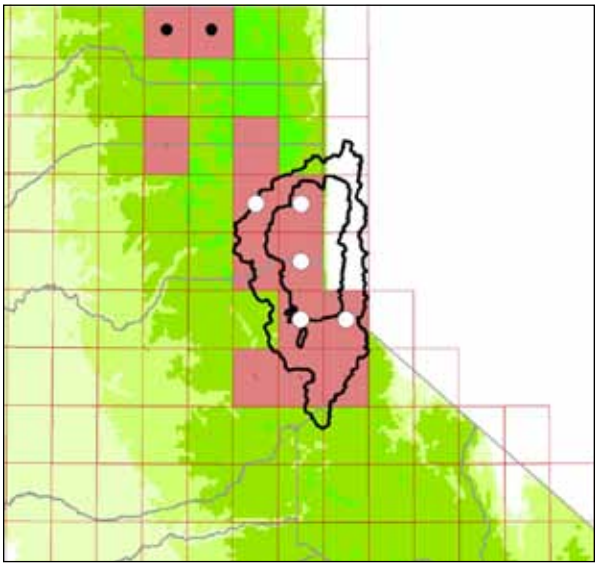
French broom (*Genista monspessulana*)



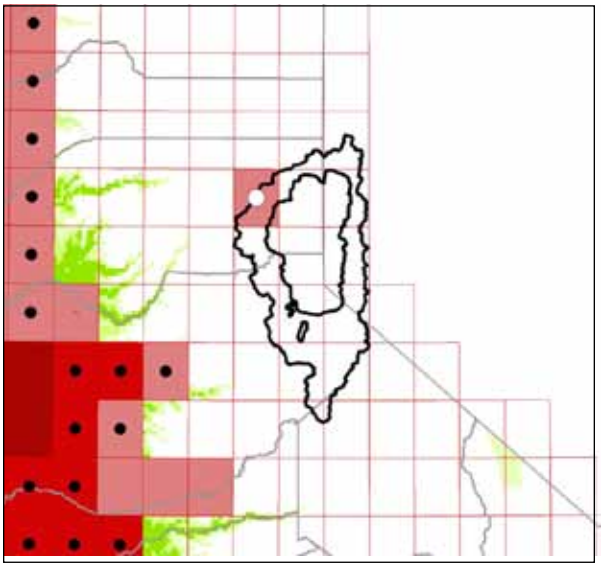
Spanish broom (*Spartium junceum*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)



tree-of-heaven (*Ailanthus altissima*)

Management opportunities for the Lake Tahoe Basin Weed Coordinating Group

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
	Family Apiaceae											
	Poison-hemlock	-	M	-	11	100	0	0	0	1	7	↑↑
	Family Asteraceae											
●	**Russian knapweed**	**H**	**-**	**-**	**22**	**27**	**0**	**0**	**17**	**62**	**99**	**↑**
●	**Musk thistle**	**-**	**H**	**-**	**33**	**40**	**0**	**0**	**0**	**46**	**5**	**↓**
	Italian thistle & slenderflower thistle	-	-	M	0	-	-	-	0	-	-	-
	Woolly distaff thistle	-	-	L	0	-	-	-	0	0	0	-
	Diffuse knapweed	-	M	-	50	60	0	0	17	88	100	-
●	**Spotted knapweed**	**-**	**H**	**-**	**67**	**80**	**0**	**0**	**6**	**79**	**100**	**↑**
	Tocalote	-	-	M	0	-	-	-	0	-	-	-
●	**Yellow starthistle**	**H**	**-**	**-**	**22**	**27**	**0**	**0**	**17**	**50**	**80**	**↑**
●	**Rush skeletonweed**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**6**	**4**	**97**	**↑↑**
	Canada thistle	-	M	-	44	47	0	0	0	87	82	-
	Bull thistle	-	L	-	94	94	65	0	0	78	99	↑
	Stinkwort	-	-	L	0	-	-	-	0	0	20	-
	Ox-eye daisy	-	M	-	50	53	22	0	0	76	82	-
●	**Scotch thistle**	**H**	**-**	**-**	**11**	**29**	**0**	**0**	**6**	**10**	**31**	**↑↑**
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	M	-	-	11	-	0	0	0	-	-	-
●	**Dyer's woad**	**H**	**-**	**-**	**11**	**13**	**0**	**0**	**0**	**74**	**59**	**↓**
	Charlock mustard	-	-	L	0	-	-	-	0	-	-	-
	Famiy Dipsacaceae											
	Common teasel & fuller's teasel	M	-	-	11	100	100	50	0	1	0	-
	Family Fabaceae											
●	**Scotch broom**	**-**	**H**	**-**	**56**	**71**	**0**	**0**	**0**	**21**	**90**	**↑↑**
●	**French broom**	**-**	**H**	**-**	**50**	**-**	**0**	**0**	**0**	**0**	**1**	**-**
●	**Spanish broom**	**-**	**H**	**-**	**50**	**-**	**0**	**0**	**0**	**0**	**26**	**-**
	Black locust	-	-	L	0	-	-	-	0	-	-	-
	Red sesbania	-	-	-	0	-	-	-	0	0	0	-
	Gorse	-	-	L	0	-	-	-	0	0	0	-
	Family Poaceae											
	Giant reed	-	-	L	0	-	-	-	0	0	0	-
	Annual false-brome	-	-	L	0	-	-	-	0	0	0	-
	Japanese brome	-	-	L	0	-	-	-	0	-	-	-
	Red brome	-	M	-	78	100	0	0	0	3	2	-
	Jubatagrass	-	M	-	6	-	0	0	0	-	-	-
	Pampasgrass	-	M	-	6	-	0	0	0	0	0	-

	Orchardgrass	-	L	-	72	87	0	0	0	92	100	-
	Common velvet grass	-	-	M	22	27	50	0	0	43	70	↑
	Mediterranean barley	-	-	M	0	-	-	-	0	-	-	-
	Hare barley	-	-	M	0	-	-	-	0	-	-	-
	Italian ryegrass	-	-	M	0	0	NA	NA	0	0	0	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**-**	**H**	**-**	**67**	**80**	**50**	**50**	**0**	**79**	**100**	**↑**
●	**Yellow toadflax**	**-**	**H**	**-**	**50**	**60**	**56**	**56**	**0**	**99**	**100**	**-**
	FAMILY SIMAROUBACEAE											
●	**Tree-of-heaven**	**H**	**-**	**-**	**6**	**100**	**0**	**100**	**0**	**0**	**7**	**↑↑**
	FAMILY SOLANACEAE											
	Tree tobacco	-	-	L	0	-	-	-	0	0	0	-

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

Eradication is recommended for species that have limited occurrence within the WMA. Of the species examined, the following are priority eradication opportunities for El Dorado WMA:

Russian knapweed (*Acroptilon repens*)

musk thistle (*Carduus nutans*)

Scotch thistle (*Onopordum acanthium*) – GIS data indicates presence in a couple of quads

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for El Dorado WMA:

spotted knapweed (*Centaurea maculosa*) – GIS data indicates scattered throughout county

yellow starthistle (*Centaurea solstitialis*) – prevent spread to higher elevations as part of YST Leading Edge Project

rush skeletonweed (*Chondrilla juncea*)

stinkwort (*Dittrichia graveolens*)

Scotch broom (*Cytisus scoparius*)

French broom (*Genista monspessulana*)

Spanish broom (*Spartium junceum*)

red sesbania (*Sesbania punicea*) – GIS data shows presence at the western edge of the county

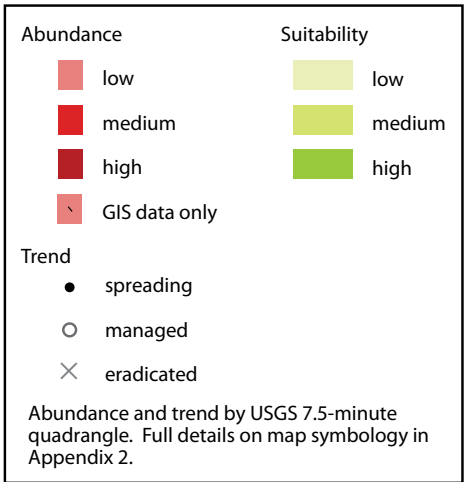
giant reed (*Arundo donax*)

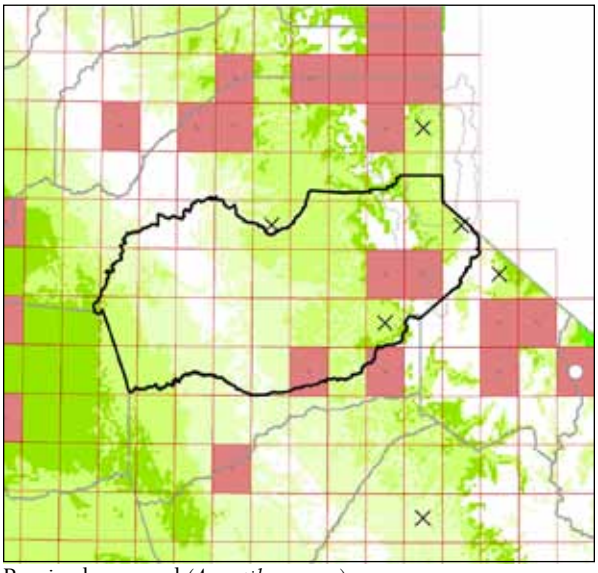
Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

yellow toadflax (*Linaria vulgaris*)

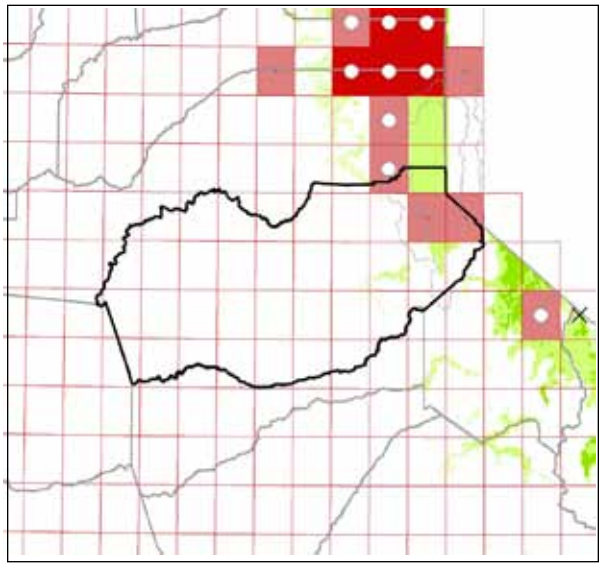
Surveillance is recommended to prevent spread into El Dorado WMA:

dyer's woad (*Isatis tinctoria*) – GIS data indicate presence to the south

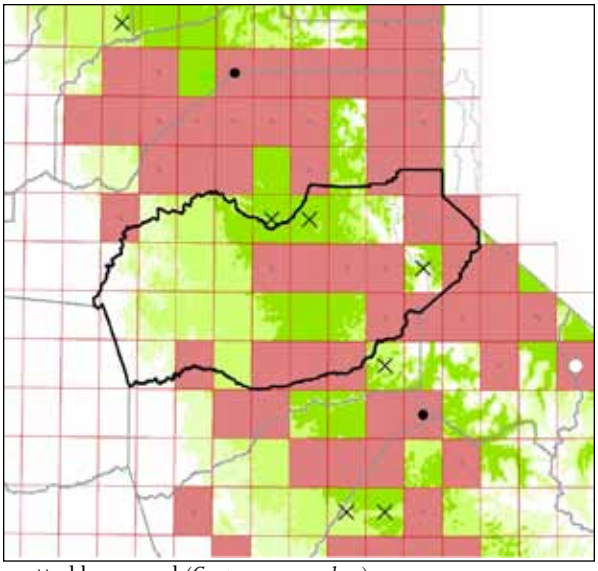




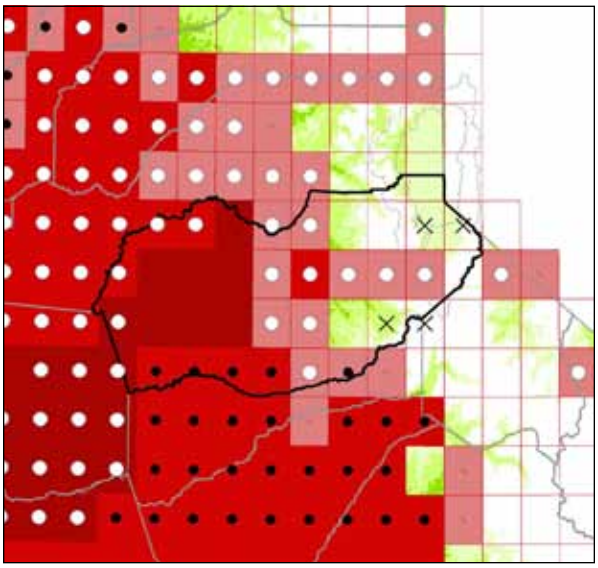
Russian knapweed (*Acroptilon repens*)



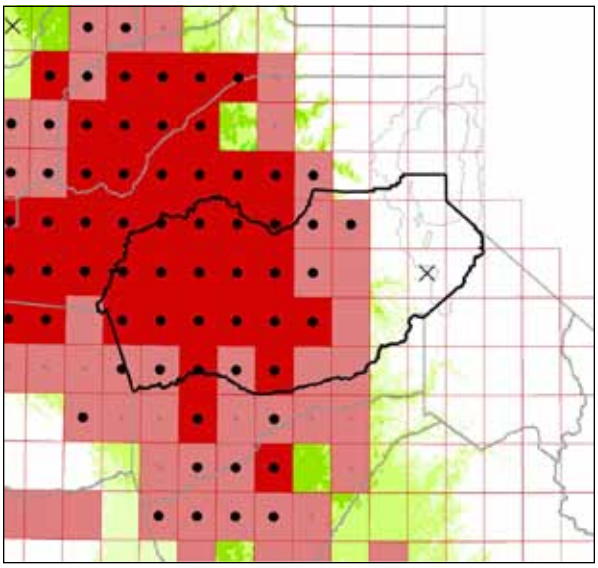
musk thistle (*Carduus nutans*)



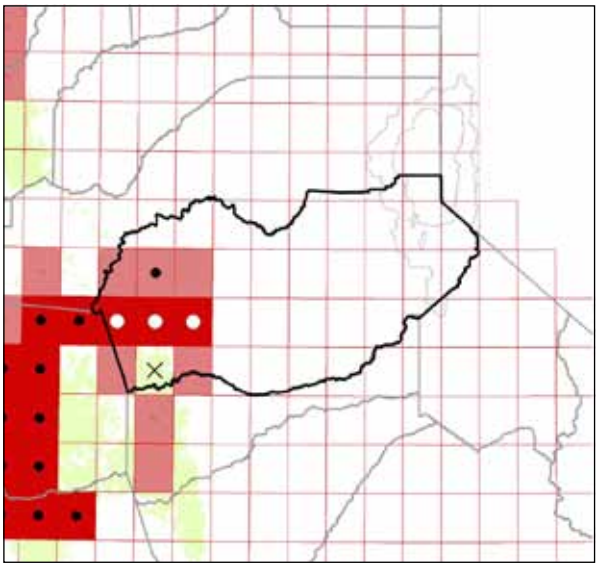
spotted knapweed (*Centaurea maculosa*)



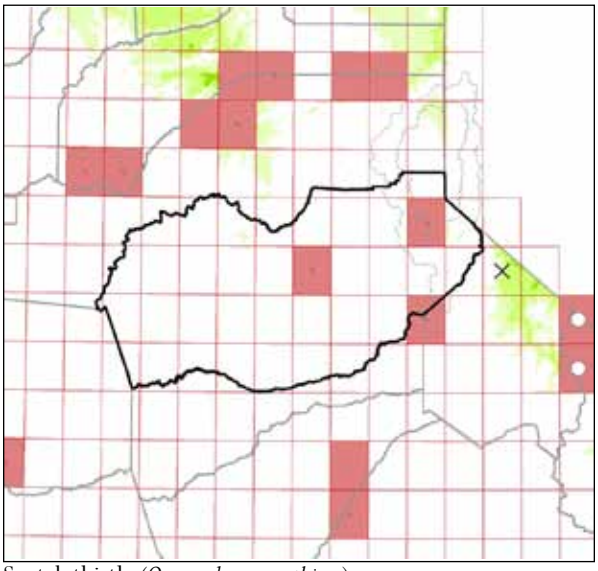
yellow starthistle (*Centaurea solstitialis*)



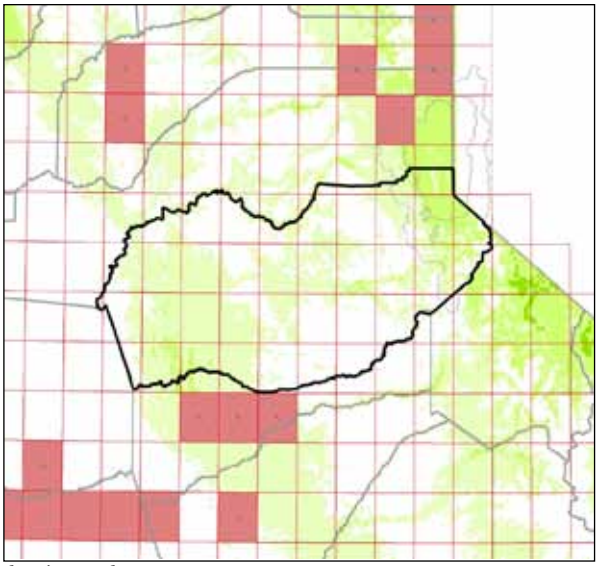
rush skeletonweed (*Chondrilla juncea*)



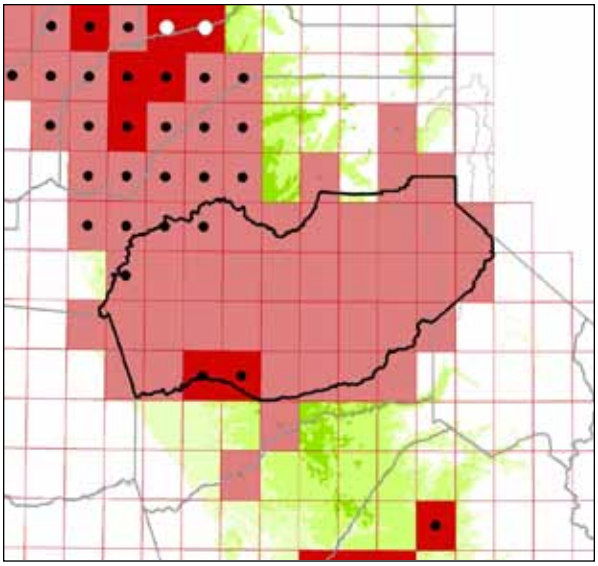
stinkwort (*Dittrichia graveolens*)



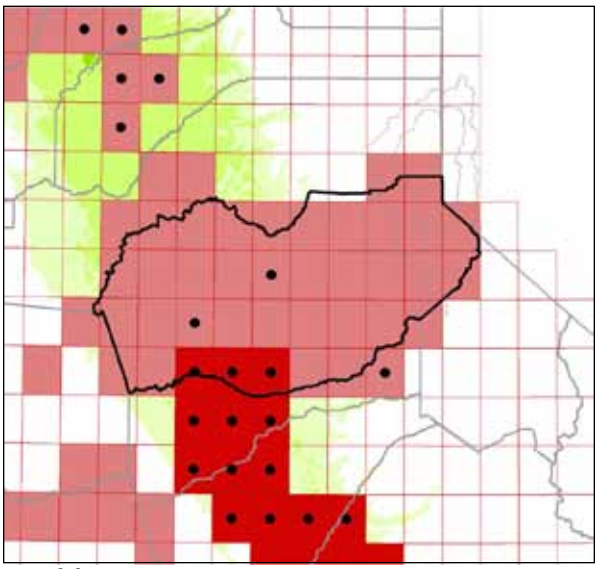
Scotch thistle (*Onopordum acanthium*)



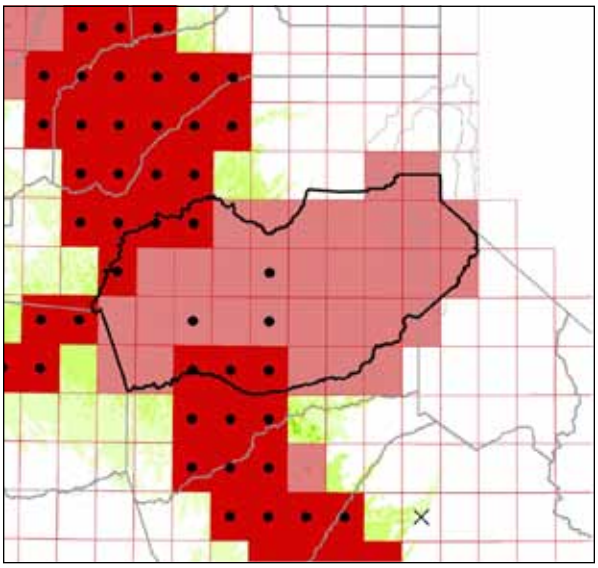
dyer's woad (*Isatis tinctoria*)



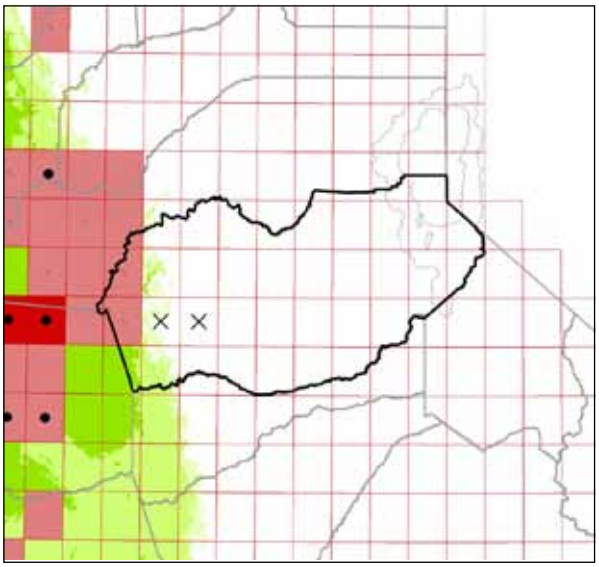
Scotch broom (*Cytisus scoparius*)



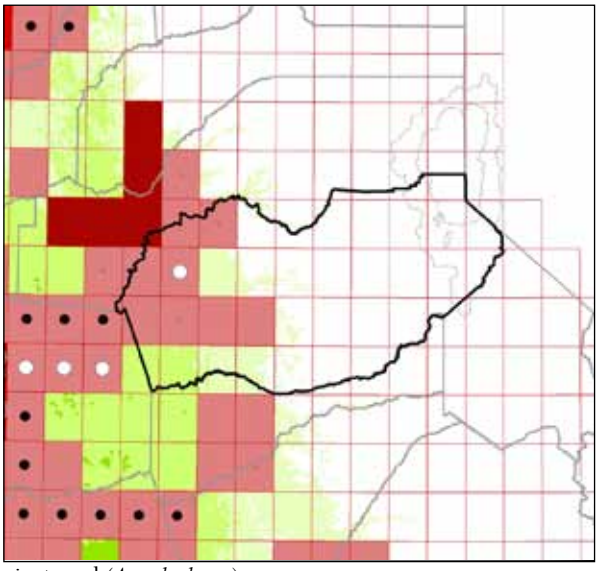
French broom (*Genista monspessulana*)



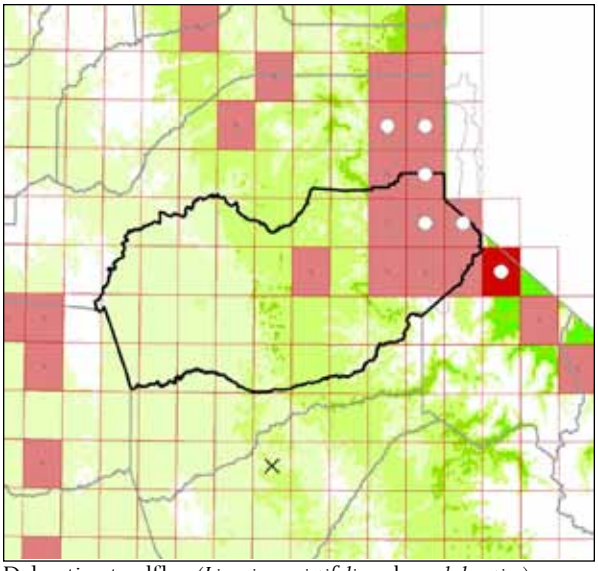
Spanish broom (*Spartium junceum*)



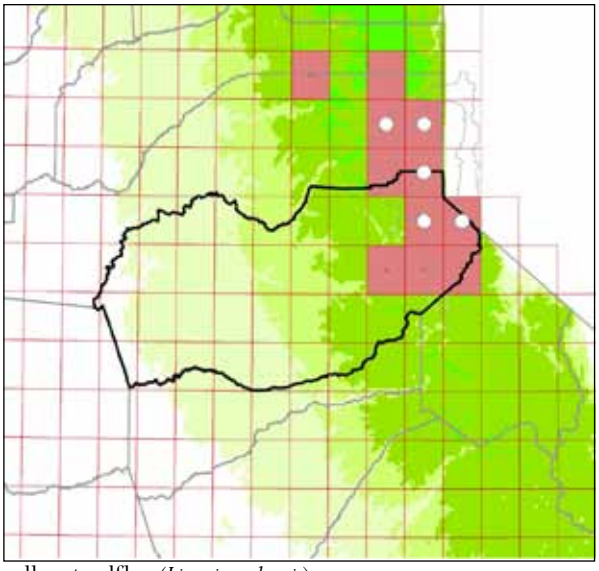
red sesbania (*Sesbania punicea*)



giant reed (*Arundo donax*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)

Management opportunities for the El Dorado WMA

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
	Family Apiaceae											
	Poison-hemlock	-	M	-	24	58	0	0	0	23	5	↓
	Family Asteraceae											
●	**Russian knapweed**	**H**	**-**	**-**	**9**	**9**	**0**	**0**	**7**	**77**	**100**	↑
●	**Musk thistle**	**H**	**-**	**-**	**7**	**20**	**0**	**0**	**0**	**8**	**0**	↓
	Italian thistle & slenderflower thistle	-	M	-	24	-	100	0	0	-	-	-
	Woolly distaff thistle	-	-	M	0	-	-	-	0	0	17	-
	Diffuse knapweed	-	M	-	28	29	0	0	7	90	72	↓
●	**Spotted knapweed**	**-**	**H**	**-**	**44**	**46**	**0**	**0**	**9**	**84**	**83**	**-**
●	**Tocalote**	**-**	**M**	**-**	**26**	**-**	**42**	**0**	**0**	**-**	**-**	**-**
●	**Yellow starthistle**	**-**	**H**	**-**	**72**	**73**	**36**	**0**	**9**	**86**	**94**	**-**
●	**Rush skeletonweed**	**-**	**H**	**-**	**70**	**82**	**84**	**0**	**2**	**74**	**100**	↑
	Canada thistle	-	M	-	26	34	0	0	0	50	20	↓
	Bull thistle	-	L	-	98	98	93	0	0	94	100	-
●	**Stinkwort**	**-**	**M**	**-**	**20**	**100**	**56**	**33**	**2**	**3**	**33**	↑↑
	Ox-eye daisy	-	M	-	39	41	56	0	0	75	36	↓
●	**Scotch thistle**	**H**	**-**	**-**	**7**	**43**	**0**	**0**	**0**	**1**	**48**	↑↑
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	M	-	-	7	-	0	0	0	-	-	-
●	**Dyer's woad**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**0**	**49**	**19**	↓
	Charlock mustard	-	-	L	0	-	-	-	0	-	-	-

	FAMILY DIPSACACEAE											
	Common teasel & fuller's teasel	-	M	-	15	25	14	14	2	40	25	↓
	FAMILY FABACEAE											
●	**Scotch broom**	**-**	**H**	**-**	**94**	**98**	**19**	**0**	**0**	**75**	**97**	↑
●	**French broom**	**-**	**H**	**-**	**89**	**100**	**15**	**0**	**0**	**53**	**70**	↑
●	**Spanish broom**	**-**	**H**	**-**	**89**	**100**	**29**	**0**	**0**	**56**	**76**	↑
	Black locust	-	L	-	22	-	0	0	0	-	-	-
●	**Red sesbania**	**-**	**H**	**-**	**9**	**40**	**0**	**0**	**4**	**15**	**42**	↑↑
	Gorse	-	-	L	0	-	-	-	0	0	38	-
	FAMILY POACEAE											
●	**Giant reed**	**-**	**H**	**-**	**22**	**42**	**10**	**0**	**0**	**35**	**51**	↑
	Annual false-brome	-	M	-	22	46	100	0	0	35	35	-
	Japanese brome	-	L	-	11	-	0	0	0	-	-	-
	Red brome	-	M	-	94	100	9	0	0	41	25	↓
	Jubatagrass	-	M	-	13	-	0	0	0	-	-	-
	Pampasgrass	-	M	-	24	100	0	0	0	8	26	↑↑
	Orchardgrass	-	L	-	91	93	0	0	0	98	100	-
	Common velvet grass	-	M	-	54	56	56	0	0	78	88	-
	Mediterranean barley	-	M	-	28	-	0	0	4	-	-	-
	Hare barley	-	M	-	30	-	21	0	0	-	-	-
	Italian ryegrass	-	M	-	33	65	20	0	0	53	42	↓
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	L	2	-	0	0	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**-**	**H**	**-**	**20**	**20**	**33**	**33**	**0**	**89**	**77**	**-**
●	**Yellow toadflax**	**-**	**H**	**-**	**15**	**16**	**43**	**43**	**0**	**89**	**100**	**-**
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	M	-	52	75	67	0	0	55	65	↑
	FAMILY SOLANACEAE											
	Tree tobacco	M	-	-	4	22	0	0	0	9	1	↓

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

Eradication is recommended for species that have limited occurrence within the WMA. Of the species examined, the following are priority eradication opportunities for Alpine WMA:

Russian knapweed (*Acroptilon repens*) – GIS data indicates presence in several quads

musk thistle (*Carduus nutans*)

yellow starthistle (*Centaurea solstitialis*) – eradicate eastern populations, prevent spread from west

Scotch thistle (*Onopordum acanthium*) – GIS data indicates presence in several quads

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for Alpine WMA:

spotted knapweed (*Centaurea maculosa*) – GIS data indicates scattered throughout county

Scotch broom (*Cytisus scoparius*)

French broom (*Genista monspessulana*)

Spanish broom (*Spartium junceum*)

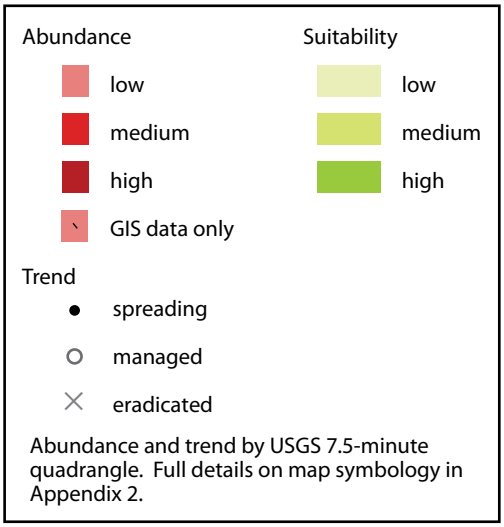
Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

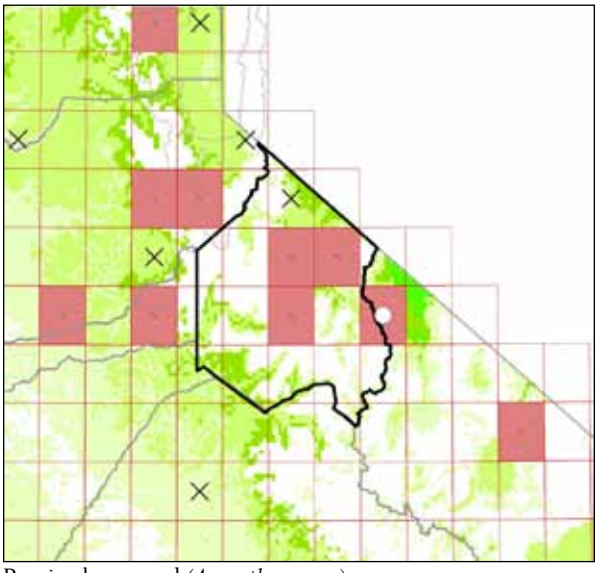
Surveillance is recommended to prevent spread into Alpine WMA:

rush skeletonweed (*Chondrilla juncea*)

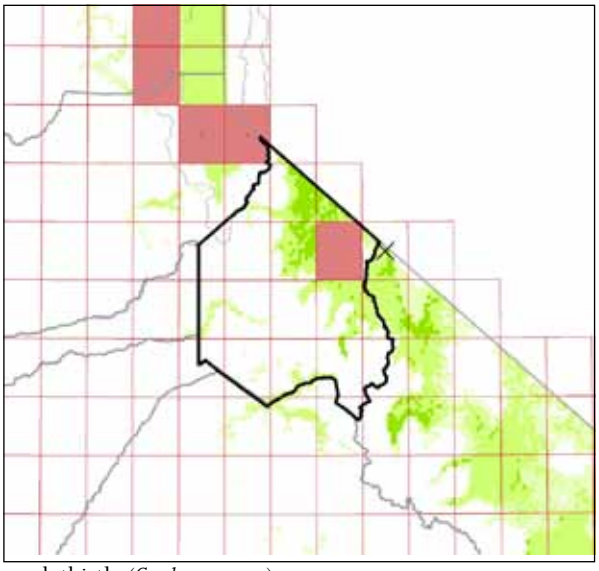
dyer's woad (*Isatis tinctoria*)

yellow toadflax (*Linaria vulgaris*) – GIS data indicates presence at northern edge of county

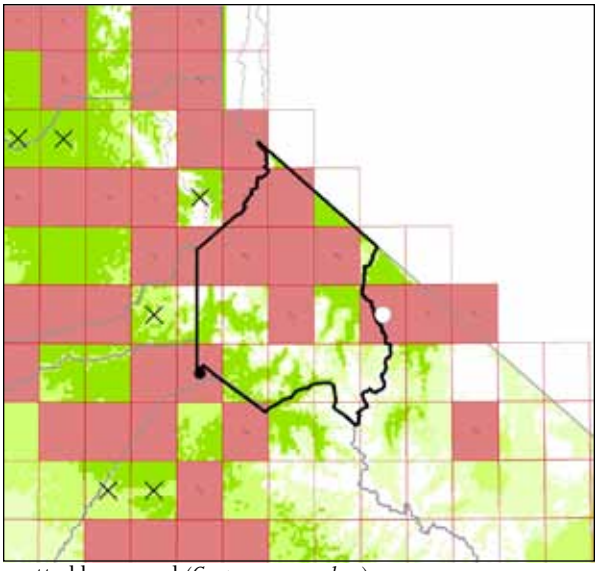




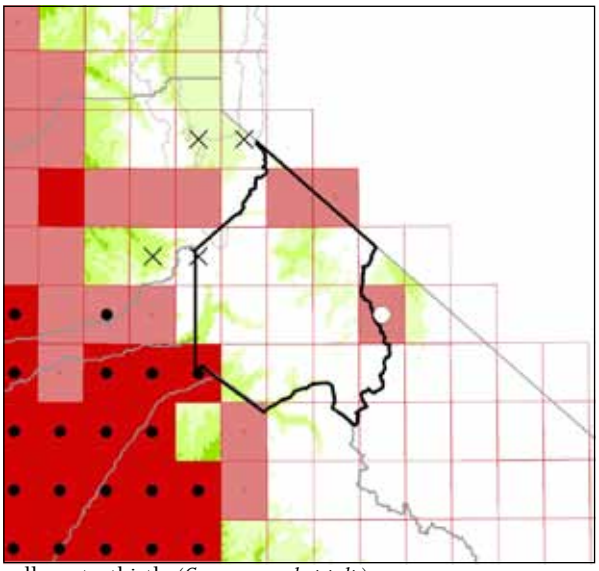
Russian knapweed (*Acroptilon repens*)



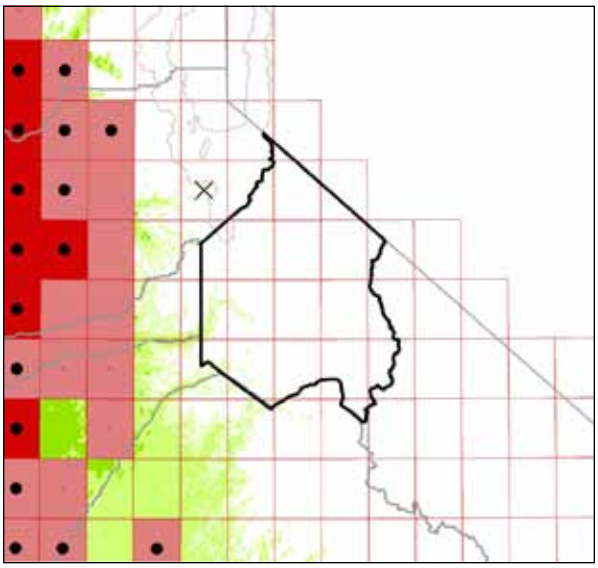
musk thistle (*Carduus nutans*)



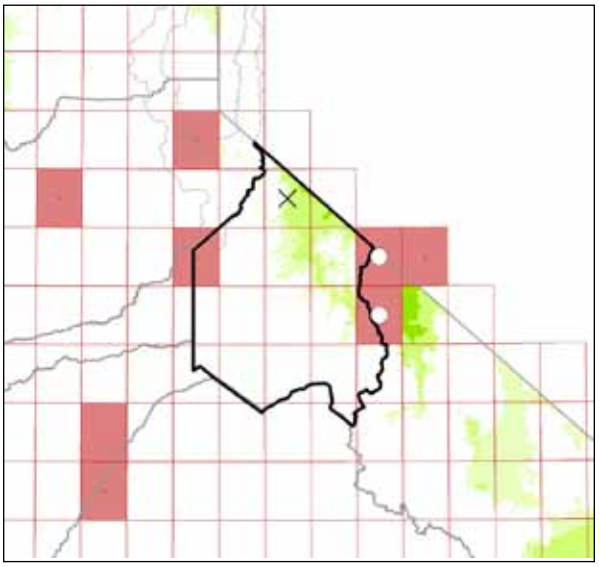
spotted knapweed (*Centaurea maculosa*)



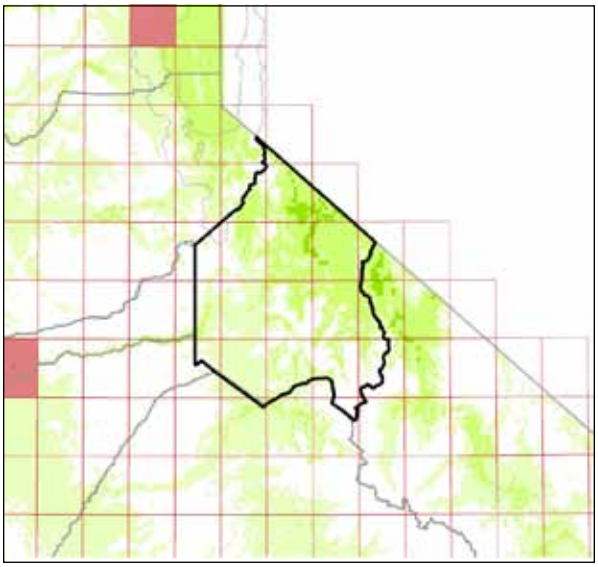
yellow starthistle (*Centaurea solstitialis*)



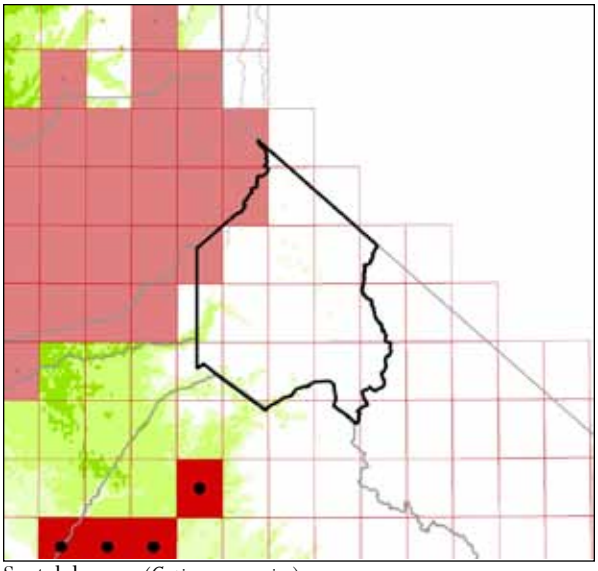
rush skeletonweed (*Chondrilla juncea*)



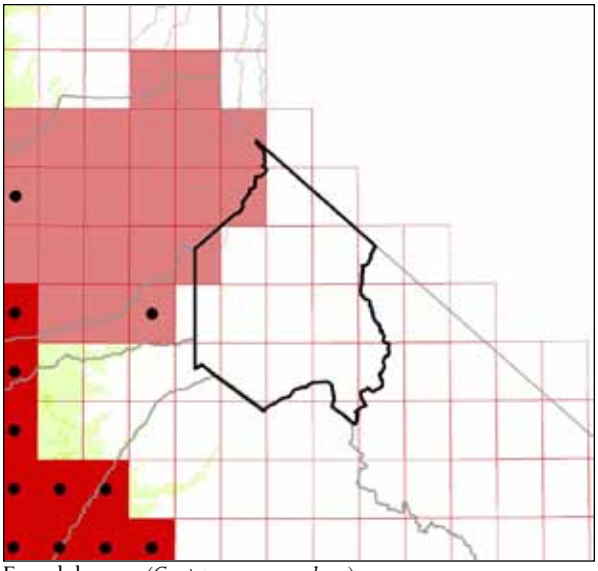
Scotch thistle (*Onopordum acanthium*)



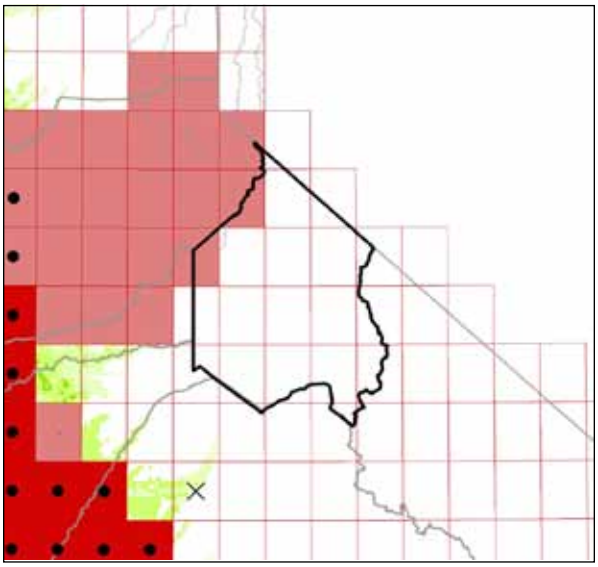
dyer's woad (*Isatis tinctoria*)



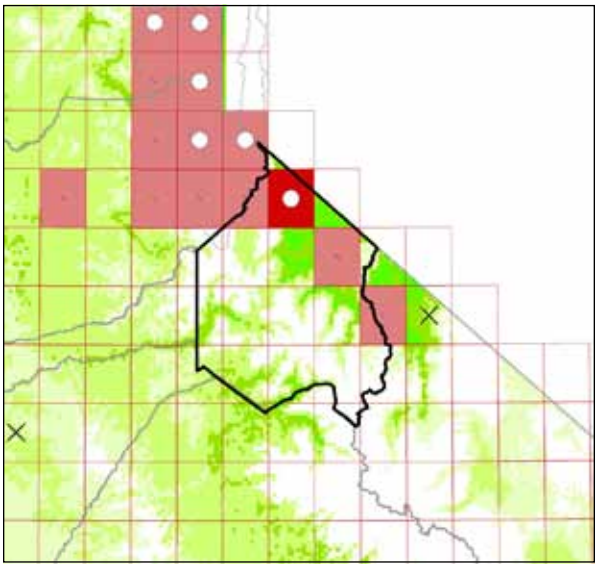
Scotch broom (*Cytisus scoparius*)



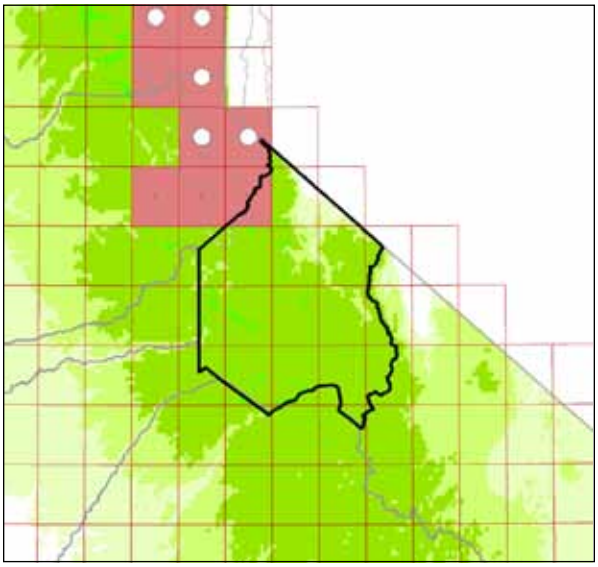
French broom (*Genista monspessulana*)



Spanish broom (*Spartium junceum*)



Dalmatian toadflax (*Linaria genistifoloria* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)

Management opportunities for Alpine Weed Management Area

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability change
	Family Apiaceae											
	Poison-hemlock	-	-	M	0	0	-	-	0	1	10	↑↑
	Family Asteraceae											
●	**Russian knapweed**	**H**	**-**	**-**	**17**	**18**	**0**	**25**	**8**	**50**	**93**	**↑**
●	**Musk thistle**	**H**	**-**	**-**	**8**	**10**	**0**	**0**	**4**	**31**	**6**	**↓**
	Italian thistle & slenderflower thistle	-	-	M	0	-	-	-	0	-	-	-
	Woolly distaff thistle	-	-	L	0	-	-	-	0	0	0	-
	Diffuse knapweed	-	M	-	42	42	0	0	8	80	100	↑
●	**Spotted knapweed**	**-**	**H**	**-**	**46**	**50**	**0**	**9**	**0**	**76**	**100**	**↑**
	Tocalote	-	-	M	0	-	-	-	0	-	-	-
●	**Yellow starthistle**	**H**	**-**	**-**	**21**	**24**	**20**	**20**	**8**	**32**	**70**	**↑↑**
●	**Rush skeletonweed**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**0**	**7**	**89**	**↑↑**
	Canada thistle	-	M	-	46	48	9	18	0	69	87	↑
	Bull thistle	-	L	-	92	100	77	0	0	64	96	↑
	Stinkwort	-	-	L	0	-	-	-	0	0	13	-
	Ox-eye daisy	-	-	M	4	5	0	0	0	53	74	↑
●	**Scotch thistle**	**H**	**-**	**-**	**13**	**25**	**0**	**67**	**4**	**15**	**16**	**-**
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	-	-	M	0	-	-	-	0	-	-	-
●	**Dyer's woad**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**0**	**67**	**65**	**-**
	Charlock mustard	-	-	L	0	-	-	-	0	-	-	-
	Famiy Dipsacaceae											
	Common teasel & fuller's teasel	-	-	M	4	17	0	100	0	2	1	-
	Family Fabaceae											
●	**Scotch broom**	**-**	**H**	**-**	**13**	**20**	**0**	**0**	**0**	**11**	**78**	**↑↑**
●	**French broom**	**-**	**H**	**-**	**13**	**100**	**0**	**0**	**0**	**0**	**2**	**↑↑**
●	**Spanish broom**	**-**	**H**	**-**	**13**	**100**	**0**	**0**	**0**	**0**	**25**	**↑↑**
	Black locust	-	-	L	0	-	-	-	0	-	-	-
	Red sesbania	-	-	-	0	-	-	-	0	0	0	-
	Gorse	-	-	-	0	-	-	-	0	0	0	-
	Family Poaceae											
	Giant reed	-	-	L	0	-	-	-	0	0	0	-
	Annual false-brome	-	-	L	0	-	-	-	0	0	0	-
	Japanese brome	L	-	-	4	-	0	0	0	-	-	-
	Red brome	-	M	-	83	100	5	0	0	5	4	↓
	Jubatagrass	-	-	M	0	-	-	-	0	-	-	-
	Pampasgrass	-	-	M	0	-	-	-	0	0	0	-
	Orchardgrass	-	L	-	75	82	0	0	0	92	97	-

	Common velvet grass	-	M	-	13	14	0	0	0	35	77	↑↑
	Mediterranean barley	-	-	M	0	-	-	-	0	-	-	-
	Hare barley	-	-	M	0	-	-	-	0	-	-	-
	Italian ryegrass	-	-	M	0	0	-	-	0	1	0	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**-**	**H**	**-**	**21**	**22**	**40**	**40**	**0**	**63**	**97**	**↑**
●	**Yellow toadflax**	**-**	**-**	**H**	**8**	**9**	**50**	**50**	**0**	**99**	**100**	**-**
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	-	M	4	20	100	0	0	1	14	↑↑
	FAMILY SOLANACEAE											
	Tree tobacco	-	-	L	0	-	-	-	0	0	0	-

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

Amador Weed Management Area

Eradication is recommended for species that have limited occurrence within the WMA. Of the species examined, the following are priority eradication opportunities for Amador WMA:

Russian knapweed (*Acroptilon repens*)

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for Amador WMA:

spotted knapweed (*Centaurea maculosa*) – GIS data indicates scattered throughout county

yellow starthistle (*Centaurea solstitialis*) – prevent spread to higher elevations as part of YST Leading Edge Project

rush skeletonweed (*Chondrilla juncea*)

dyer's woad (*Isatis tinctoria*) – GIS data indicates presence in several quads

stinkwort (*Dittrichia graveolens*)

Scotch broom (*Cytisus scoparius*)

French broom (*Genista monspessulana*)

Spanish broom (*Spartium junceum*)

giant reed (*Arundo donax*)

Surveillance is recommended to prevent spread into Amador WMA:

musk thistle (*Carduus nutans*)

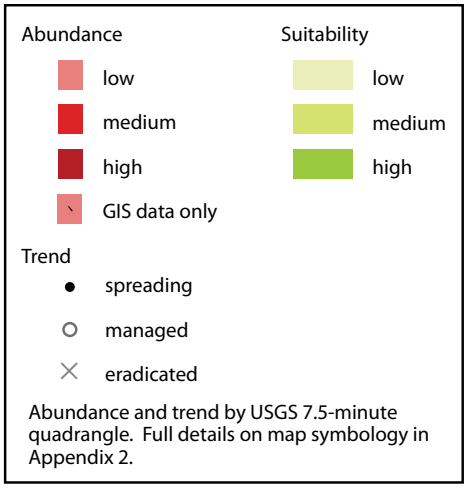
woolly distaff thistle (*Carthamus lanatus*)

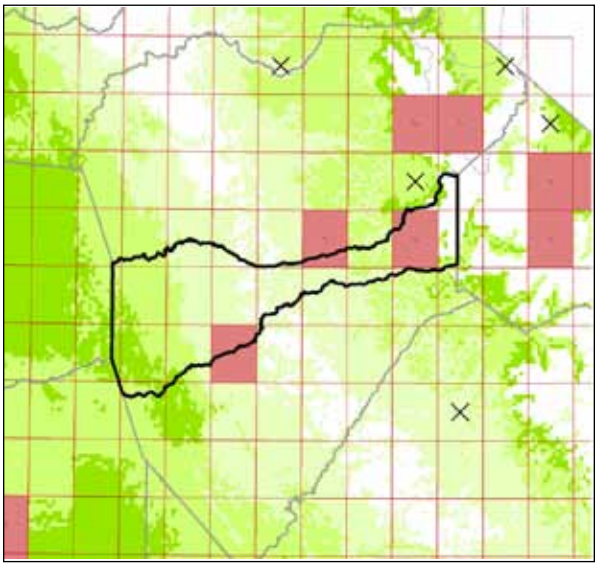
Scotch thistle (*Onopordum acanthium*) – GIS data indicates one quad at eastern edge

red sesbania (*Sesbania punicea*) – modeling indicates suitable habitat at western side, near valley populations

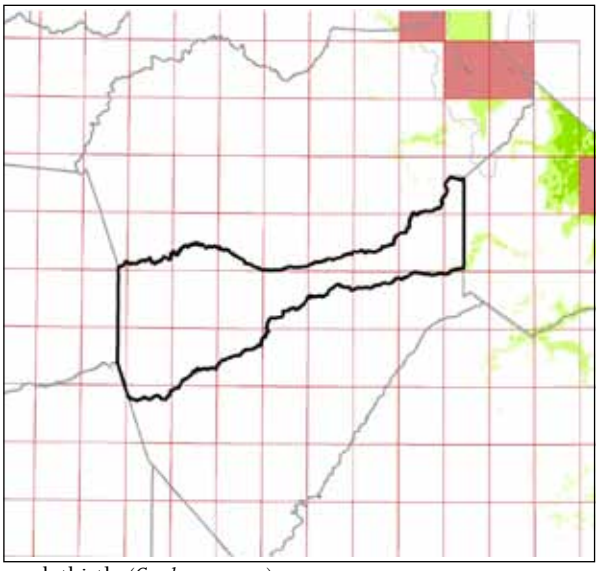
Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

yellow toadflax (*Linaria vulgaris*)

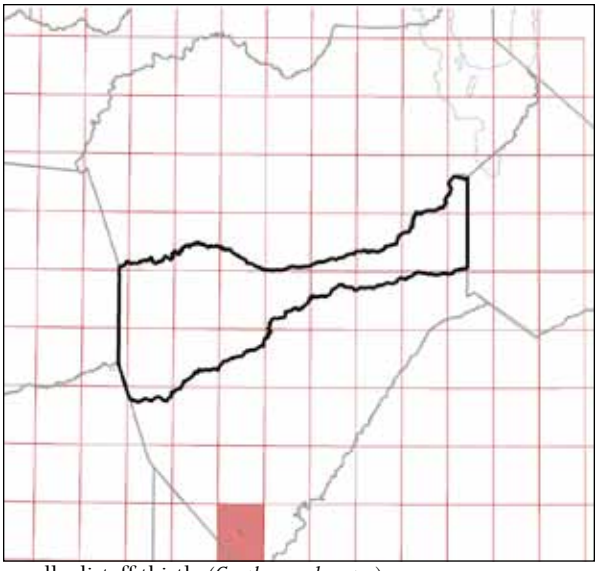




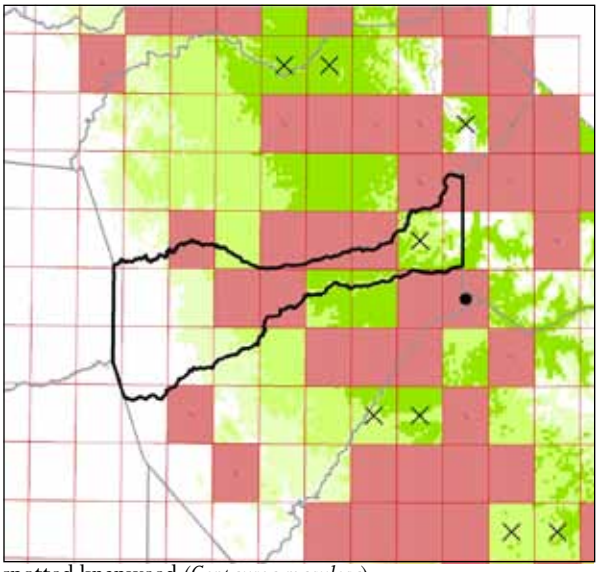
Russian knapweed (*Acroptilon repens*)



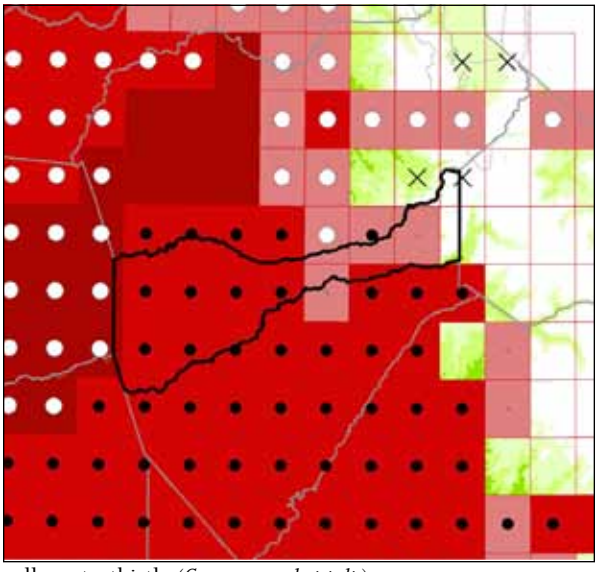
musk thistle (*Carduus nutans*)



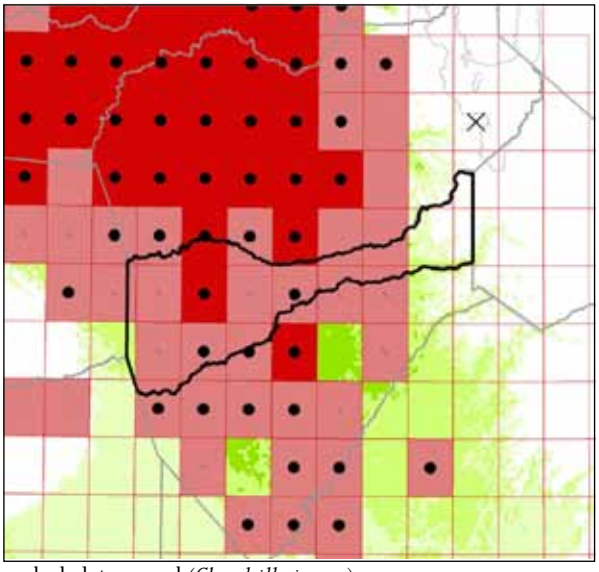
woolly distaff thistle (*Carthamus lanatus*)



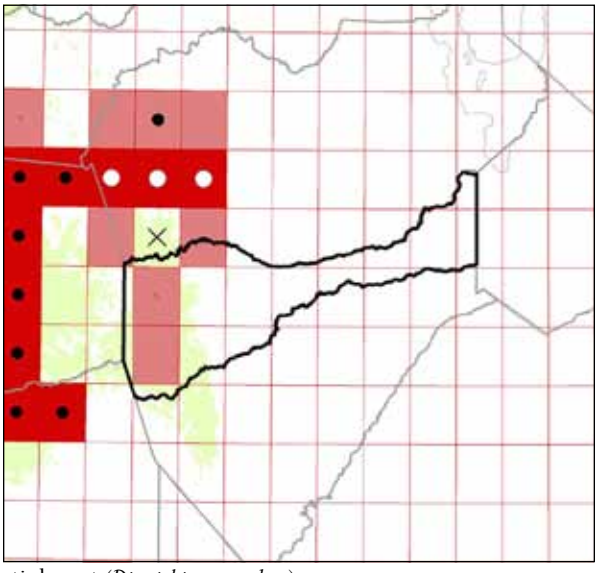
spotted knapweed (*Centaurea maculosa*)



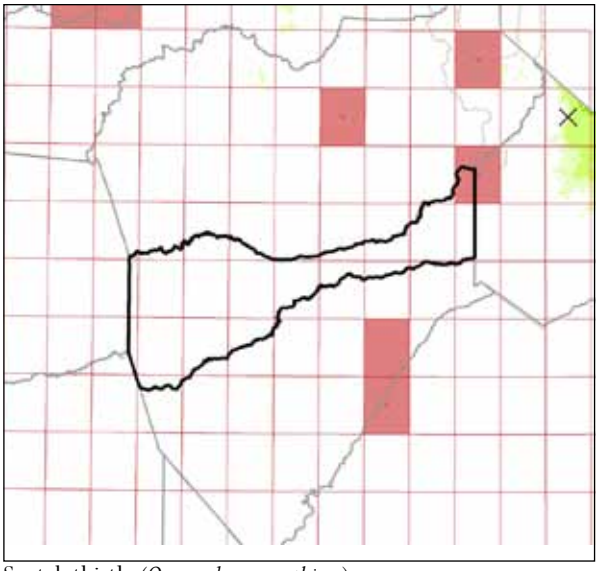
yellow starthistle (*Centaurea solstitialis*)



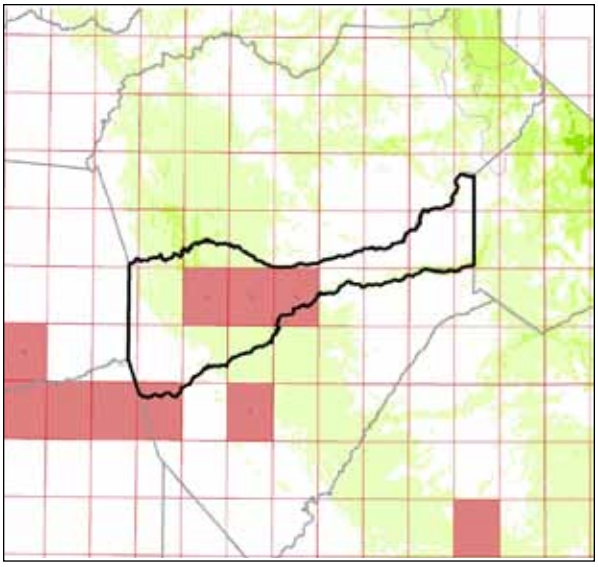
rush skeletonweed (*Chondrilla juncea*)



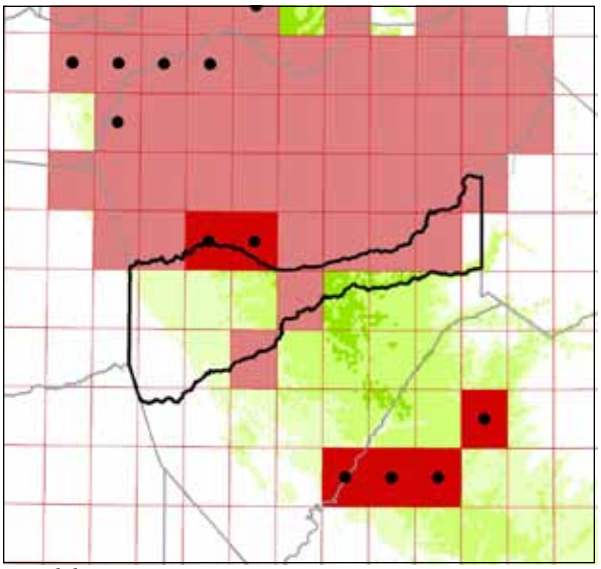
stinkwort (*Dittrichia graveolens*)



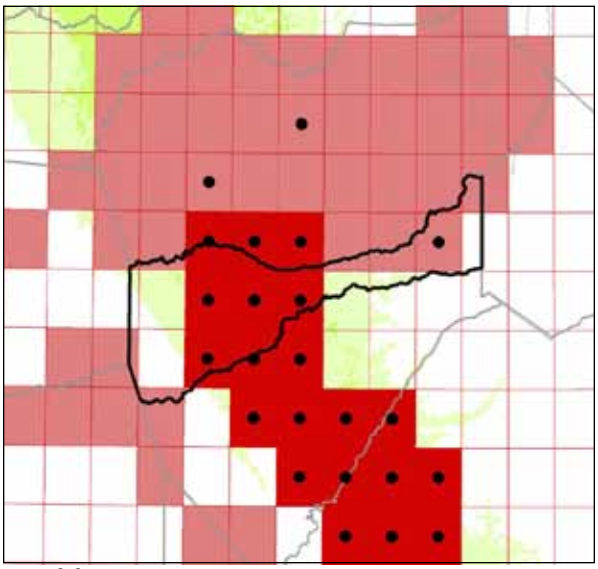
Scotch thistle (*Onopordum acanthium*)



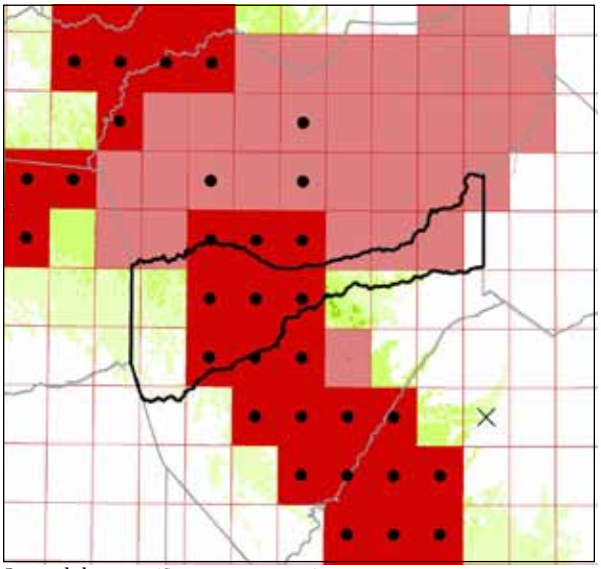
dyer's woad (*Isatis tinctoria*)



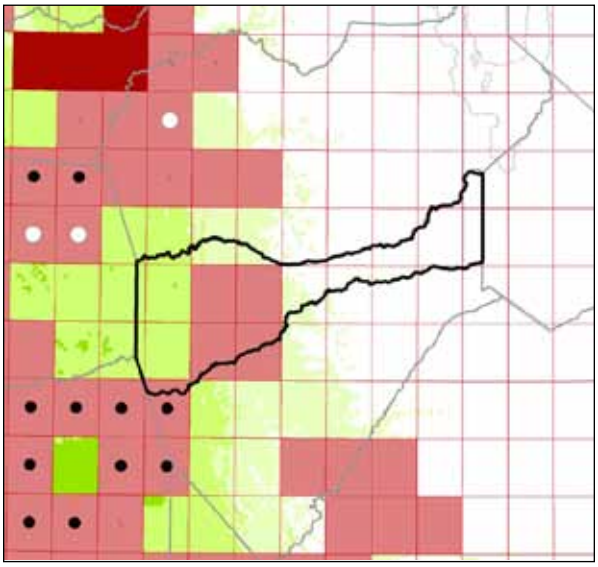
Scotch broom (*Cytisus scoparius*)



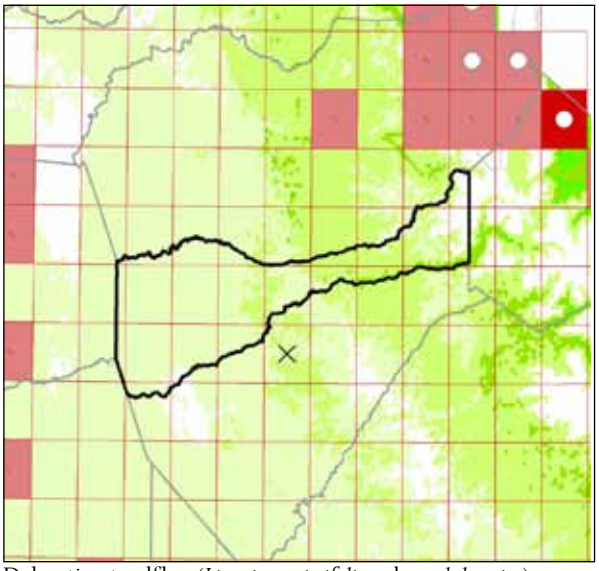
French broom (*Genista monspessulana*)



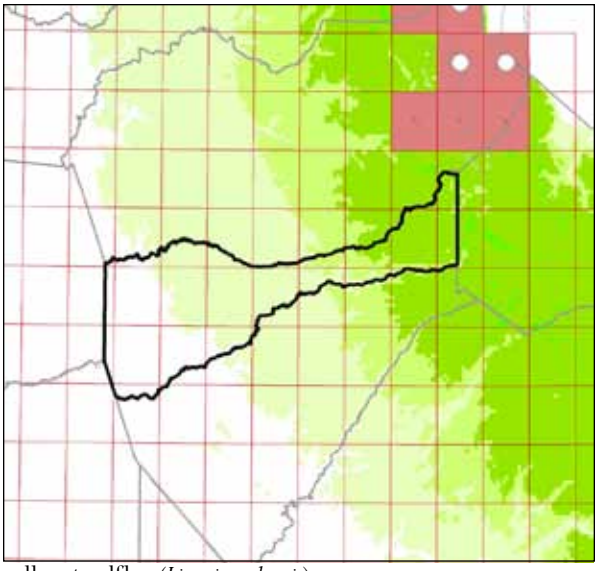
Spanish broom (*Spartium junceum*)



giant reed (*Arundo donax*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)

Management opportunities for the Amador WMA

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability change
	Family Apiaceae											
	Poison-hemlock	M	-	-	29	44	50	0	0	44	20	↓
	Family Asteraceae											
●	**Russian knapweed**	**H**	**-**	**-**	**11**	**11**	**0**	**0**	**4**	**89**	**100**	**-**
●	**Musk thistle**	**-**	**-**	**M**	**0**	**0**	**-**	**-**	**0**	**1**	**0**	**-**
	Italian thistle & slenderflower thistle	-	M	-	68	-	100	0	0	-	-	-
●	**Woolly distaff thistle**	**-**	**-**	**M**	**0**	**-**	**-**	**-**	**0**	**0**	**9**	**-**
	Diffuse knapweed	-	M	-	25	25	0	0	0	98	51	↓
●	**Spotted knapweed**	**-**	**H**	**-**	**39**	**48**	**0**	**0**	**4**	**63**	**60**	**-**
●	**Tocalote**	**-**	**M**	**-**	**54**	**-**	**87**	**0**	**0**	**-**	**-**	**-**
●	**Yellow starthistle**	**-**	**H**	**-**	**89**	**89**	**88**	**0**	**7**	**92**	**96**	**-**
●	**Rush skeletonweed**	**-**	**H**	**-**	**71**	**71**	**60**	**0**	**0**	**88**	**100**	**-**
	Canada thistle	M	-	-	11	20	0	0	0	36	7	↓
	Bull thistle	-	L	-	100	100	100	0	0	97	100	-
●	**Stinkwort**	**-**	**M**	**-**	**14**	**33**	**0**	**0**	**4**	**22**	**27**	**↑**
	Ox-eye daisy	-	M	-	11	15	100	0	0	49	27	↓
●	**Scotch thistle**	**-**	**-**	**H**	**4**	**-**	**0**	**0**	**0**	**0**	**41**	**-**
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	M	-	-	11	-	0	0	0	-	-	-
●	**Dyer's woad**	**-**	**H**	**-**	**18**	**21**	**0**	**0**	**0**	**40**	**13**	**↓**
	Charlock mustard	L	-	-	14	-	0	0	0	-	-	-

	FAMILY DIPSACACEAE											
	Common teasel & fuller's teasel	M	-	-	11	13	0	0	0	61	48	↓
	FAMILY FABACEAE											
●	**Scotch broom**	**-**	**H**	**-**	**43**	**48**	**17**	**0**	**0**	**65**	**99**	↑
●	**French broom**	**-**	**H**	**-**	**68**	**91**	**53**	**0**	**0**	**50**	**84**	↑
●	**Spanish broom**	**-**	**H**	**-**	**57**	**70**	**56**	**0**	**0**	**60**	**88**	↑
	Black locust	-	L	-	14	-	100	0	0	-	-	-
●	**Red sesbania**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**0**	**33**	**66**	↑↑
	Gorse	-	-	L	4	-	0	0	0	0	63	-
	FAMILY POACEAE											
●	**Giant reed**	**-**	**H**	**-**	**21**	**29**	**33**	**0**	**0**	**58**	**71**	↑
	Annual false-brome	-	M	-	43	63	67	0	0	61	61	-
	Japanese brome	-	-	L	7	-	0	0	0	-	-	-
	Red brome	-	M	-	86	100	67	0	0	66	49	↓
	Jubatagrass	-	-	M	18	-	0	0	0	-	-	-
	Pampasgrass	-	-	M	14	80	0	0	0	7	30	↑↑
	Orchardgrass	-	L	-	68	68	0	0	0	99	100	-
	Common velvet grass	-	M	-	68	68	21	0	0	89	91	-
	Mediterranean barley	-	M	-	54	-	0	0	7	-	-	-
	Hare barley	-	M	-	54	-	80	0	0	-	-	-
	Italian ryegrass	-	M	-	71	80	0	0	0	67	59	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**4**	**92**	**74**	↓
●	**Yellow toadflax**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**0**	**64**	**100**	↑
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	M	-	71	80	85	0	0	73	79	-
	FAMILY SOLANACEAE											
	Tree tobacco	M	-	-	11	23	0	0	4	30	15	↓

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

Eradication is recommended for species that have limited occurrence within the WMA. Of the species examined, the following are priority eradication opportunities for CSPAW:

Scotch thistle (*Onopordum acanthium*) – GIS data indicates one quad at eastern edge

dyer's woad (*Isatis tinctoria*) – GIS data indicates presence in several quads

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for CSPAW:

spotted knapweed (*Centaurea maculosa*)

yellow starthistle (*Centaurea solstitialis*) – prevent spread to higher elevations as part of YST Leading Edge Project

rush skeletonweed (*Chondrilla juncea*)

Scotch broom (*Cytisus scoparius*)

French broom (*Genista monspessulana*)

Spanish broom (*Spartium junceum*)

giant reed (*Arundo donax*)

Surveillance is recommended to prevent spread into CSPAW:

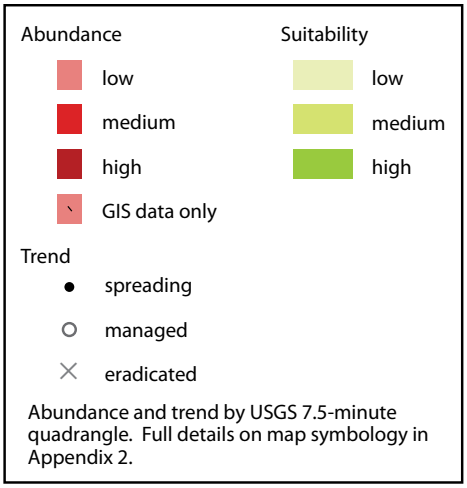
Russian knapweed (*Acroptilon repens*) – GIS data indicates presence at the edge of the WMA

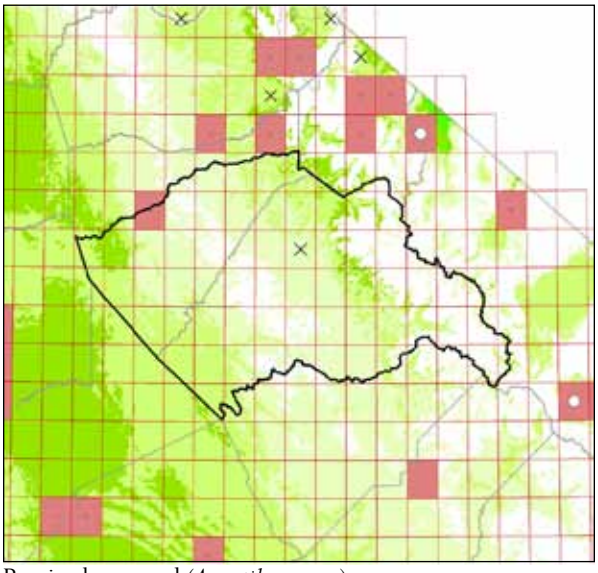
stinkwort (*Dittrichia graveolens*)

red sesbania (*Sesbania punicea*) – one quad at western edge of the WMA

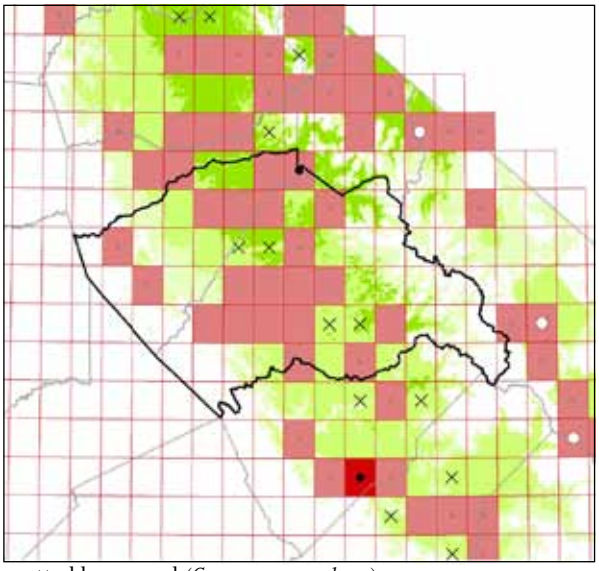
Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*) – suitable range, could spread from north

yellow toadflax (*Linaria vulgaris*) – suitable range, could spread from north

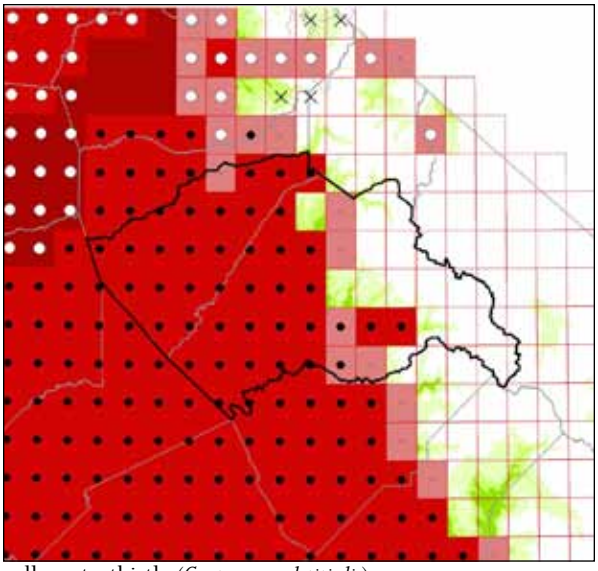




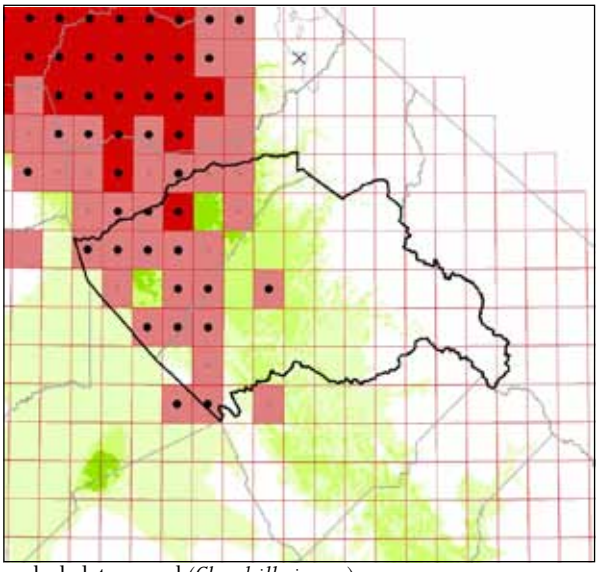
Russian knapweed (*Acroptilon repens*)



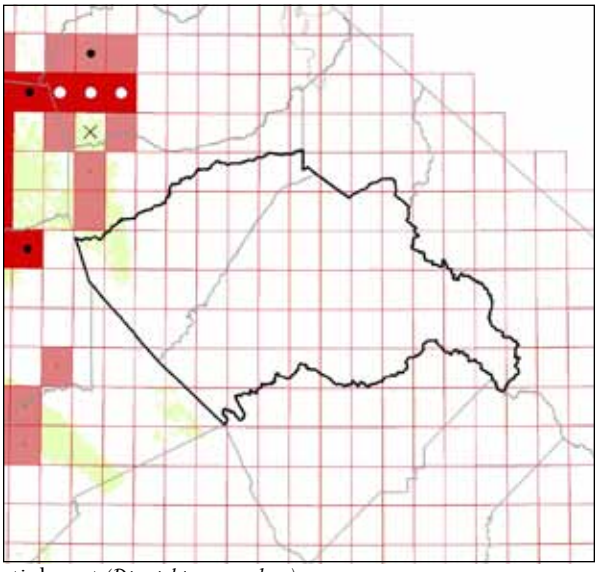
spotted knapweed (*Centaurea maculosa*s)



yellow starthistle (*Centaurea solstitialis*)

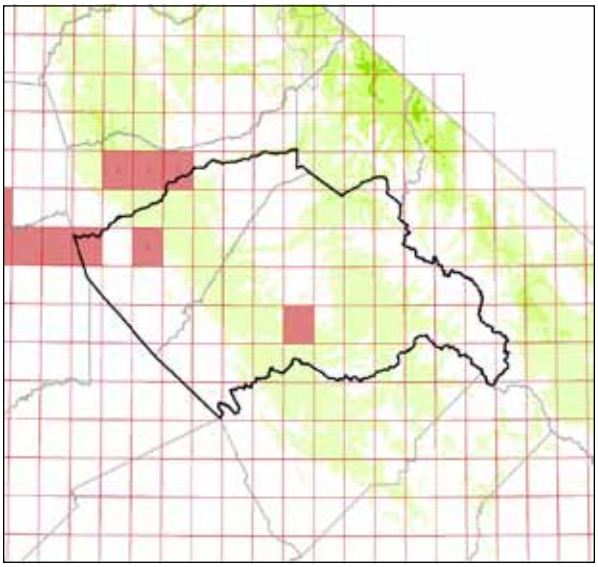


rush skeletonweed (*Chondrilla juncea*)

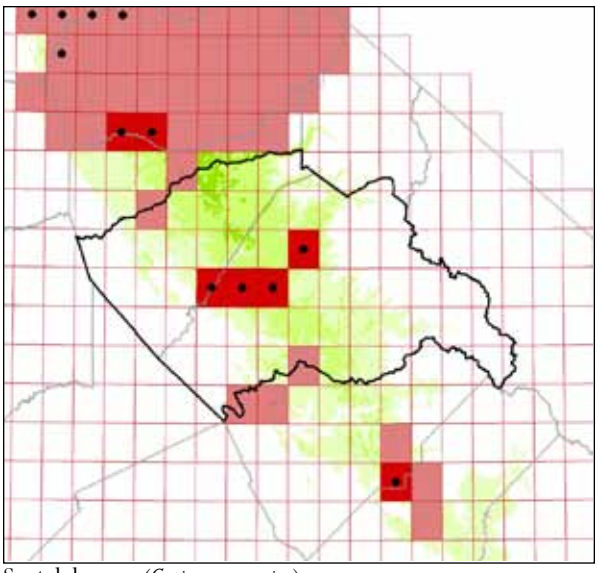


stinkwort (*Dittrichia graveolens)*

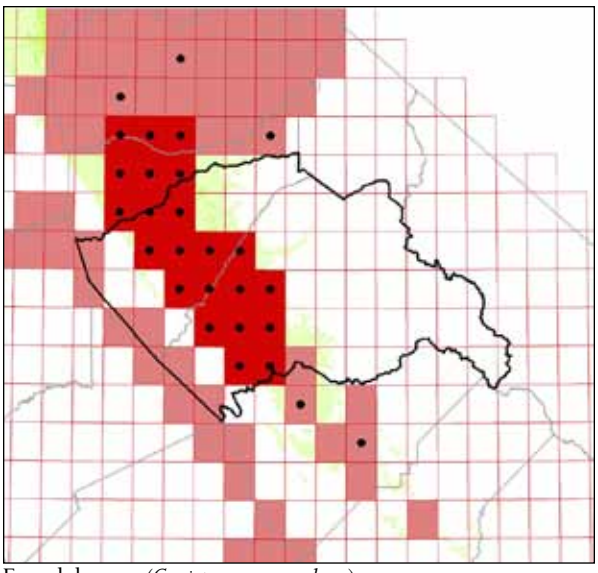
Scotch thistle (*Onopordum acanthium*)



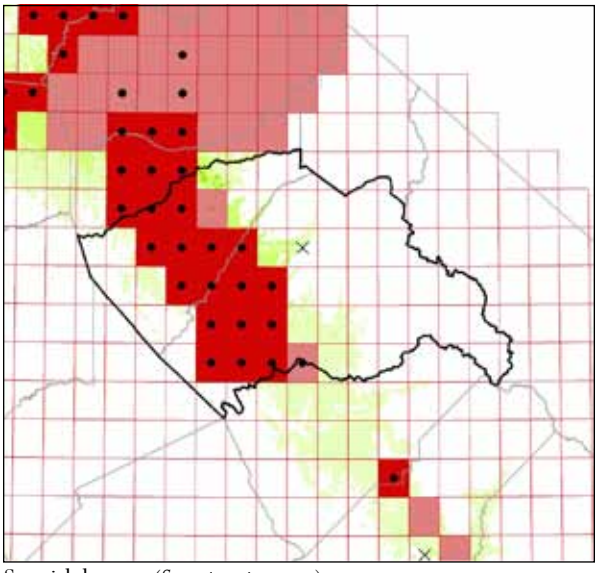
dyer's woad (*Isatis tinctoria*)



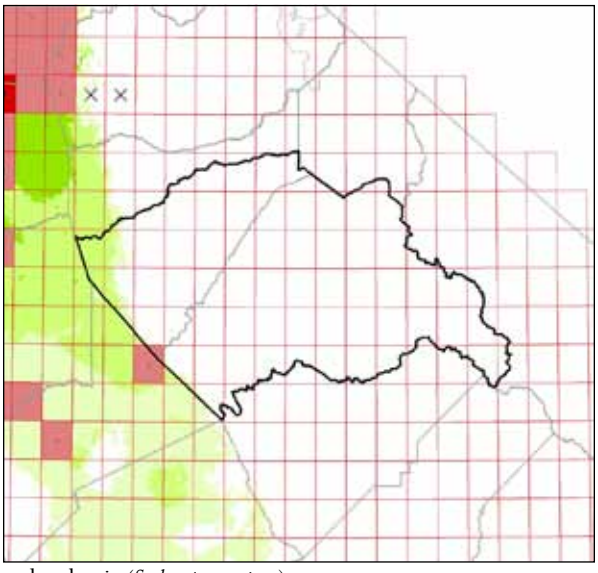
Scotch broom (*Cytisus scoparius*)



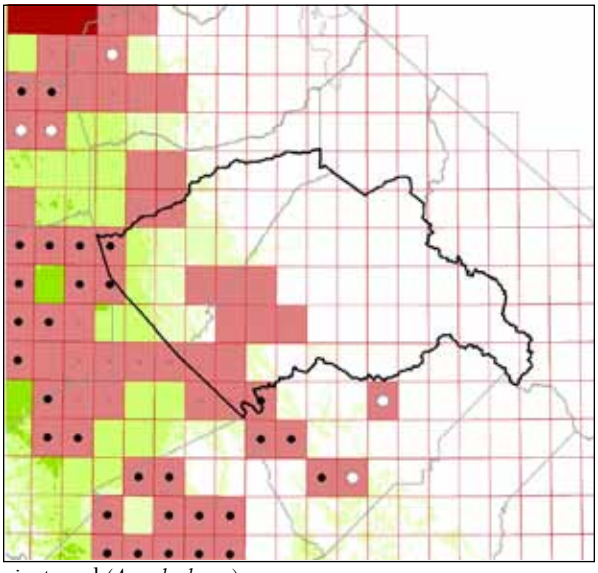
French broom (*Genista monspessulana*)



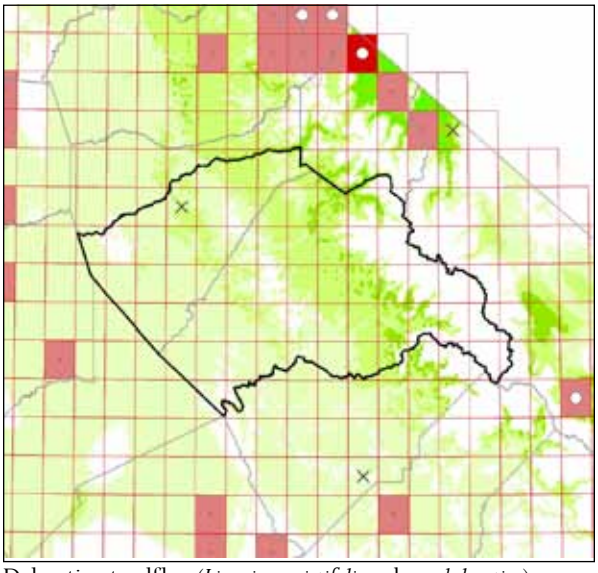
Spanish broom (*Spartium junceum*)



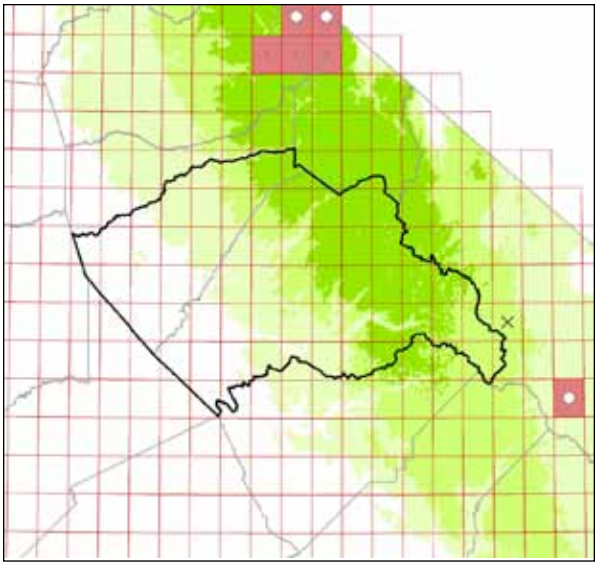
red sesbania (*Sesbania punicea*)



giant reed (*Arundo donax*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)

Management opportunities for Central Sierra Partnership Against Weeds

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
	Family Apiaceae											
	Poison-hemlock	-	M	-	18	34	79	0	0	26	8	↓
	Family Asteraceae											
●	**Russian knapweed**	**-**	**-**	**M**	**1**	**1**	**0**	**0**	**1**	**70**	**89**	↑
●	**Musk thistle**	**-**	**-**	**L**	**0**	**0**	**-**	**-**	**0**	**4**	**0**	**-**
	Italian thistle & slenderflower thistle	-	M	-	49	-	100	0	0	-	-	-
	Woolly distaff thistle	M	-	-	3	-	50	0	0	0	0	-
	Diffuse knapweed	-	M	-	8	8	0	0	0	80	63	↓
●	**Spotted knapweed**	**-**	**H**	**-**	**28**	**31**	**0**	**0**	**5**	**66**	**76**	↑
	Tocalote	-	M	-	46	-	92	0	0	-	-	-
●	**Yellow starthistle**	**-**	**H**	**-**	**65**	**73**	**92**	**0**	**0**	**71**	**78**	**-**
●	**Rush skeletonweed**	**-**	**H**	**-**	**29**	**35**	**70**	**0**	**0**	**61**	**90**	↑
	Canada thistle	M	-	-	4	5	100	0	1	36	32	-
	Bull thistle	-	L	-	95	99	91	0	0	77	91	↑
●	**Stinkwort**	**-**	**-**	**M**	**0**	**0**	**-**	**-**	**0**	**3**	**16**	↑↑
	Ox-eye daisy	-	M	-	6	8	60	0	1	43	26	↓
●	**Scotch thistle**	**H**	**-**	**-**	**3**	**50**	**0**	**0**	**0**	**0**	**25**	↑↑
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	M	-	-	3	-	0	0	0	-	-	-
●	**Dyer's woad**	**H**	**-**	**-**	**5**	**6**	**0**	**0**	**0**	**40**	**21**	↓
	Charlock mustard	-	L	-	22	-	0	0	0	-	-	-

	FAMILY DIPSACACEAE											
	Common teasel & fuller's teasel	M	-	-	1	2	0	0	0	37	22	↓
	FAMILY FABACEAE											
●	**Scotch broom**	**-**	**H**	**-**	**11**	**17**	**44**	**0**	**0**	**44**	**67**	↑
●	**French broom**	**-**	**H**	**-**	**33**	**72**	**65**	**0**	**0**	**23**	**60**	↑↑
●	**Spanish broom**	**-**	**H**	**-**	**25**	**46**	**95**	**0**	**1**	**31**	**67**	↑↑
	Black locust	-	L	-	10	-	88	0	0	-	-	-
●	**Red sesbania**	**-**	**-**	**H**	**1**	**7**	**0**	**0**	**0**	**9**	**36**	↑↑
	Gorse	M	-	-	1	-	0	0	0	0	30	-
	FAMILY POACEAE											
●	**Giant reed**	**-**	**H**	**-**	**20**	**41**	**19**	**0**	**0**	**27**	**47**	↑
	Annual false-brome	-	M	-	23	46	44	0	0	38	34	-
	Japanese brome	-	L	-	10	-	0	0	0	-	-	-
	Red brome	-	M	-	60	77	45	0	0	51	34	↓
	Jubatagrass	-	M	-	15	-	0	0	1	-	-	-
	Pampasgrass	-	M	-	17	-	0	0	0	0	8	-
	Orchardgrass	-	L	-	37	37	0	0	0	96	96	-
	Common velvet grass	-	M	-	30	36	0	0	0	63	83	↑
	Mediterranean barley	-	M	-	30	-	0	0	0	-	-	-
	Hare barley	-	M	-	29	-	78	0	0	-	-	-
	Italian ryegrass	-	M	-	38	55	0	0	0	46	40	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**1**	**71**	**67**	**-**
●	**Yellow toadflax**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**1**	**72**	**97**	↑
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	M	-	44	64	100	0	0	50	58	↑
	FAMILY SOLANACEAE											
	Tree tobacco	M	-	-	11	50	33	0	0	4	10	↑↑

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

These recommendations focus on the portion of the Sierra-San Joaquin Noxious Weed Alliance that falls within the Sierra Nevada ecoregion. This includes Mariposa County and the eastern portions of Madera and Fresno counties (see map in chapter 1) Statistics are based on all of Mariposa, Madera and Fresno counties.

Eradication is recommended for species that have limited occurrence within the Sierra portion of the WMA. Of the species examined, the following are priority eradication opportunities for this WMA:

Russian knapweed (*Acroptilon repens*)

diffuse knapweed (*Centaurea diffusa*)

rush skeletonweed (*Chondrilla juncea*) – only one quad within Sierra but several more quads under management in western Fresno County

Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for this WMA:

Italian and slenderflower thistles (*Carduus pycnocephalus, C. tenuiforus*) – prevent spread further south

spotted knapweed (*Centaurea maculosa*) – GIS data indicates several quads, would be good to verify these populations

yellow starthistle (*Centaurea solstitialis*) – prevent spread to higher elevations as part of YST Leading Edge Project

Scotch broom (*Cytisus scoparius*)

French broom (*Genista monspessulana*)

Spanish broom (*Spartium junceum*)

giant reed (*Arundo donax*)

Surveillance is recommended to prevent spread into the Sierra portion of the WMA:

woolly distaff thistle (*Carthamus lanatus*)

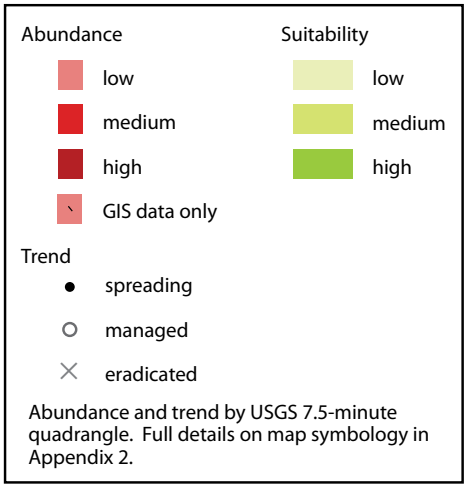
stinkwort (*Dittrichia graveolens*) – one quad in Mariposa County outside Sierra portion

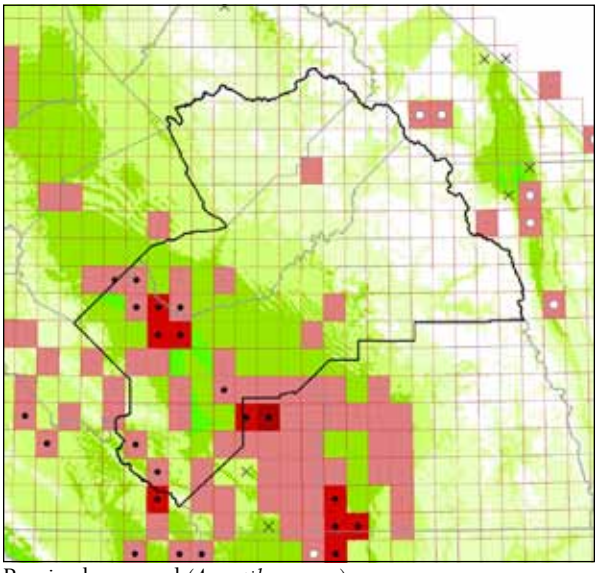
Scotch thistle (*Onopordum acanthium*) – GIS data indicates several quads near the southern border of the WMA

dyer's woad (*Isatis tinctoria*) – one quad just outside northern edge of WMA

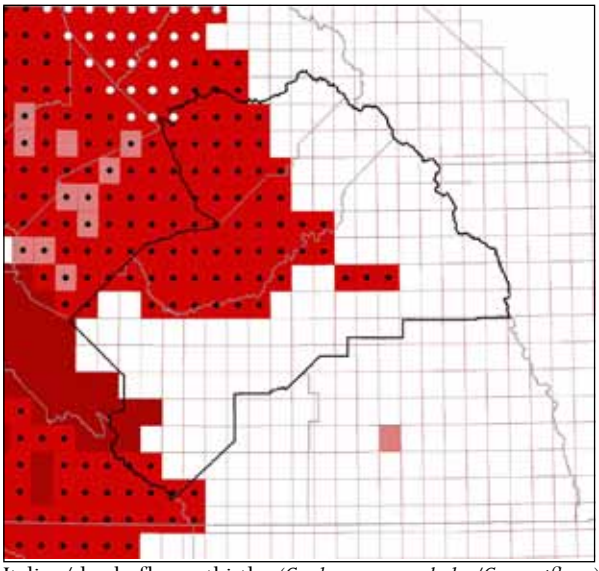
red sesbania (*Sesbania punicea*) – spreading in Fresno and Madera counties just outside the Sierra region

yellow toadflax (*Linaria vulgaris*)

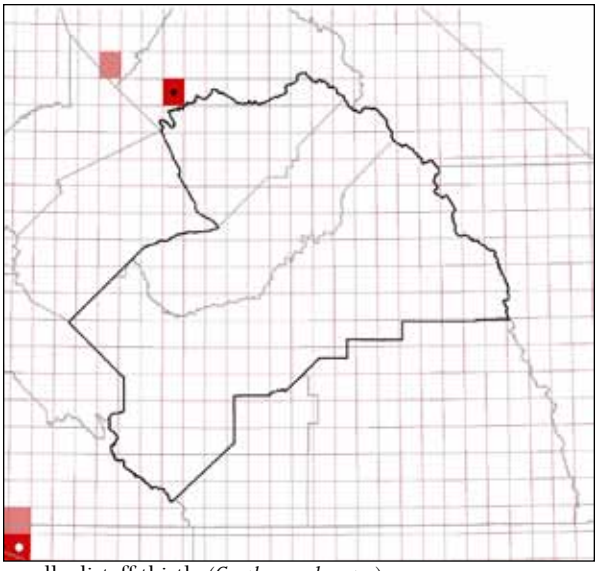




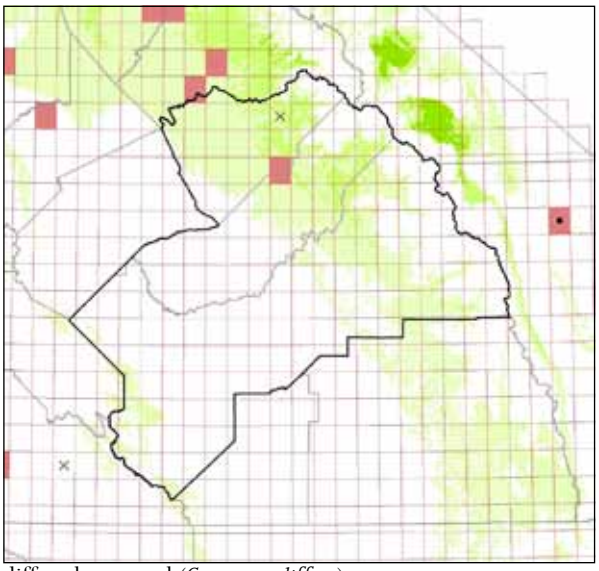
Russian knapweed (*Acroptilon repens*)



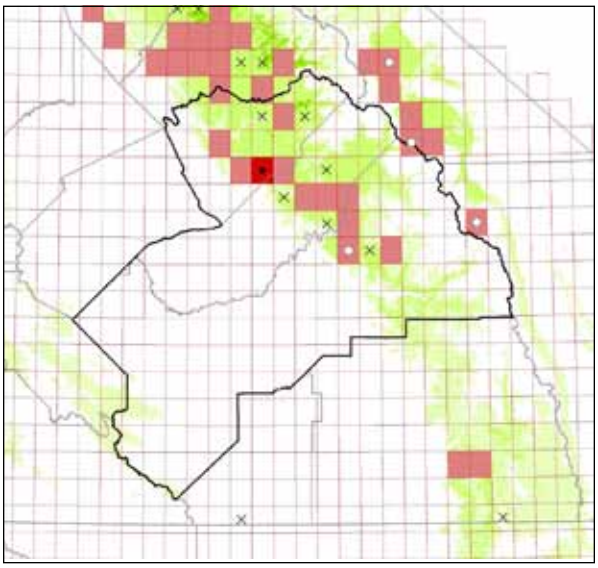
Italian/slenderflower thistles (*Carduus pycnocephalus/C. tenuiflorus*)



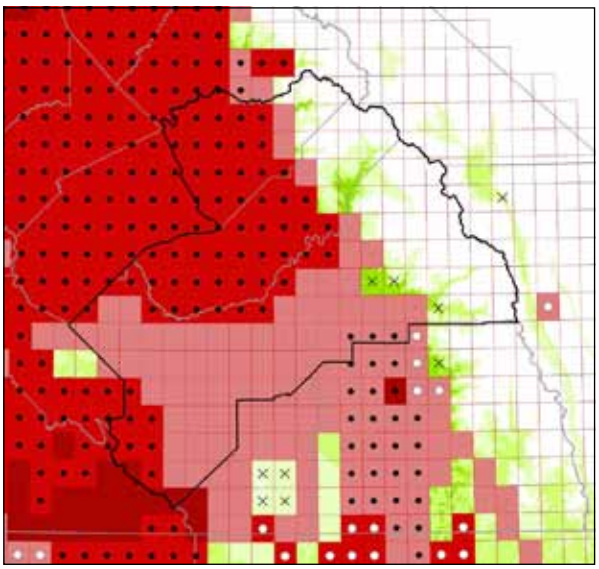
woolly distaff thistle (*Carthamus lanatus*)



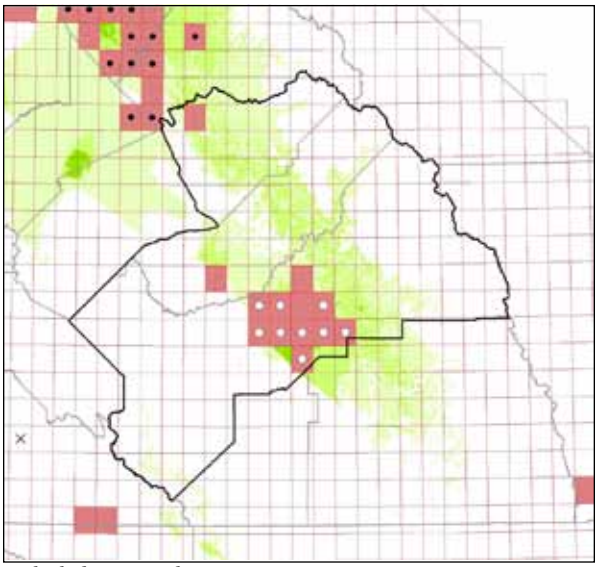
diffuse knapweed (*Centaurea diffusa*)



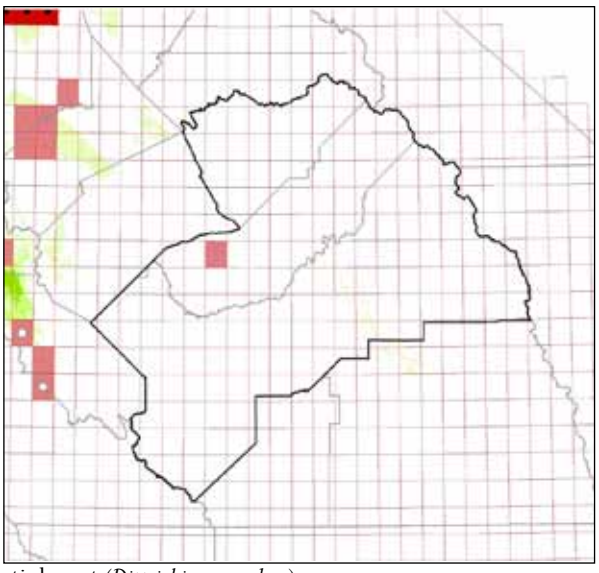
spotted knapweed (*Centaurea maculosa*)



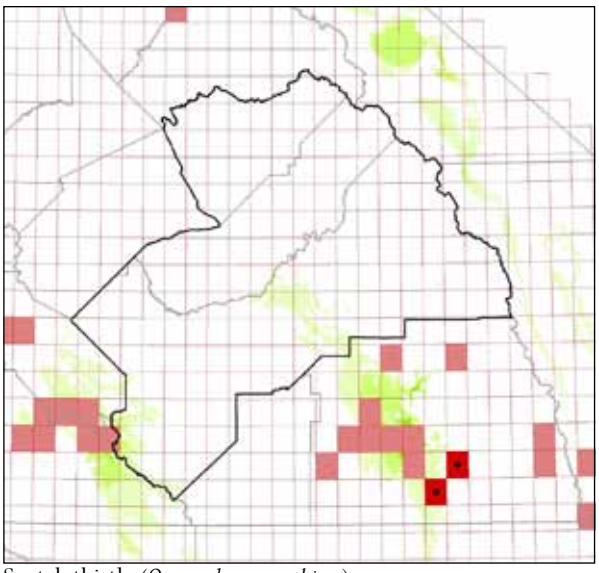
yellow starthistle (*Centaurea solstitialis*)



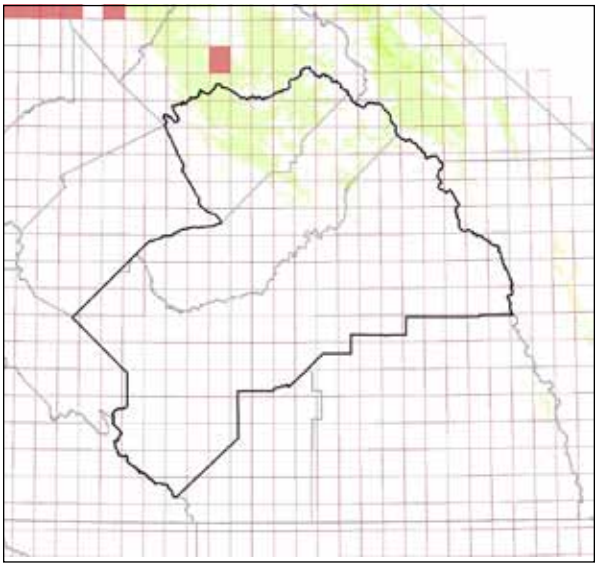
rush skeletonweed (*Chondrilla juncea*)



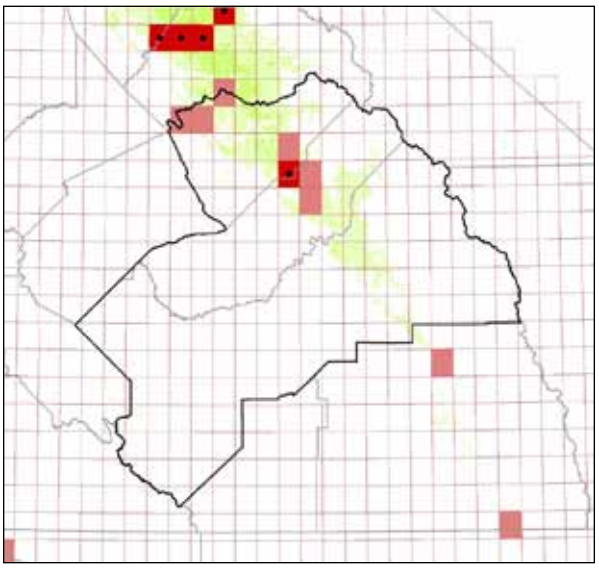
stinkwort (*Dittrichia graveolens*)



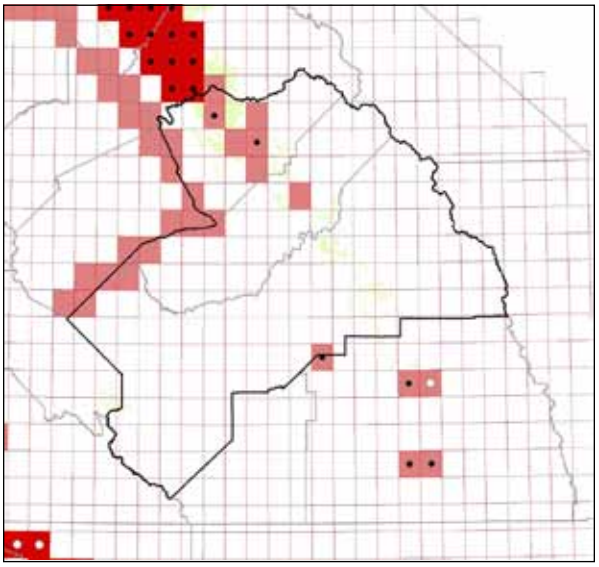
Scotch thistle (*Onopordum acanthium*)



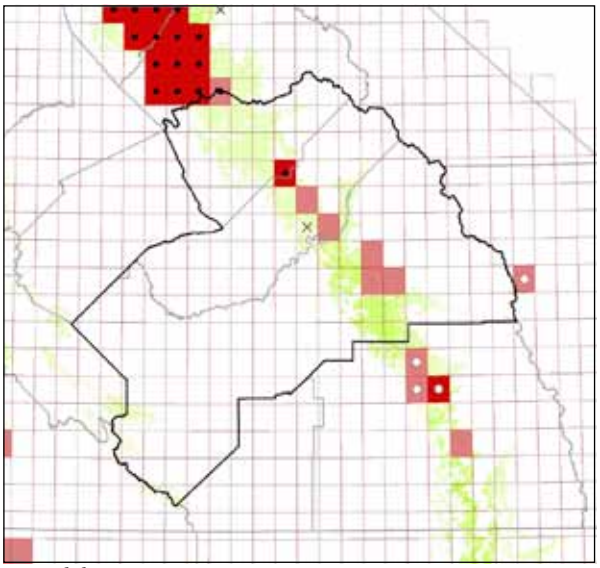
dyer's woad (*Isatis tinctoria*)



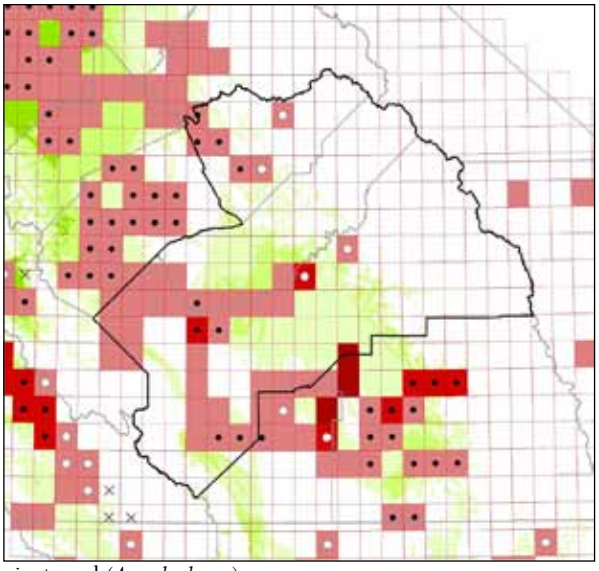
Scotch broom (*Cytisus scoparius*)



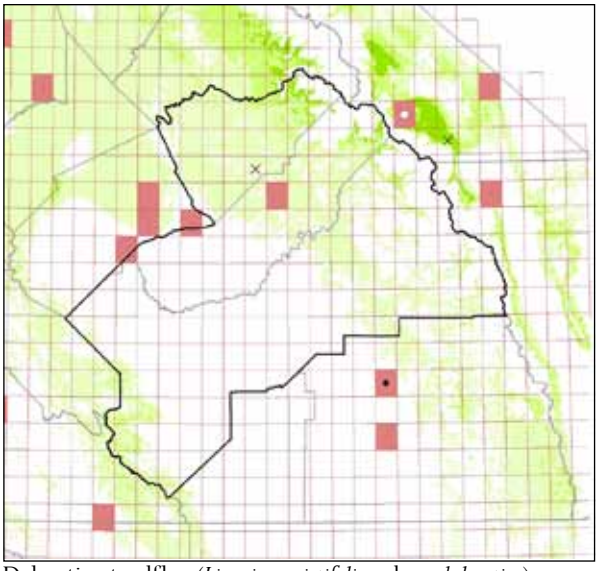
French broom (*Genista monspessulana*)



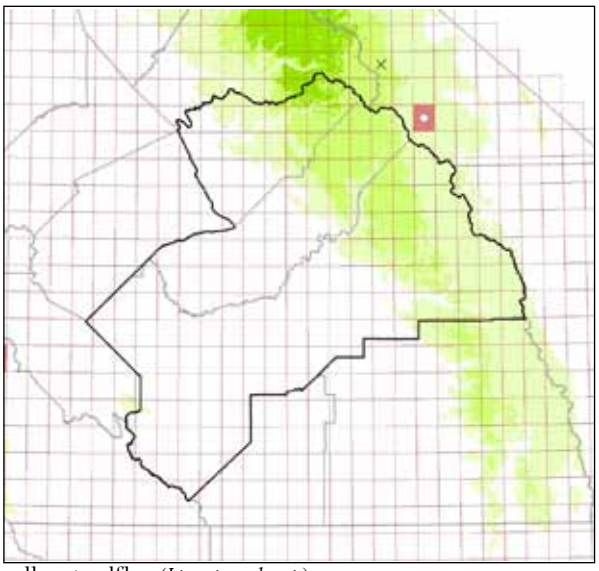
Spanish broom (*Spartium junceum*)



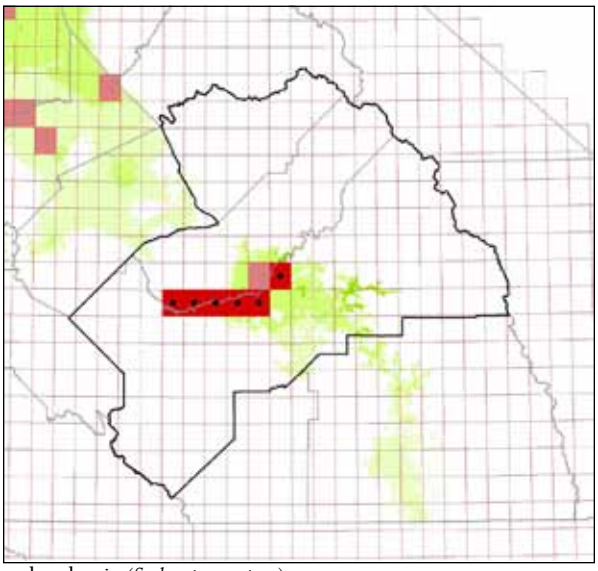
giant reed (*Arundo donax*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)



red sesbania (*Sesbania punicea*)

Management opportunities for Sierra-San Joaquin Noxious Weed Alliance

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
	Family Apiaceae											
	Poison-hemlock	-	M	-	51	100	14	1	0	22	2	↓
	Family Asteraceae											
●	**Russian knapweed**	**H**	**-**	**-**	**16**	**16**	**33**	**0**	**0**	**79**	**87**	**-**
	Musk thistle	-	-	L	0	0	-	-	0	1	0	-
●	**Italian thistle & slenderflower thistle**	**-**	**H**	**-**	**32**	**-**	**100**	**0**	**0**	**-**	**-**	**-**
●	**Woolly distaff thistle**	**-**	**-**	**M**	**0**	**-**	**-**	**-**	**0**	**0**	**0**	**-**
●	**Diffuse knapweed**	**H**	**-**	**-**	**1**	**2**	**0**	**0**	**1**	**32**	**29**	**-**
●	**Spotted knapweed**	**-**	**H**	**-**	**8**	**14**	**6**	**19**	**3**	**30**	**42**	**↑**
●	**Tocalote**	**-**	**M**	**-**	**52**	**-**	**55**	**0**	**0**	**-**	**-**	**-**
●	**Yellow starthistle**	**-**	**H**	**-**	**69**	**74**	**48**	**1**	**2**	**78**	**78**	**-**
●	**Rush skeletonweed**	**H**	**-**	**-**	**7**	**11**	**7**	**64**	**0**	**32**	**53**	**↑**
	Canada thistle	M	-	-	2	3	33	33	1	18	11	↓
	Bull thistle	-	L	-	92	100	6	2	0	44	84	↑
●	**Stinkwort**	**-**	**-**	**M**	**1**	**13**	**0**	**0**	**0**	**0**	**2**	**↑↑**
	Ox-eye daisy	-	M	-	8	21	18	0	1	15	13	↓
●	**Scotch thistle**	**-**	**-**	**H**	**1**	**2**	**0**	**0**	**0**	**6**	**8**	**↑**
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	M	-	-	6	-	0	31	1	-	-	-
●	**Dyer's woad**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**0**	**9**	**5**	**↓**
	Charlock mustard	-	L	-	39	-	3	0	0	-	-	-
	Family Dipsacaceae											
	Common teasel & fuller's teasel	-	M	-	24	61	0	0	1	11	9	↓
	Family Fabaceae											
●	**Scotch broom**	**-**	**H**	**-**	**3**	**12**	**14**	**0**	**0**	**12**	**29**	**↑↑**
●	**French broom**	**-**	**H**	**-**	**11**	**55**	**17**	**0**	**0**	**4**	**26**	**↑↑**
●	**Spanish broom**	**-**	**H**	**-**	**4**	**12**	**33**	**11**	**1**	**14**	**56**	**↑↑**
	Black locust	-	L	-	5	-	40	0	0	-	-	-
●	**Red sesbania**	**-**	**-**	**H**	**3**	**12**	**86**	**0**	**0**	**11**	**39**	**↑↑**
	Gorse	-	-	-	0	-	-	-	0	0	18	-
	Family Poaceae											
●	**Giant reed**	**-**	**H**	**-**	**21**	**32**	**24**	**0**	**0**	**30**	**44**	**↑**
	Annual false-brome	M	-	-	3	11	0	0	0	12	6	↓
	Japanese brome	L	-	-	2	-	0	0	0	-	-	-
	Red brome	-	M	-	52	53	8	0	0	79	65	↓
	Jubatagrass	M		-	10	-	0	0	0	-	-	-
	Pampasgrass	-	M	-	12	-	0	0	0	0	1	-
	Orchardgrass	-	L	-	70	100	13	1	0	50	74	↑

	Common velvet grass	-	M	-	39	71	1	3	0	30	49	↑
	Mediterranean barley	-	M	-	43	-	1	0	0	-	-	-
	Hare barley	-	M	-	45	-	1	0	0	-	-	-
	Italian ryegrass	-	M	-	74	100	19	0	0	39	50	↑
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**H**	**-**	**-**	**2**	**2**	**0**	**0**	**1**	**33**	**68**	**↑↑**
●	**Yellow toadflax**	**-**	**-**	**M**	**0**	**0**	**-**	**-**	**0**	**38**	**54**	**↑**
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	M	-	33	52	67	0	0	40	70	↑
	FAMILY SOLANACEAE											
	Tree tobacco	-	M	-	47	100	1	0	0	7	41	↑↑

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

These recommendations focus on the portion of Tulare WMA within the Sierra Nevada ecoregion (see map in chapter 1). Statistics are based on all of Tulare County.

Eradication is recommended for species that have limited occurrence within the WMA. Of the species examined, the following are priority eradication opportunities for Tulare WMA:

spotted knapweed (*Centaurea maculosa*)

Scotch broom (*Cytisus scoparius*)

French broom (*Genista monspessulana*)

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for Tulare WMA:

yellow starthistle (*Centaurea solstitialis*) – prevent spread to higher elevations as part of YST Leading Edge Project

Scotch thistle (*Onopordum acanthium*)

Spanish broom (*Spartium junceum*)

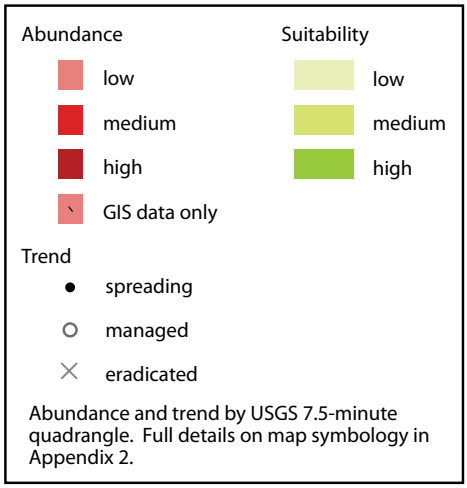
giant reed (*Arundo donax*)

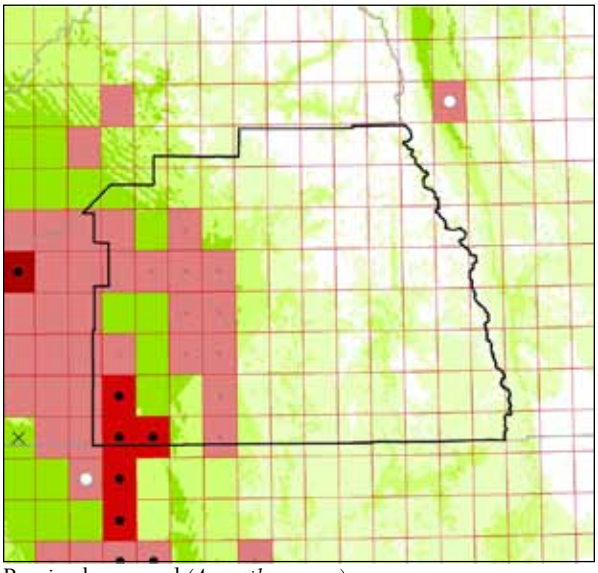
Surveillance is recommended to prevent spread into the WMA:

Russian knapweed (*Acroptilon repens*)

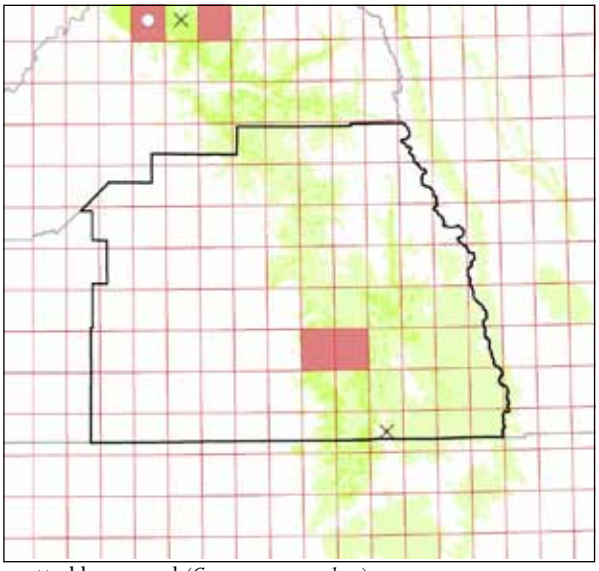
rush skeletonweed (*Chondrilla juncea*) – several quads infested in southern Fresno County and western Inyo County

Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*) – one quad infested on edge of Sierra region in Tulare WMA

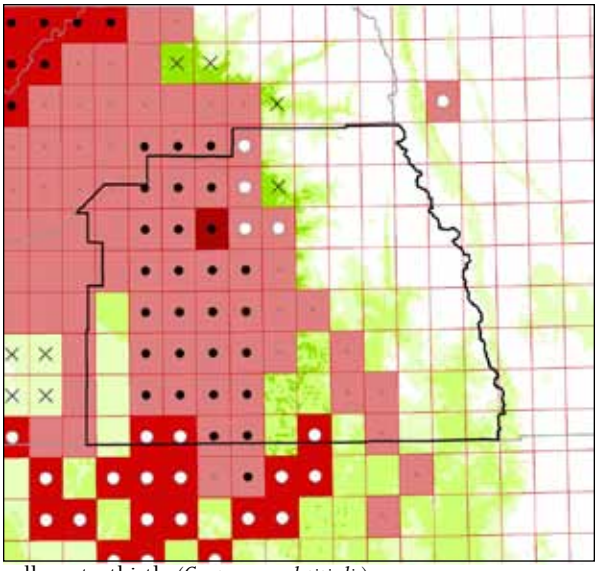




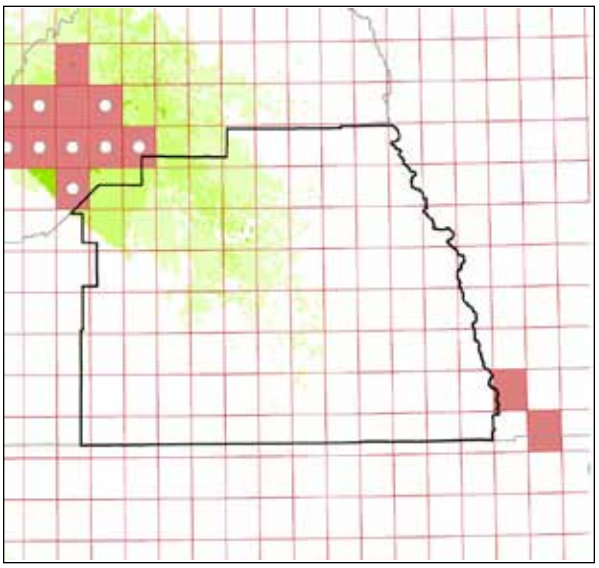
Russian knapweed (*Acroptilon repens*)



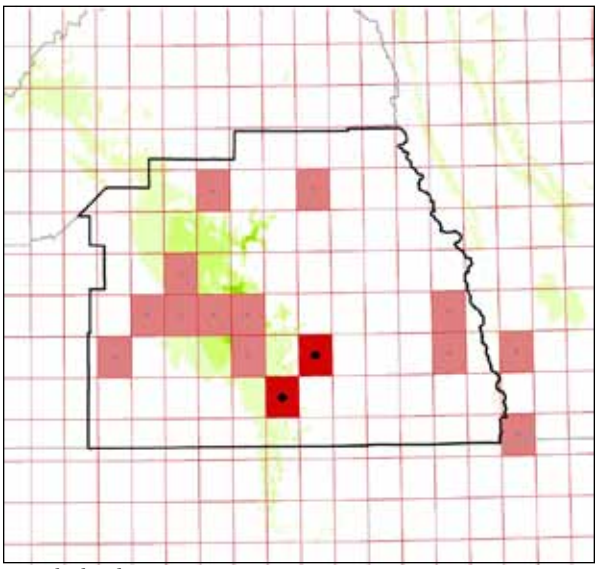
spotted knapweed (*Centaurea maculosa*)



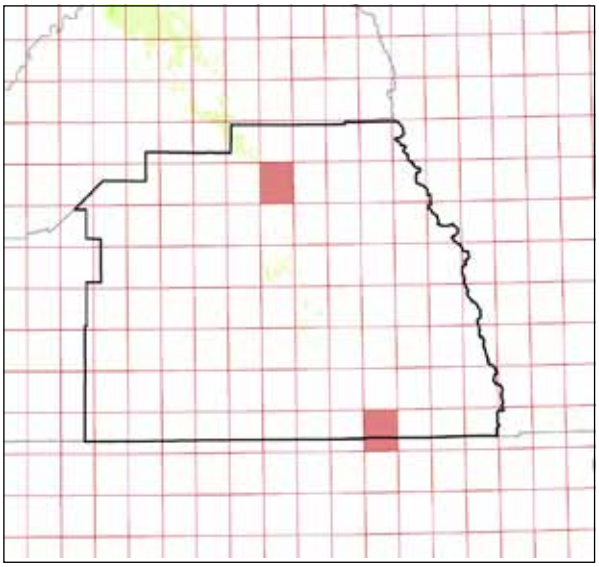
yellow starthistle (*Centaurea solstitialis*)



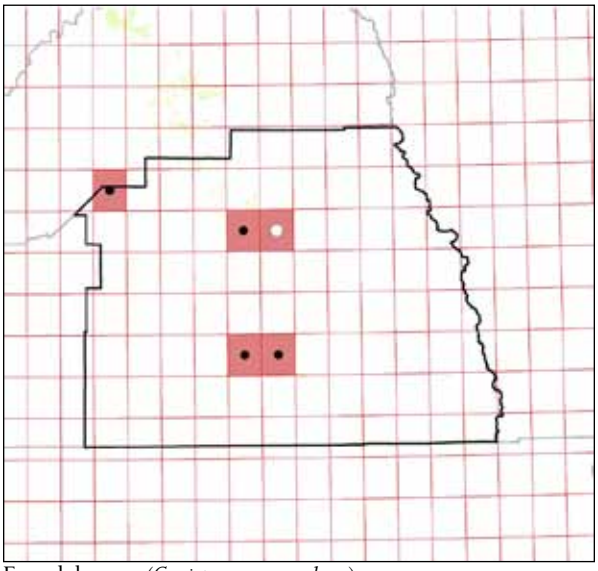
rush skeletonweed (*Chondrilla juncea*)



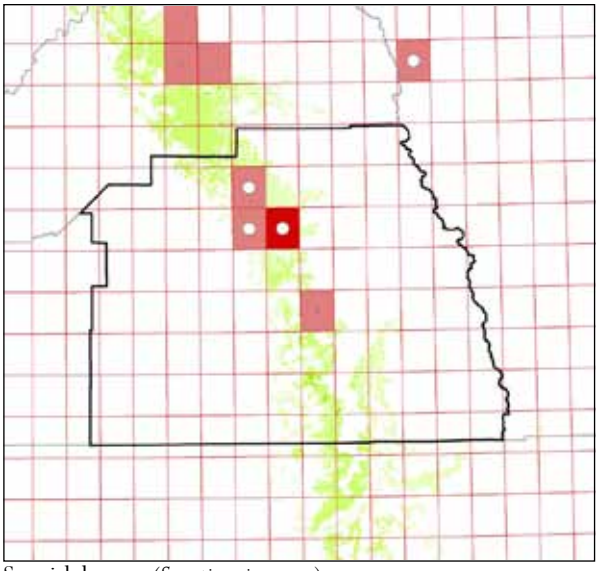
Scotch thistle (*Onopordum acanthium*)



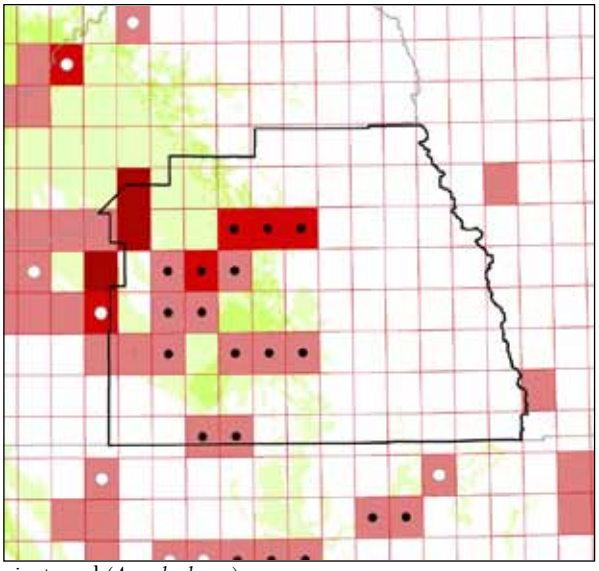
Scotch broom (*Cytisus scoparius*)



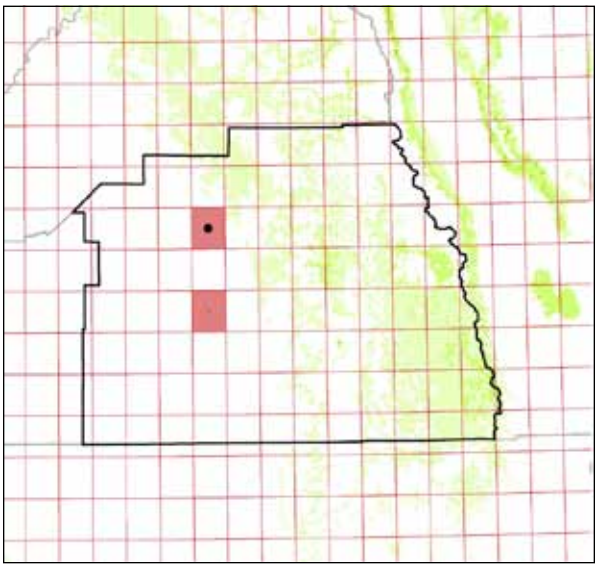
French broom (*Genista monspessulana*)



Spanish broom (*Spartium junceum*)



giant reed (*Arundo donax*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
	Family Apiaceae											
	Poison-hemlock	-	M	-	26	58	81	0	0	26	0	↓
	Family Asteraceae											
●	**Russian knapweed**	**-**	**-**	**H**	**22**	**22**	**14**	**0**	**0**	**79**	**88**	**-**
	Musk thistle	-	-	L	0	0	-	-	0	0	0	-
	Italian thistle & slenderflower thistle	-	-	M	1	-	0	0	0	-	-	-
	Woolly distaff thistle	**-**	**-**	**L**	0	-	-	-	0	0	0	-
	Diffuse knapweed	-	-	L	0	0	-	-	0	30	26	-
●	**Spotted knapweed**	**H**	**-**	**-**	**2**	**3**	**0**	**0**	**1**	**35**	**45**	↑
●	**Tocalote**	**-**	**M**	**-**	**49**	**-**	**16**	**0**	**0**	**-**	**-**	**-**
●	**Yellow starthistle**	**-**	**H**	**-**	**52**	**55**	**60**	**14**	**1**	**79**	**86**	**-**
●	**Rush skeletonweed**	**-**	**-**	**H**	**3**	**7**	**0**	**67**	**0**	**20**	**22**	**-**
	Canada thistle	M	-	-	1	2	100	0	0	8	4	↓
	Bull thistle	-	M	-	39	46	15	10	0	59	90	↑
	Stinkwort	-	-	L	0	0	-	-	0	1	0	↓
	Ox-eye daisy	-	-	M	8	19	0	0	0	7	19	↑↑
●	**Scotch thistle**	**-**	**H**	**-**	**14**	**31**	**14**	**0**	**0**	**17**	**7**	**↓**
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	-	-	M	3	-	0	0	1	-	-	-
	Dyer's woad	-	-	L	0	0	-	-	0	0	0	↓
	Charlock mustard	-	-	L	13	-	92	0	0	-	-	-
	Family Dipsacaceae											
	Common teasel & fuller's teasel	-	-	M	6	12	0	0	0	14	20	↑
	Family Fabaceae											
●	**Scotch broom**	**H**	**-**	**-**	**2**	**17**	**0**	**0**	**0**	**1**	**23**	**↑↑**
●	**French broom**	**H**	**-**	**-**	**5**	**63**	**80**	**20**	**0**	**0**	**15**	**↑↑**
●	**Spanish broom**	**-**	**H**	**-**	**4**	**11**	**0**	**75**	**0**	**13**	**51**	**↑↑**
	Black locust	L	-	-	3	-	0	0	0	-	-	-
	Red sesbania	-	-	L	0	0	-	-	0	11	31	↑↑
	Gorse	-	-	-	0	-	-	-	0	0	5	-
	Family Poaceae											
●	**Giant reed**	**-**	**H**	**-**	**21**	**37**	**67**	**0**	**0**	**30**	**51**	**↑**
	Annual false-brome	-	-	M	0	0	-	-	0	5	1	↓
	Japanese brome	-	-	L	3	-	100	0	0	-	-	-
	Red brome	-	M	-	52	53	69	0	0	85	68	↓
	Jubatagrass	-	-	M	3	-	0	0	0	-	-	-
	Pampasgrass	-	-	M	4	100	0	0	0	0	1	-
	Orchardgrass	-	L	-	21	30	0	0	0	55	64	-

	Common velvet grass	-	M	-	11	18	46	9	0	37	55	↑
	Mediterranean barley	-	M	-	53	-	11	0	0	-	-	-
	Hare barley	-	M	-	64	-	9	0	0	-	-	-
	Italian ryegrass	-	M	-	47	71	75	0	0	38	23	↓
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**-**	**-**	**H**	**2**	**3**	**50**	**0**	**0**	**24**	**74**	**↑↑**
	Yellow toadflax	-	L	-	0	0	-	-	0	34	56	↑
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	M	-	49	79	94	2	0	34	74	↑↑
	FAMILY SOLANACEAE											
	Tree tobacco	-	-	M	21	51	10	0	0	21	43	↑↑

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

These recommendations focus on the portion of Kern WMA within the Sierra Nevada ecoregion (see map in chapter 1). Statistics are based on all of Kern County.

Eradication is recommended for species that have limited occurrence within the WMA. Of the species examined, the following are priority eradication opportunities for Kern WMA:

Russian knapweed (*Acroptilon repens*)

Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities for Kern WMA:

yellow starthistle (*Centaurea solstitialis*) – prevent spread to higher elevations as part of YST Leading Edge Project

giant reed (*Arundo donax*)

Surveillance is recommended to prevent spread into the WMA:

spotted knapweed (*Centaurea maculosa*)

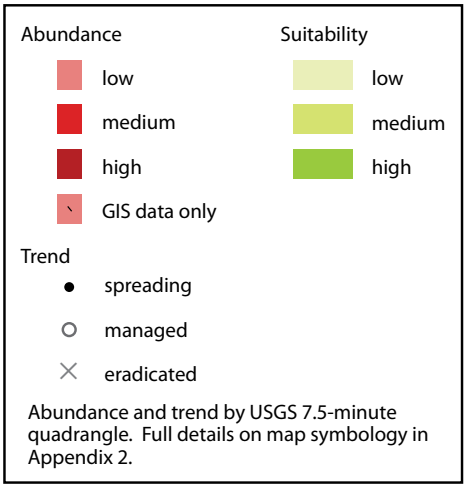
rush skeletonweed (*Chondrilla juncea*) – several quads infested in southern Fresno County and western Inyo County

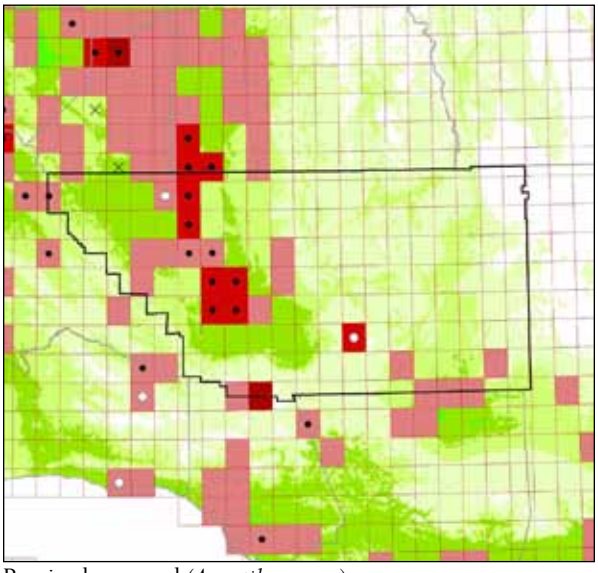
Scotch thistle (*Onopordum acanthium*)

Scotch broom (*Cytisus scoparius*)

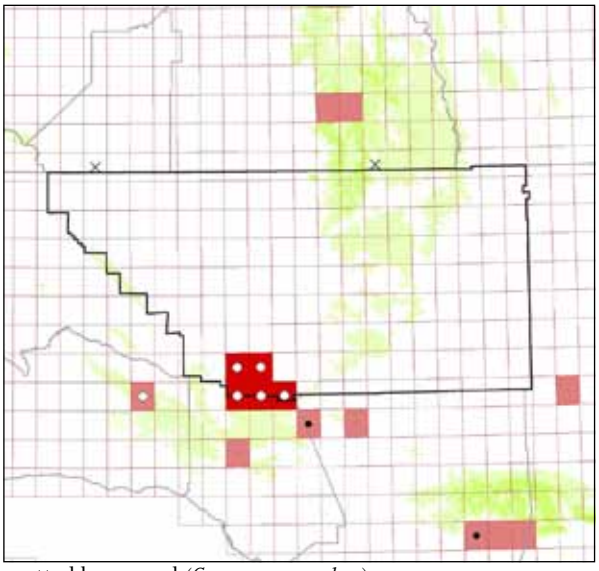
French broom (*Genista monspessulana*)

Spanish broom (*Spartium junceum*)

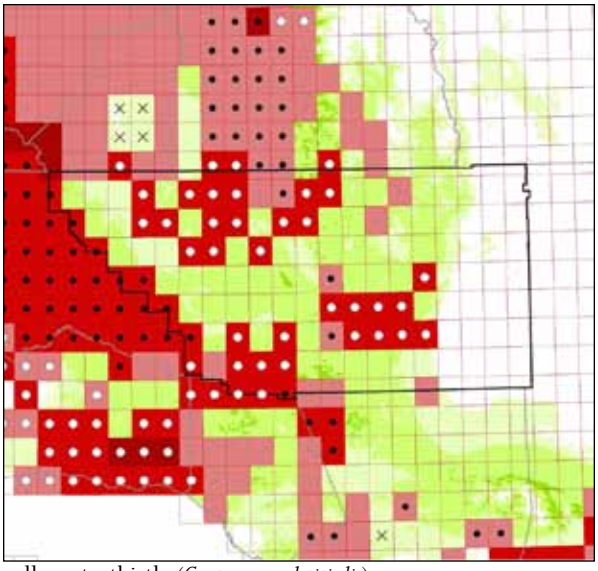




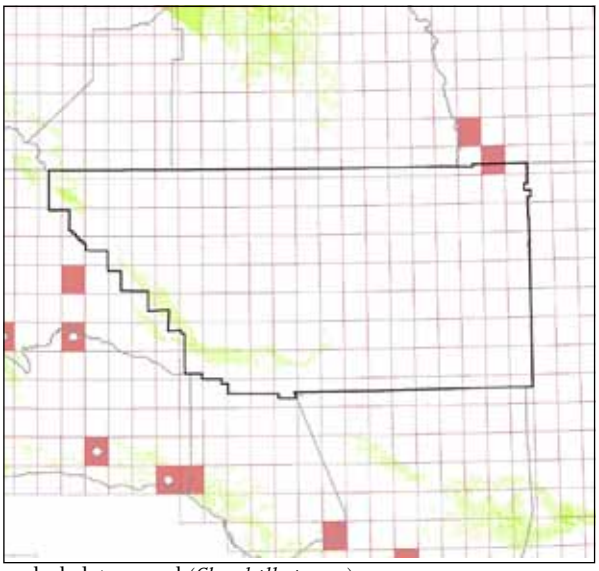
Russian knapweed (*Acroptilon repens*)



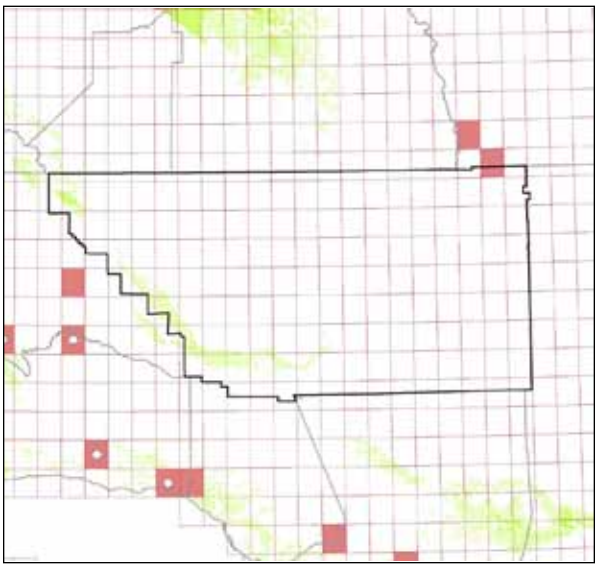
spotted knapweed (*Centaurea maculosa*)



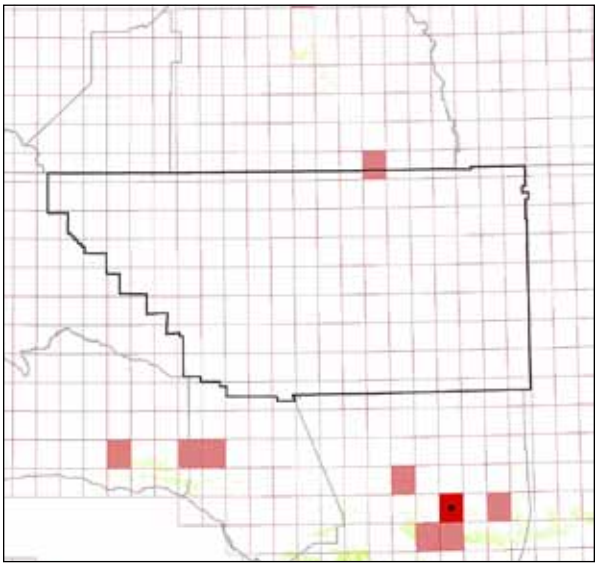
yellow starthistle (*Centaurea solstitialis*)



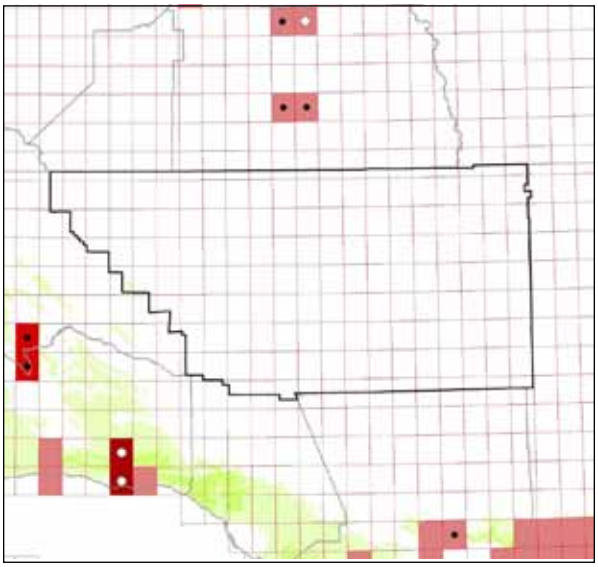
rush skeletonweed (*Chondrilla juncea*)



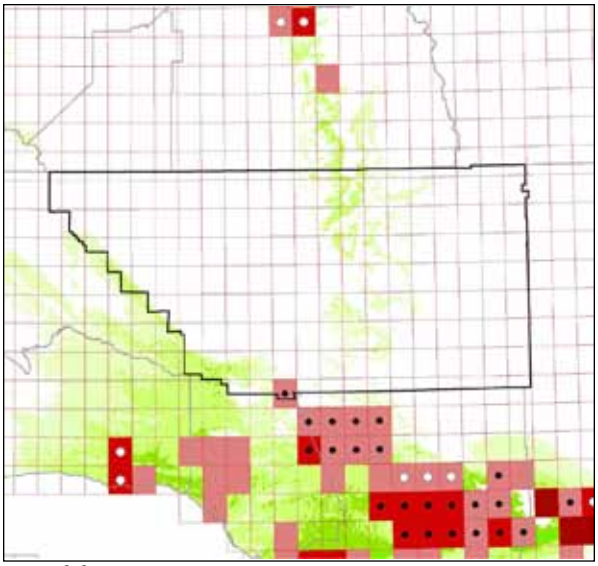
Scotch thistle (*Onopordum acanthium*)



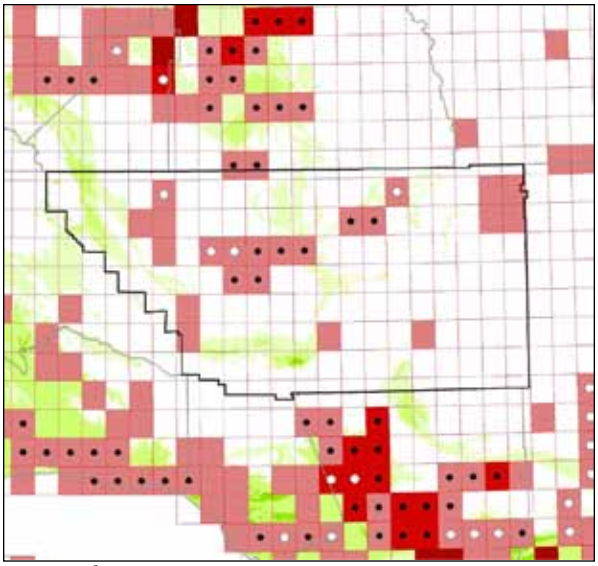
Scotch broom (*Cytisus scopariuss*)



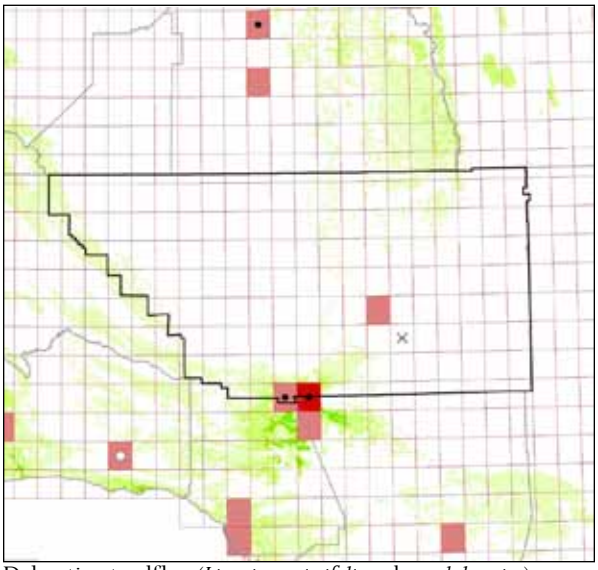
French broom (*Genista monspessulana*)



Spanish broom (*Spartium junceum*)



giant reed (*Arundo donax*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

Management opportunities for Kern WMA

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability change
	Family Apiaceae											
	Poison-hemlock	-	M	-	9	19	33	0	0	14	8	↓
	Family Asteraceae											
●	**Russian knapweed**	**H**	**-**	**-**	**18**	**19**	**43**	**7**	**1**	**94**	**85**	**-**
	Musk thistle	-	-	L	0	-	-	-	0	0	0	-
	Italian thistle & slenderflower thistle	-	M	-	3	-	20	0	0	-	-	-
	Woolly distaff thistle	**-**	**-**	**L**	0	-	-	-	0	0	0	-
	Diffuse knapweed	-	-	L	0	0	-	-	0	7	2	↓
●	**Spotted knapweed**	**-**	**-**	**H**	**3**	**8**	**100**	**100**	**1**	**15**	**14**	**-**
	Tocalote	-	M	-	98	-	11	3	0	-	-	-
●	**Yellow starthistle**	**-**	**H**	**-**	**41**	**46**	**52**	**55**	**0**	**82**	**65**	**↓**
●	**Rush skeletonweed**	**-**	**-**	**M**	**1**	**3**	**0**	**0**	**0**	**3**	**10**	**↑↑**
	Canada thistle	M	-	-	1	3	100	0	0	2	0	**-**
	Bull thistle	-	M	-	27	46	4	13	0	41	70	↑
	Stinkwort	-	-	L	0	0	-	-	0	0	1	**-**
	Ox-eye daisy	-	-	L	4	46	0	0	0	1	2	**-**
●	**Scotch thistle**	**-**	**-**	**H**	**1**	**8**	**0**	**50**	**0**	**1**	**7**	**↑↑**
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	M	-	-	4	-	17	0	0	-	-	-
	Dyer's woad	-	-	L	0	-	-	-	0	0	0	-
	Charlock mustard	-	-	L	12	-	16	0	0	-	-	-
	Family Dipsacaceae											
	Common teasel & fuller's teasel	M	-	-	4	10	17	0	0	9	25	↑↑
	Family Fabaceae											
●	**Scotch broom**	**-**	**-**	**H**	**1**	**-**	**0**	**0**	**0**	**0**	**6**	**-**
●	**French broom**	**-**	**-**	**M**	**0**	**0**	**-**	**-**	**0**	**0**	**9**	**↑↑**
●	**Spanish broom**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**0**	**12**	**69**	**↑↑**
	Black locust	-	L	-	4	-	17	0	0	-	-	-
	Red sesbania	-	-	-	0	0	-	-	0	1	11	↑↑
	Gorse	-	-	-	0	-	-	-	0	0	2	-
	Family Poaceae											
●	**Giant reed**	**-**	**H**	**-**	**15**	**28**	**42**	**17**	**0**	**14**	**50**	**↑↑**
	Annual false-brome	-	-	L	1	7	0	0	0	1	6	↑↑
	Japanese brome	-	-	L	1	-	0	0	0	-	-	-
	Red brome	-	-	-	100	100	0	0	0	98	90	-
	Jubatagrass	-	M	-	4	-	0	0	1	-	-	-
	Pampasgrass	-	M	-	6	-	0	0	1	0	3	-
	Orchardgrass	-	L	-	5	9	0	0	0	28	34	↑

	Common velvet grass	-	M	-	4	8	0	0	0	21	31	↑
	Mediterranean barley	-	M	-	26	-	19	0	0	-	-	-
	Hare barley	-	M	-	76	-	6	0	0	-	-	-
	Italian ryegrass	-	M	-	18	35	13	0	0	21	33	↑
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**H**	**-**	**-**	**2**	**4**	**33**	**33**	**1**	**12**	**42**	**↑↑**
	Yellow toadflax	-	L	-	0	0	-	-	0	2	15	↑↑
	FAMILY SIMAROUBACEAE											
	Tree-of-heaven	-	M	-	39	62	80	3	1	36	80	↑↑
	FAMILY SOLANACEAE											
	Tree tobacco	-	M	-	72	100	0	0	0	16	48	↑↑

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

Eastern Sierra Weed Management Area

These recommendations focus on the far western portions of Inyo and Mono County on the eastern slope of the Sierra Nevada (see map in chapter 1). Statistics are based on all of Inyo and Mono counties.

Eradication is recommended for species that have limited occurrence within the Sierra portion of the WMA. Of the species examined, the following are priority eradication opportunities for Eastern Sierra WMA:

Russian knapweed (*Acroptilon repens*)

diffuse knapweed (*Centaurea diffusa*)

yellow starthistle (*Centaurea solstitialis*)

Scotch thistle (*Onopordum acanthium*)

Spanish broom (*Spartium junceum*)

Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)

yellow toadflax (*Linaria vulgaris*)

tree-of-heaven (*Ailanthus altissima*)

rush skeletonweed (*Chondrilla juncea*)

Containment is recommended for species that are more widespread, where eradication may not be a realistic goal. The following species are priority containment opportunities:

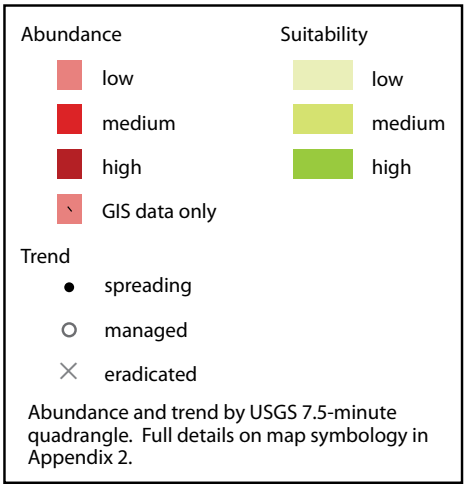
spotted knapweed (*Centaurea maculosa*)

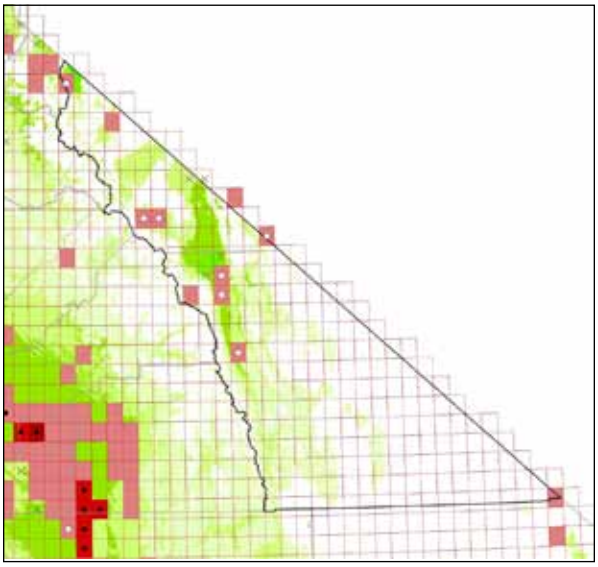
red brome (*Bromus madritensis* subsp *rubens*)

Surveillance is recommended to prevent spread for the following species:

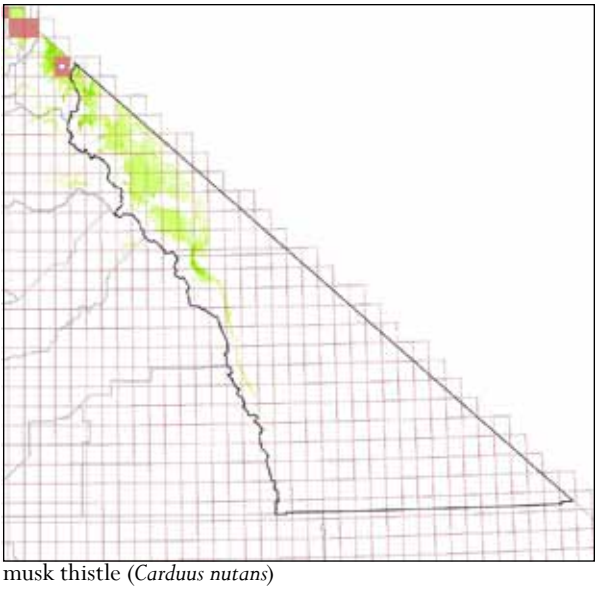
musk thistle (*Carduus nutans*)

dyer's woad (*Isatis tinctoria*)

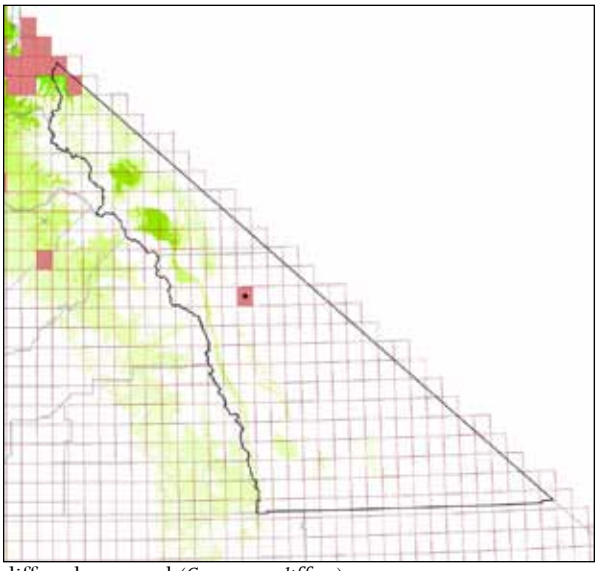




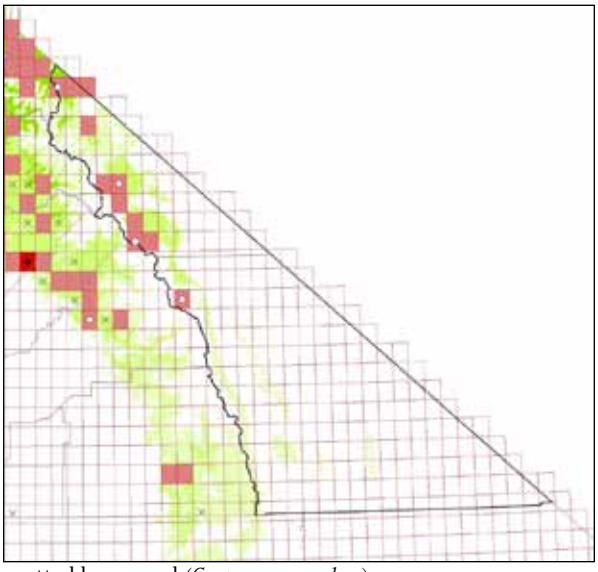
Russian knapweed (*Acroptilon repens*)



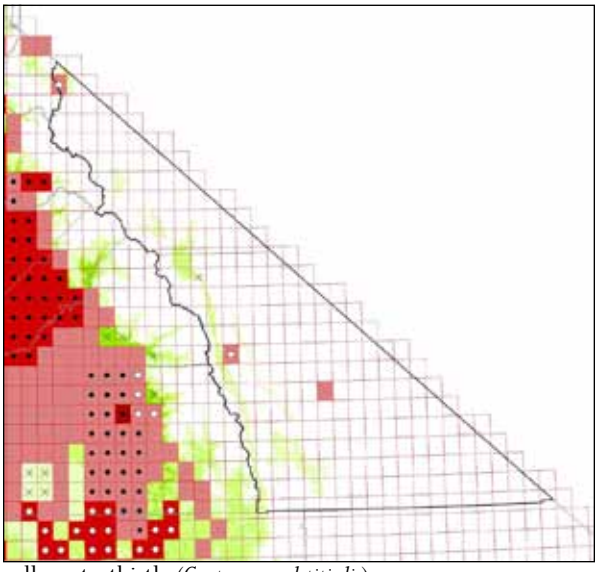
musk thistle (*Carduus nutans*)



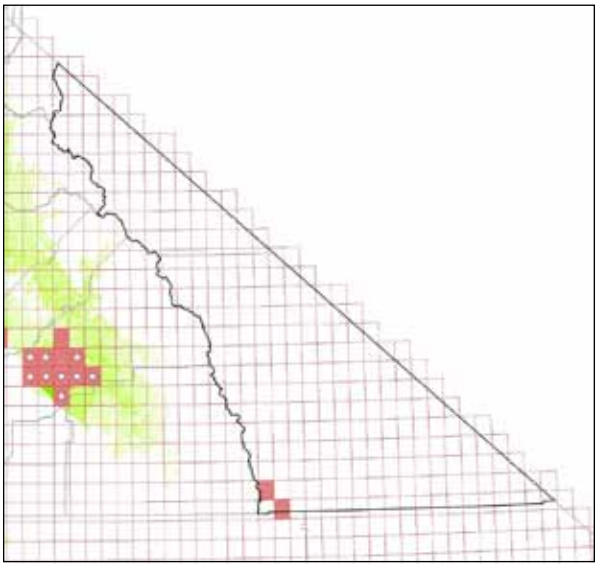
diffuse knapweed (*Centaurea diffusa*)



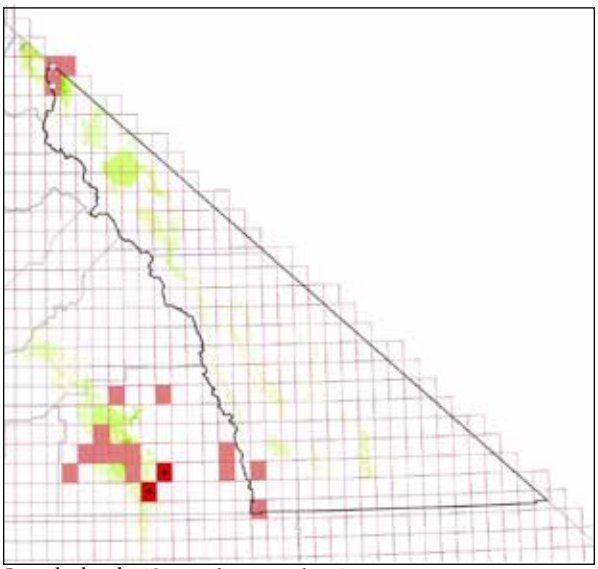
spotted knapweed (*Centaurea maculosa*)



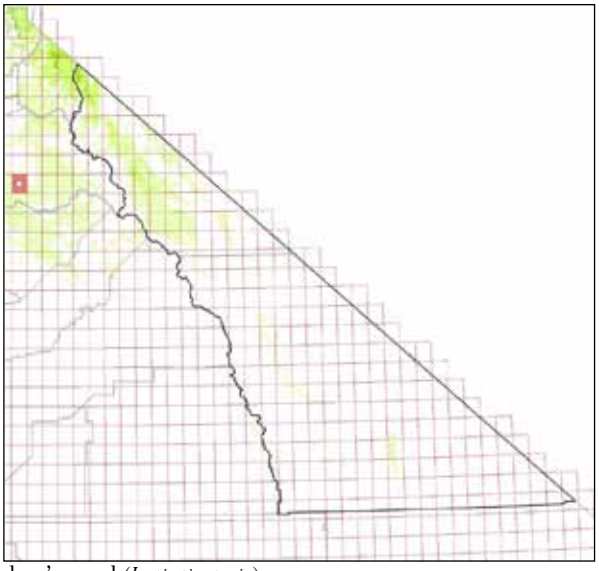
yellow starthistle (*Centaurea solstitialis*)



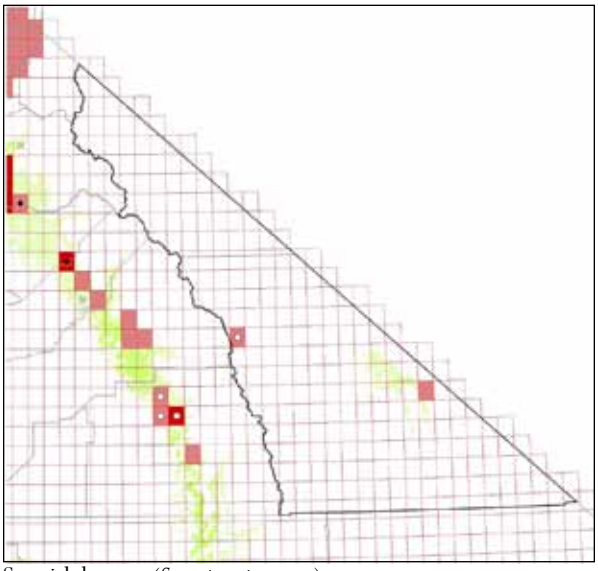
rush skeletonweed (*Chondrilla juncea*)



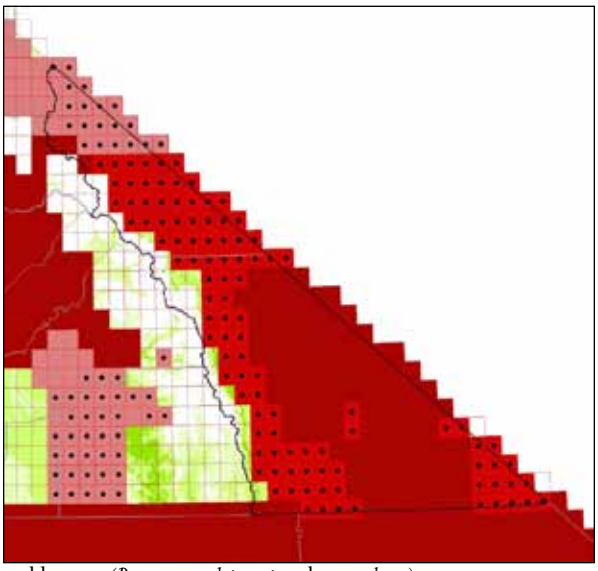
Scotch thistle (*Onopordum acanthium*)



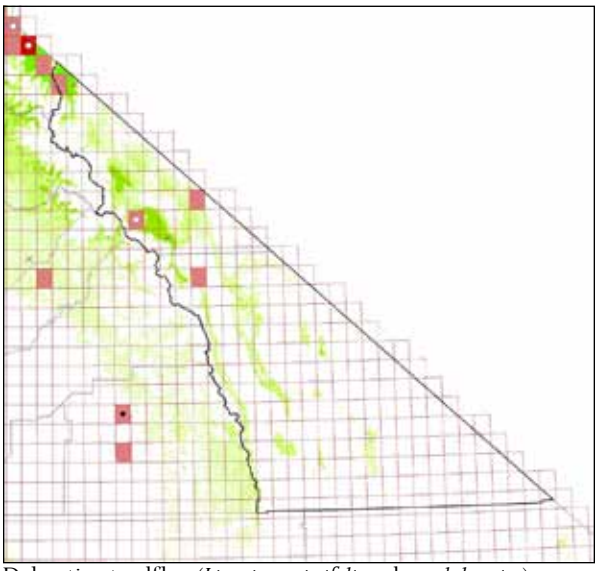
dyer's woad (*Isatis tinctoria*)



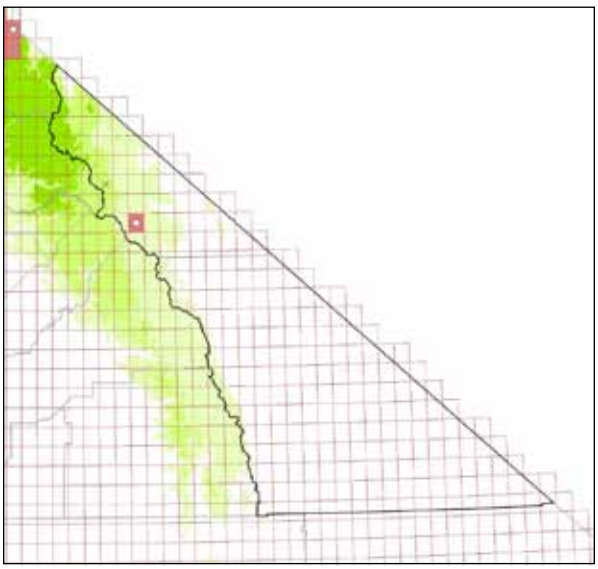
Spanish broom (*Spartium junceum*)



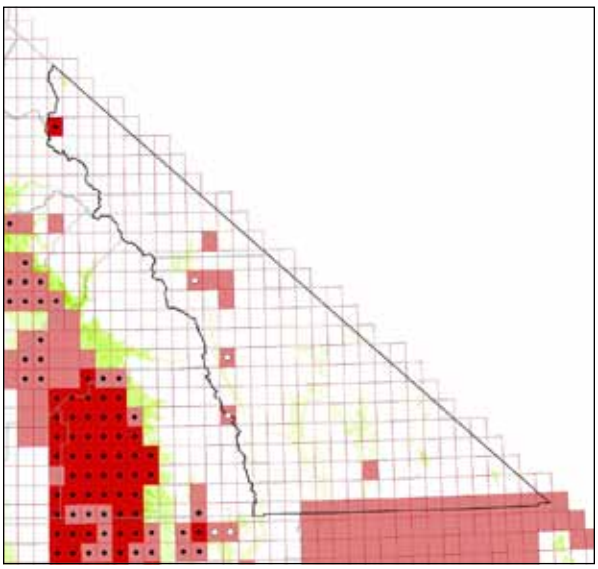
red brome (*Bromus madritensis* subsp. *rubens*)



Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



yellow toadflax (*Linaria vulgaris*)



tree-of-heaven (*Ailanthus altissima*)

Management opportunities for the Eastern Sierra WMA

Priority	Species	Opportunities			Statistics							
		Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability change
	Family Apiaceae											
	Poison-hemlock	-	-	M	7	100	0	95	0	0	4	-
	Family Asteraceae											
●	**Russian knapweed**	**H**	**-**	**-**	**4**	**5**	**0**	**64**	**1**	**37**	**58**	**↑**
●	**Musk thistle**	**-**	**-**	**H**	**0**	**0**	**-**	**-**	**0**	**11**	**6**	**↓**
	Italian thistle & slenderflower thistle	-	-	L	0	-	-	-	0	-	-	-
	Woolly distaff thistle	**-**	**-**	**L**	0	-	-	-	0	0	0	-
●	**Diffuse knapweed**	**H**	**-**	**-**	**1**	**2**	**33**	**0**	**0**	**16**	**33**	**↑↑**
●	**Spotted knapweed**	**-**	**H**	**-**	**4**	**9**	**0**	**36**	**0**	**16**	**35**	**↑↑**
	Tocalote	-	-	M	2	-	0	0	0	-	-	-
●	**Yellow starthistle**	**H**	**-**	**-**	**1**	**4**	**0**	**67**	**0**	**8**	**18**	**↑↑**
●	**Rush skeletonweed**	**M**	**-**	**-**	**1**	**10**	**0**	**0**	**0**	**0**	**6**	**↑↑**
	Canada thistle	M	-	-	4	9	0	82	0	14	16	↑
	Bull thistle	-	L	-	95	100	4	0	0	19	27	↑
	Stinkwort	-	-	-	0	-	-	-	0	0	0	-
	Ox-eye daisy	M	-	-	1	5	0	0	0	1	13	↑↑
●	**Scotch thistle**	**H**	**-**	**-**	**2**	**5**	**0**	**40**	**0**	**9**	**7**	**↓**
	Family Boraginaceae											
	Houndstongue	-	-	-	0	-	-	-	0	-	-	-
	Family Brassicaceae											
	Lens-podded white-top & hoary cress	M	-	-	3	-	0	75	0	-	-	-
●	**Dyer's woad**	**-**	**-**	**M**	**0**	**0**	**-**	**-**	**0**	**11**	**18**	**↑**
	Charlock mustard	-	-	-	0	-	-	-	0	-	-	-
	Famiy Dipsacaceae											
	Common teasel & fuller's teasel	M	-	-	1	6	0	67	0	1	7	↑↑
	Family Fabaceae											
	Scotch broom	-	-	L	0	0	-	-	0	0	5	↑↑
	French broom	-	-	L	0	-	-	-	0	0	0	-
●	**Spanish broom**	**H**	**-**	**-**	**1**	**11**	**0**	**50**	**0**	**2**	**35**	**↑↑**
	Black locust	-	-	L	8	-	0	0	0	-	-	-
	Red sesbania	-	-	-	0	-	-	-	0	0	0	-
	Gorse	-	-	-	0	-	-	-	0	0	0	-
	Family Poaceae											
	Giant reed	M	-	-	3	33	0	0	0	2	13	↑↑
	Annual false-brome	-	-	L	0	-	-	-	0	0	0	-
	Japanese brome	-	-	L	1	-	0	0	0	-	-	-
●	**Red brome**	**-**	**H**	**-**	**85**	**100**	**95**	**0**	**0**	**68**	**72**	**-**
	Jubatagrass	-	-	M	0	-	0	0	0	-	-	-
	Pampasgrass	-	-	M	1	36	0	0	0	1	9	↑↑
	Orchardgrass	-	L	-	9	24	0	4	0	20	35	↑

	Common velvet grass	-	M	-	1	7	0	0	0	4	35	↑↑
	Mediterranean barley	-	-	M	0	-	-	-	0	-	-	-
	Hare barley	-	-	M	8	-	0	0	0	-	-	-
	Italian ryegrass	-	-	L	0	0	-	-	0	0	0	-
	FAMILY POLYGONACEAE											
	Japanese knotweed	-	-	-	0	-	-	-	0	-	-	-
	Giant knotweed	-	-	-	0	-	-	-	0	-	-	-
	FAMILY SCROPHULARIACEAE											
●	**Dalmatian toadflax**	**H**	**-**	**-**	**1**	**3**	**0**	**25**	**1**	**20**	**50**	**↑↑**
●	**Yellow toadflax**	**H**	**-**	**-**	**0**	**1**	**0**	**100**	**0**	**24**	**35**	**↑**
	FAMILY SIMAROUBACEAE											
●	**Tree-of-heaven**	**H**	**-**	**-**	**9**	**23**	**4**	**12**	**0**	**5**	**29**	**↑↑**
	FAMILY SOLANACEAE											
	Tree tobacco	-	-	L	0	100	0	0	0	0	5	↑↑

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

4. STATEWIDE MAPS AND SPECIES PROFILES

For each of the 43 species covered in this report, this chapter presents a brief profile and statewide maps showing distribution and suitable range. These maps indicate where populations of the species continue to spread and where the species is under management.

For most of species, smaller maps show the change in suitable range using climate projections for 2050. These maps provide a general picture of where each invasive plant might spread in the future but they are not detailed predictions. (Appendix 2 provides details on the map symbology.) Accompanying tables summarize statistics and management opportunities by Weed Management Area.

Each species profile provides a brief description of the plant's biology and ecology, based primarily on the "California Invasive Plant Inventory" (Cal-IPC 2006), *Invasive Plants of California's Wildlands* (Bossard et al. 2000), *Weeds of California and Other Western States* (DiTomaso and Healy 2007) and the "Pest Ratings of Noxious Weeds and Noxious Weed Seeds" (CDFA 2010). Each profile also summarizes priority recommendations for the region and overall change in suitable range for the species in the Sierra Nevada. See chapter 1 for a more complete description of mapping and modeling methods.

Key to Tables

Opportunities: H = high priority, M = medium, L = low

% Infested: portion of USGS quads in the area in which the species is present in wildlands

% Suitable Infested: portion of quads in the area with suitable climate that are currently infested

% Spreading: portion of infested quads in which the species is spreading

% Managed: portion of infested quads where species is under management

% Eradicated: portion of all quads in the area in which the species has been eradicated

% Suitable in 2010: portion of area with current climatic suitability of at least a level of "low" or higher

% Suitable in 2050: of area with projected 2050 climatic suitability of at least a level of "low" or higher

Suitability change:
↑ = a 15% - 99% increase from 2010 to 2050
↑↑= an increase of greater than 100%
↓ = a decrease of greater than 15%

Poison-hemlock

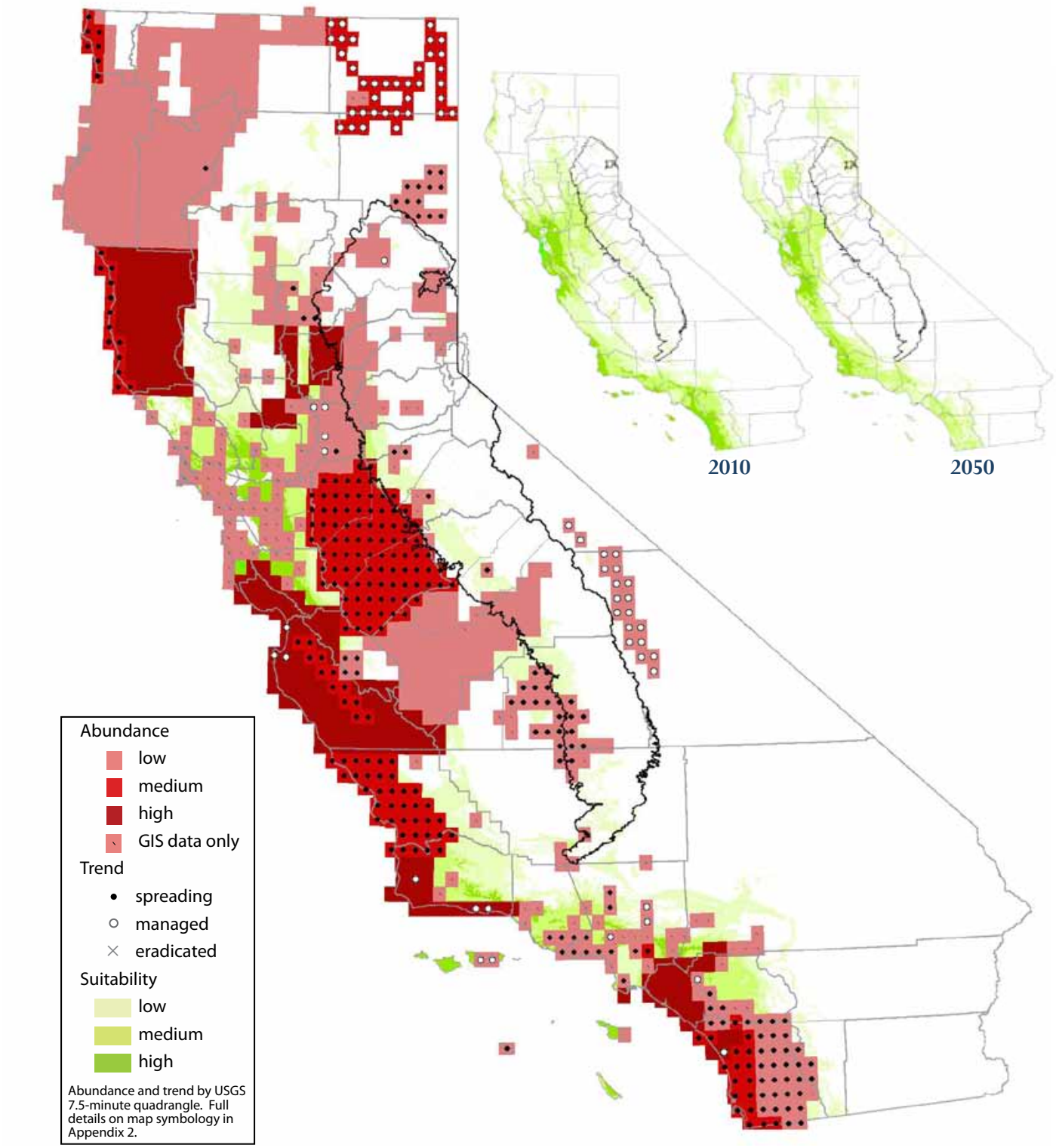
(*Conium maculatum*)

Ratings: Cal-IPC Moderate; CDFA not rated

Poison-hemlock is an erect biennial, sometimes annual or short-lived perennial to 120 in. (3 m) tall with large triangular, dissected compound leaves and purple-spotted stems. It occurs throughout California in roadsides, pastures, fields, riparian areas and other disturbed, often moist sites. It is common in shady areas throughout the state. Poison-hemlock is toxic to humans, livestock, and wildlife. Plants do not regenerate when hand pulled or cut below the crown. Our modeling suggests that the amount of suitable range for poison-hemlock in the Sierra Nevada will decrease with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	M	-	24	100	48	0	0	3	41	↑↑
Plumas/Sierra	-	M	-	26	100	5	5	0	3	25	↑↑
Butte	-	M	-	46	60	14	0	0	51	20	↓
Yuba/Sutter	-	M	-	54	91	0	0	0	68	14	↓
Nevada/Placer	-	M	-	51	91	0	0	0	32	3	↓
Lake Tahoe Basin	-	M	-	11	100	0	0	0	1	7	↑↑
El Dorado	-	M	-	24	58	0	0	0	23	5	↓
Alpine	-	-	M	0	0	-	-	0	1	10	↑↑
Amador	M	-	-	29	44	50	0	0	44	20	↓
Central Sierra	-	M	-	18	34	79	0	0	26	8	↓
Sierra/San Joaquin	-	M	-	51	100	14	1	0	22	2	↓
Tulare	-	M	-	26	58	81	0	0	26	0	↓
Kern	-	M	-	9	19	33	0	0	14	8	↓
Eastern Sierra	-	-	M	7	100	0	95	0	0	4	-
All Sierra Nevada	L	M	-	27	53	29	2	0	21	9	↓

Poison-hemlock (*Conium maculatum*)



Russian knapweed

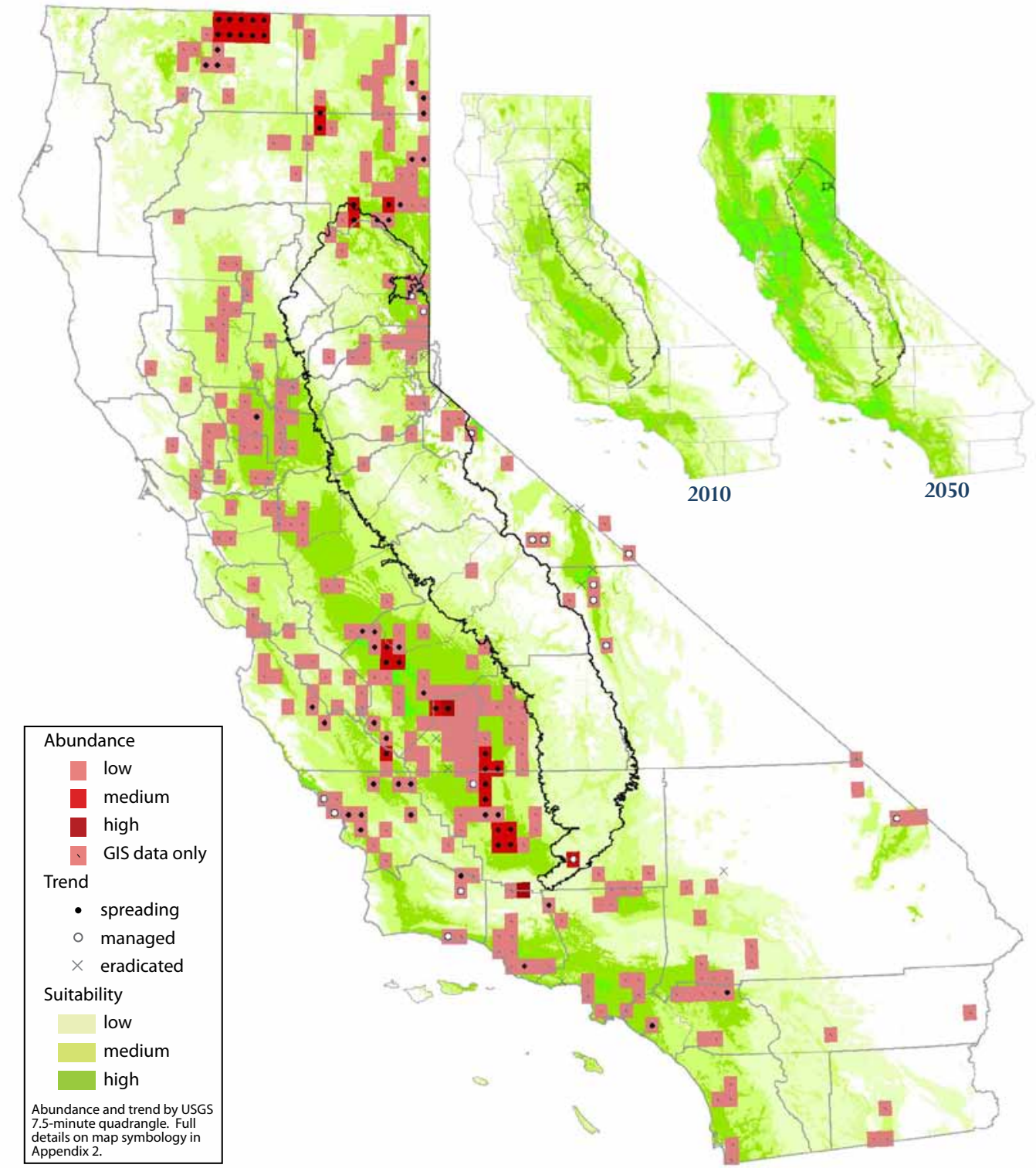
(*Acroptilon repens*)

Ratings: Cal-IPC Moderate; CDFA B

Russian knapweed typically invades disturbed, open sites such as roadsides, riverbanks, irrigation ditches, pasture, waste places, and cropland. Russian knapweed does not readily establish or thrive in healthy, natural habitats because it is sensitive to shading and may not compete well with other plants. Occasionally, Russian knapweed grows in healthy native plant communities, especially those lacking aggressive plant competition or in areas that border sites with recent natural or anthropogenic disturbance. Russian knapweed commonly infests cropland and can be found as a contaminant in hay, straw, and fill dirt. Plants often grow in roadsides, ditches, and parking areas and are spread along transportation corridors. Our modeling suggests that the amount of suitable range for Russian knapweed in the Sierra Nevada will increase with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	H	-	28	28	34	3	0	94	98	-
Plumas/Sierra	-	H	-	13	13	18	18	0	82	98	↑
Butte	-	-	M	10	19	0	0	0	66	100	↑
Yuba/Sutter	-	-	M	19	33	0	0	0	86	100	↑
Nevada/Placer	-	H	-	21	21	0	0	3	78	100	↑
Lake Tahoe Basin	H	-	-	22	27	0	0	17	62	99	↑
El Dorado	H	-	-	9	9	0	0	7	77	100	↑
Alpine	H	-	-	17	18	0	25	8	50	93	↑
Amador	H	-	-	11	11	0	0	4	89	100	-
Central Sierra	-	-	M	1	1	0	0	1	70	89	↑
Sierra/San Joaquin	H	-	-	16	16	33	0	0	79	87	-
Tulare	-	-	H	22	22	14	0	0	79	88	-
Kern	H	-	-	18	19	43	7	1	94	85	-
Eastern Sierra	H	-	-	4	5	0	64	1	37	58	↑
All Sierra Nevada	H	M		8	8	13	11	1	76	90	↑

Russian knapweed (*Acroptilon repens*)



Musk Thistle

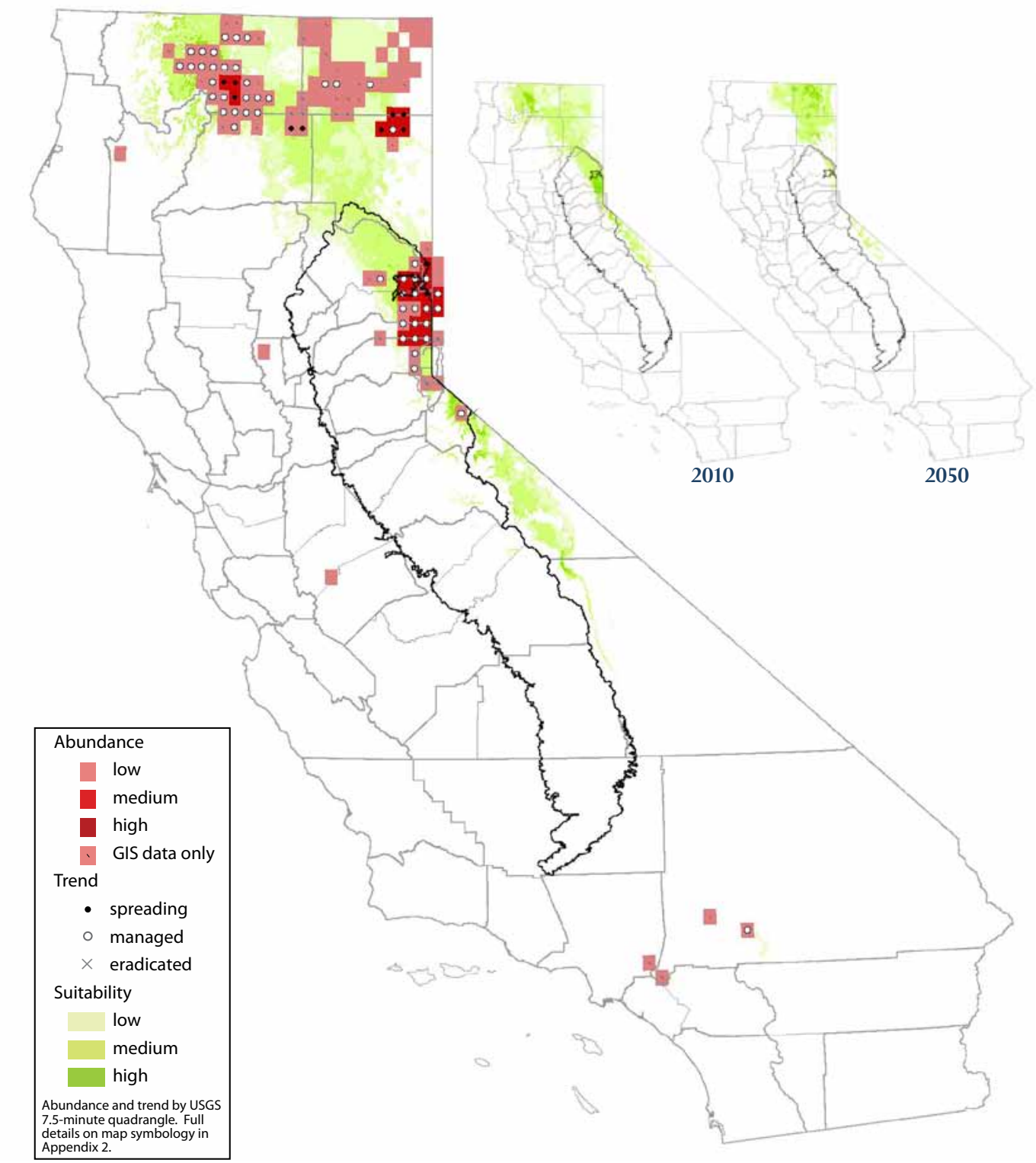
(*Carduus nutans*)

Ratings: Cal-IPC Moderate; CDFA A

Musk thistle is a biennial or winter annual thistle with purple to pink flowers. It readily hybridizes with plumeless thistle (*Carduus acanthoides*). It produces a taproot that grows to >16 in (40 cm). Like other thistles, it colonizes disturbed open sites, pastures, and annual grasslands. Musk thistle is often associated with sandy fertile soils or soils that are high in calcium, but it tolerates a wide range of soil conditions, including those that are acidic or saline. *Carduus nutans* can form dense stands and may inhibit the growth of other plants through allelopathy. It is also a host plant for an introduced weevil that attacks native thistles. Thistles generally compete poorly with established grasses and other vegetation. We recommend eradication in the few isolated quads as a high priority, and containment as a high priority elsewhere. Our modeling suggests that the amount of suitable range for musk thistle in the Sierra Nevada will decrease with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	H	-	15	16	41	18	0	71	56	↓
Plumas/Sierra	-	H	-	21	28	39	50	0	58	13	↓
Butte	-	-	M	0	0	-	-	0	1	0	-
Yuba/Sutter	-	-	M	0	-	-	-	0	0	0	-
Nevada/Placer	-	H	-	14	45	0	0	0	17	3	↓
Lake Tahoe Basin	-	H	-	33	40	0	0	0	46	5	↓
El Dorado	H	-	-	7	20	0	0	0	8	0	
Alpine	H	-	-	8	10	0	0	4	31	6	↓
Amador	-	-	M	0	0	-	-	0	1	0	-
Central Sierra	-	-	L	0	0	-	-	0	4	0	-
Sierra/San Joaquin	-	-	L	0	0	-	-	0	1	0	-
Tulare	-	-	L	0	0	-	-	0	0	0	-
Kern	-	-	L	0	-	-	-	0	0	0	-
Eastern Sierra	-	-	H	0	0	-	-	0	11	6	↓
All Sierra Nevada	H	H	-	5	19	19	27	0	13	3	↓

Musk thistle (*Carduus nutans*)



Italian thistle and slenderflower thistle

(*Carduus pycnocephalus and C. tenuiflorus*)

Ratings: *C. pycnocephalus*: Cal-IPC Moderate; CDFA C

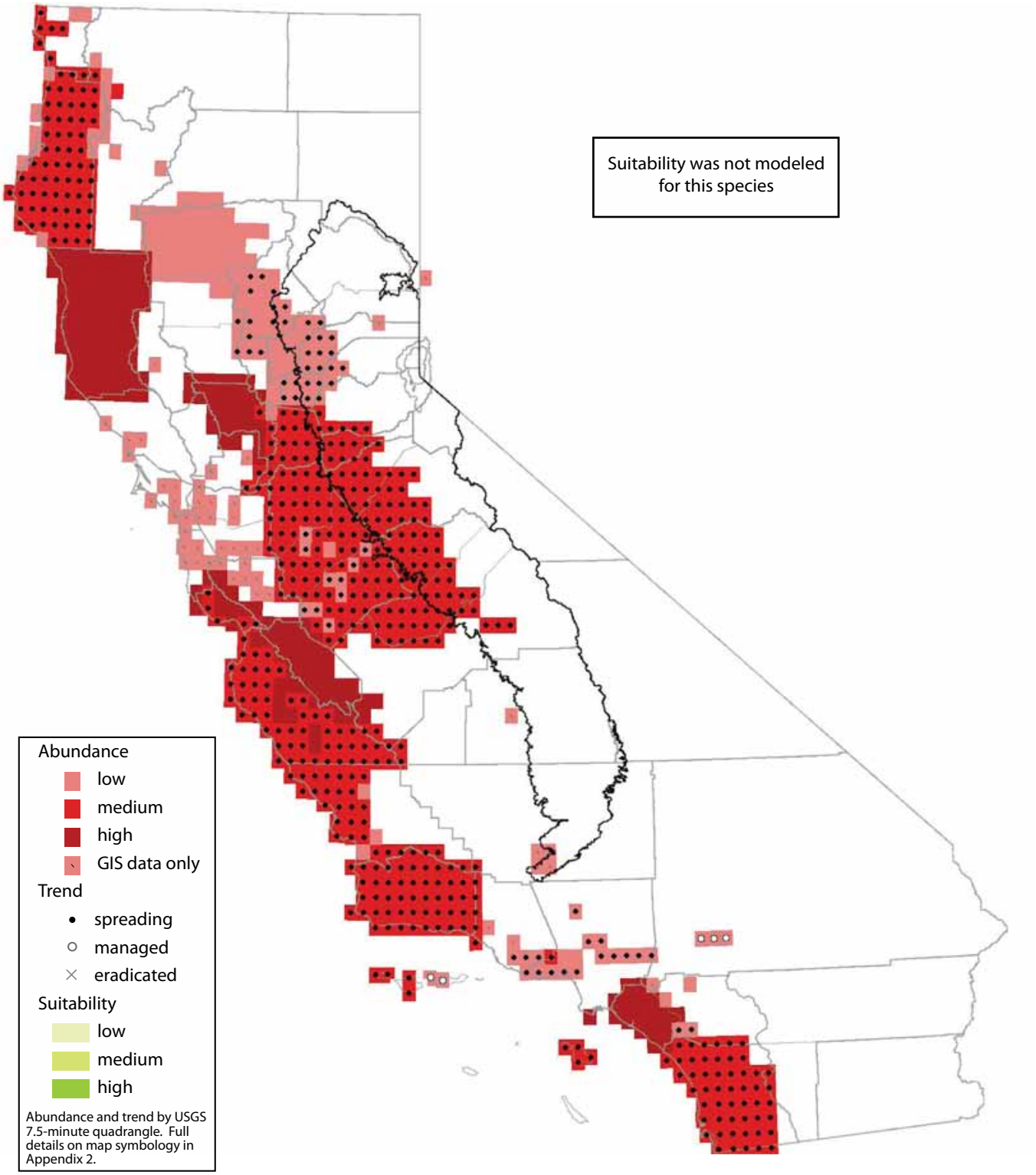
C. tenuiflorus: Cal-IPC Limited; CDFA C

We combined Italian and slenderflower thistles for this report due to difficulties in their identification and because they occasionally hybridize. Both species are winter annuals or biennials that grow up to 6 ft (2 m) tall with pink to purple flowers. Both are widely distributed in California. They colonize disturbed sites and annual grasslands but inhabit drier sites than musk thistle. Thistles generally compete poorly with established grasses and other vegetation. We did not model suitability for this species.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	M	1	-	0	0	0	-	-	-
Plumas/Sierra	-	-	M	2	-	50	0	0	-	-	-
Butte	-	M	-	60	-	38	0	0	-	-	-
Yuba/Sutter	-	M	-	60	-	55	0	0	-	-	-
Nevada/Placer	M	M	-	48	-	97	0	0	-	-	-
Lake Tahoe Basin	-	-	M	0	-	-	-	0	-	-	-
El Dorado	-	M	-	24	-	100	0	0	-	-	-
Alpine	-	-	M	0	-	-	-	0	-	-	-
Amador	-	M	-	68	-	100	0	0	-	-	-
Central Sierra	-	M	-	49	-	100	0	0	-	-	-
Sierra/San Joaquin	-	H	-	32	-	100	0	0	-	-	-
Tulare	-	-	M	1	-	0	0	0	-	-	-
Kern	-	M	-	3	-	20	0	0	-	-	-
Eastern Sierra	-	-	L	0	-	-	-	0	-	-	-
All Sierra Nevada	-	M	-	26	-	91	0	0	-	-	-

Italian thistle and slenderflower thistle

(*Carduus pycnocephalus* and *C. tenuiflorus*)



Woolly distaff thistle

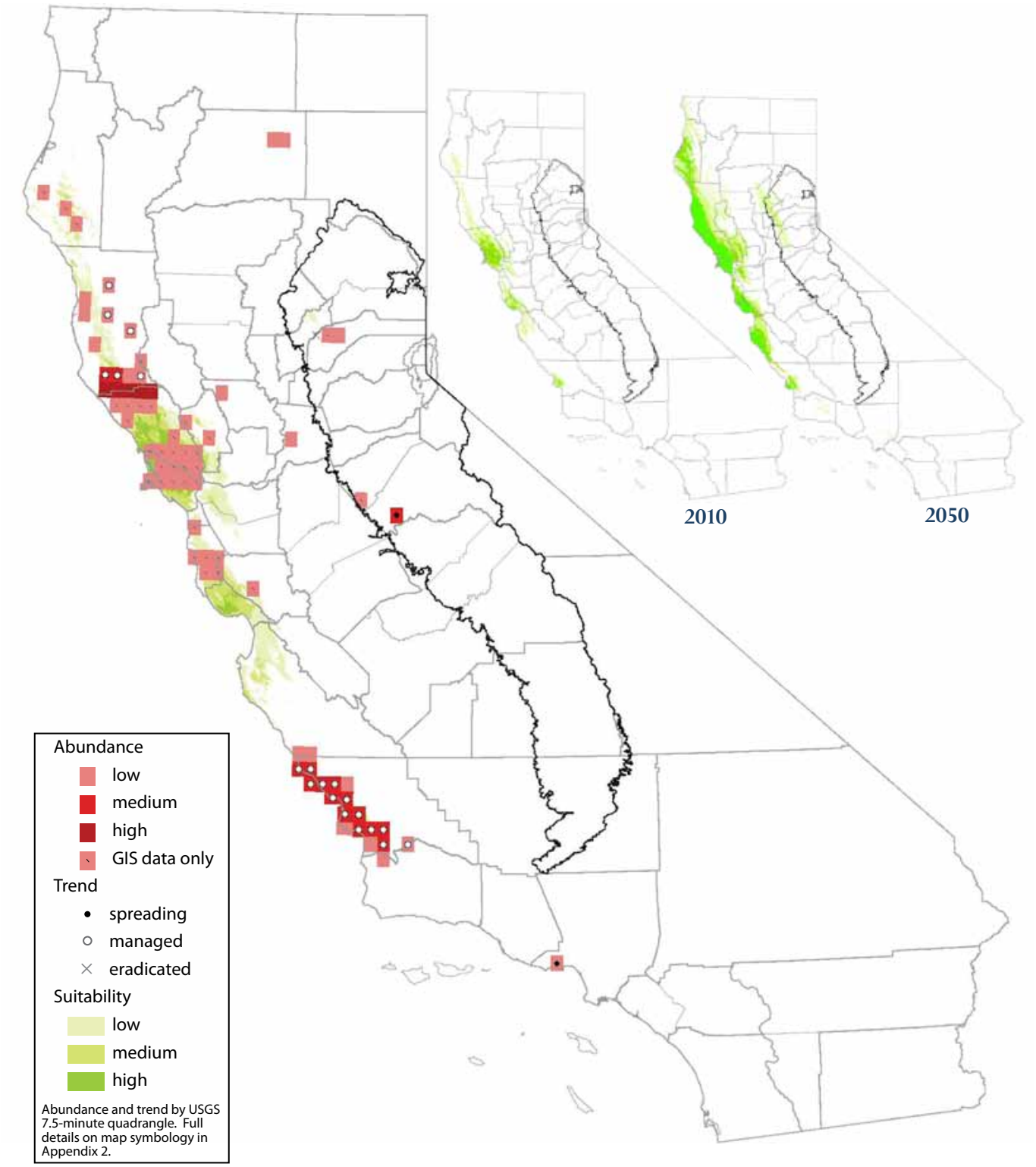
(*Carthamus lanatus*)

Ratings: Cal-IPC Moderate Alert; CDFA B

An annual thistle with a rigid stem to 40 in. (1 m) tall, woolly distaff thistle is highly competitive with cereal crops and desirable rangeland species. It grows in disturbed open sites, grasslands, rangelands, and on many soil types. Woolly distaff thistle is especially prolific in areas that receive 16-24 in. (40-60 cm) annual rainfall. Its large seeds and flat rosettes give it an early growth advantage over other species. The spiny foliage and flower heads can injure livestock. Some botanists classify smooth distaff thistle (*Carthamus baeticus*) as a subspecies of *C. lanatus*. Our modeling suggests that the amount of suitable range for woolly distaff thistle in the Sierra Nevada will increase considerably with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	L	0	-	-	-	0	0	0	-
Plumas/Sierra	-	-	M	0	0			0	0	2	-
Butte	-	-	L	0	0	-	-	0	1	34	↑↑
Yuba/Sutter	-	-	M	0	0	-	-	3	3	23	↑↑
Nevada/Placer	M	-	-	3	67	0	0	2	1	16	↑↑
Lake Tahoe Basin	-	-	L	0	-	-	-	0	0	0	-
El Dorado	-	-	M	0	-	-	-	0	0	17	-
Alpine	-	-	L	0	-	-	-	0	0	0	-
Amador	-	-	M	0	-	-	-	0	0	9	-
Central Sierra	M	-	-	3	-	50	0	0	0	0	-
Sierra/San Joaquin	-	-	M	0	-	-	-	0	0	0	-
Tulare	-	-	L	0	-	-	-	0	0	0	-
Kern	-	-	L	0	-	-	-	0	0	0	-
Eastern Sierra	-	-	L	0	-	-	-	0	0	0	-
All Sierra Nevada	L	-	-	1	40	25	0	0	0	5	↑↑

Woolly distaff thistle (*Carthamus lanatus*)



Diffuse knapweed

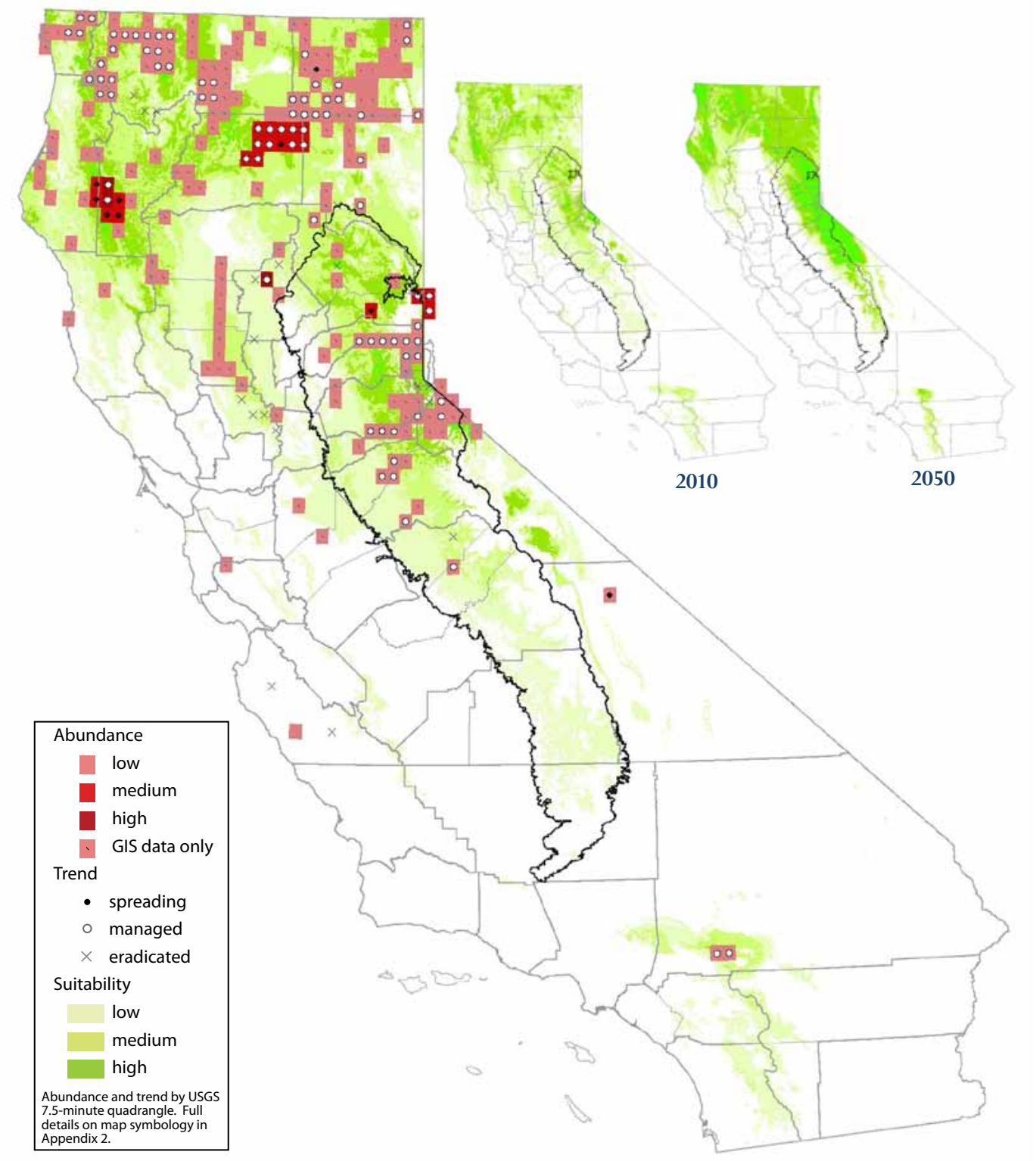
(*Centaurea diffusa*)

Ratings: Cal-IPC Moderate; CDFA A

Diffuse knapweed is typically a biennial but can grow as an annual or short-lived perennial. It invades fields, disturbed open sites, grasslands, and rangeland. It forms large, dense infestations, especially on light, well-drained soils in areas that receive summer rainfall. It requires less moisture than spotted knapweed. Disturbance increases the rate and density of diffuse knapweed. It can be spread by attaching to vehicles. It occasionally hybridizes with spotted knapweed. Maintaining pasture and rangeland health by preventing overgrazing and minimizing disturbance can help limit knapweeds. Our modeling suggests that the amount of suitable range for diffuse knapweed in the Sierra Nevada will remain relatively unchanged with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	H	-	-	20	20	9	9	1	85	100	↑
Plumas/Sierra	H	-	-	12	12	40	40	2	94	99	-
Butte	-	-	M	6	6	33	0	4	83	37	↓
Yuba/Sutter	-	-	M	3	4	0	0	3	65	27	↓
Nevada/Placer	-	M	-	22	23	7	0	0	70	68	-
Lake Tahoe Basin	-	M	-	50	60	0	0	17	88	100	-
El Dorado	-	M	-	28	29	0	0	7	90	72	↓
Alpine	-	M	-	42	42	0	0	8	80	100	↑
Amador	-	M	-	25	25	0	0	0	98	51	↓
Central Sierra	-	M	-	8	8	0	0	0	80	63	↓
Sierra/San Joaquin	H	-	-	1	2	0	0	1	32	29	-
Tulare	-	-	L	0	0	-	-	0	30	26	-
Kern	-	-	L	0	0	-	-	0	7	2	↓
Eastern Sierra	H	-	-	1	2	33	0	0	16	33	↑↑
All Sierra Nevada	M	M	-	10	10	4	2	1	62	56	-

Diffuse knapweed (*Centaurea diffusa*)



Spotted knapweed

(*Centaurea maculosa*)

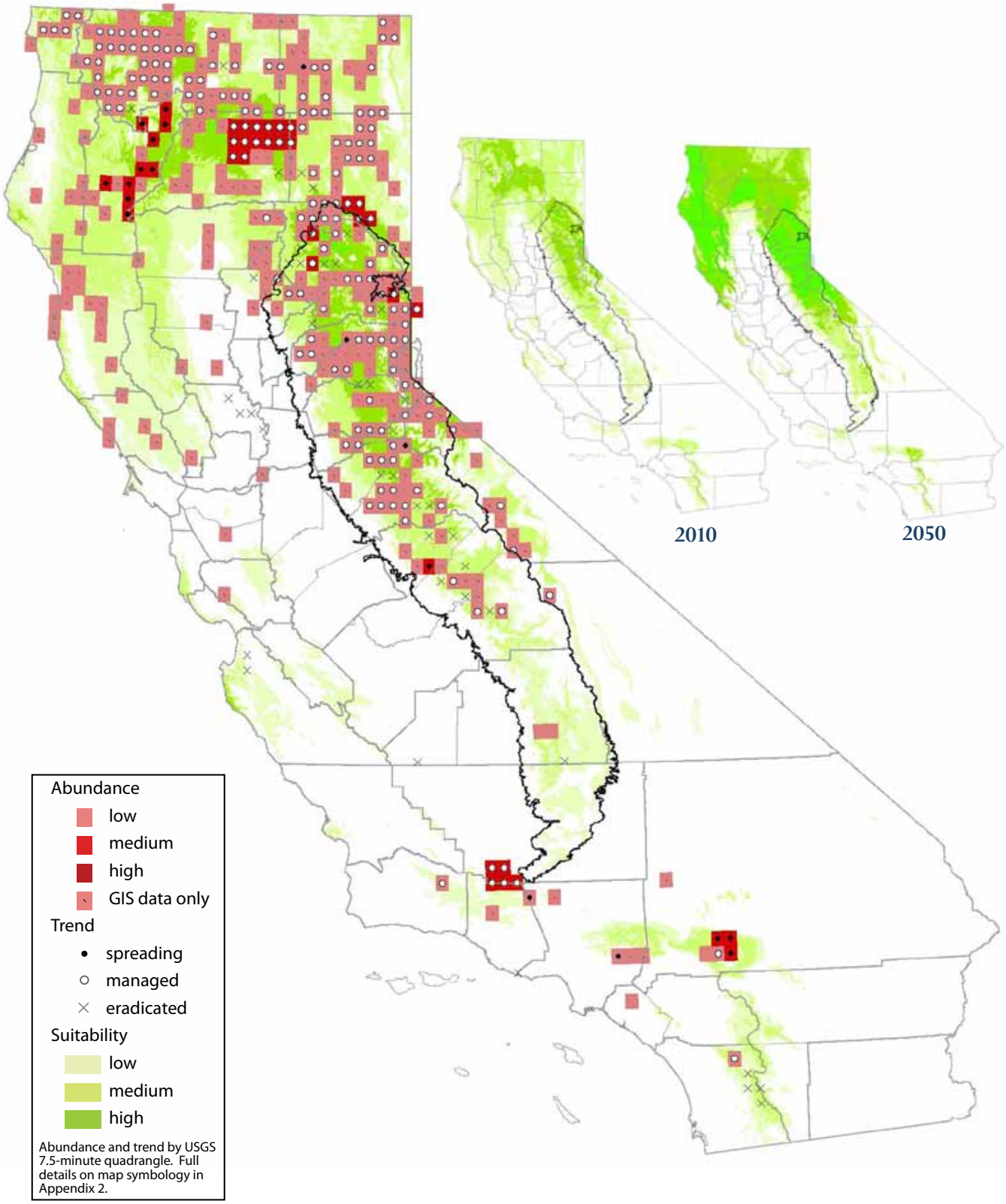
Ratings: Cal-IPC High; CDFA A

Spotted knapweed is a biennial to short-lived perennial that grows 40 in. (1 m) tall. It invades fields, disturbed open sites, grasslands, and rangeland. It forms large, dense infestations, especially on light, well-drained soils in areas that receive summer rainfall. Spotted knapweed requires more moisture than diffuse knapweed. Spotted knapweed can be transported on the undercarriages of vehicles and by moving hay from infested to non-infested areas. Maintaining pasture and rangeland health by preventing overgrazing and minimizing disturbance can help limit knapweeds. We recommend eradication as a high priority where possible and containment as a high priority elsewhere. Our modeling suggests that the amount of suitable range for spotted knapweed in the Sierra Nevada will remain relatively unchanged with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	H	-	40	41	0	9	2	90	100	-
Plumas/Sierra	-	H	-	47	47	5	38	8	99	100	-
Butte	-	H	-	27	35	0	0	2	58	59	-
Yuba/Sutter	-	-	H	5	20	0	0	3	31	34	-
Nevada/Placer	-	H	-	43	51	4	0	3	75	75	-
Lake Tahoe Basin	-	H	-	67	80	0	0	6	79	100	↑
El Dorado	-	H	-	44	46	0	0	9	84	83	-
Alpine	-	H	-	46	50	0	9	0	76	100	↑
Amador	-	H	-	39	48	0	0	4	63	60	-
Central Sierra	-	H	-	28	31	0	0	5	66	76	↑
Sierra/San Joaquin	-	H	-	8	14	6	19	3	30	42	↑
Tulare	H	-	-	2	3	0	0	1	35	45	↑
Kern	-	-	H	3	8	100	100	1	15	14	-
Eastern Sierra	-	H	-	4	9	0	36	0	16	35	↑↑
All Sierra Nevada	H	H	-	26	30	4	15	5	62	71	-

Abundance, Trend and Suitability

Spotted knapweed (*Centaurea maculosa*)



Tocalote

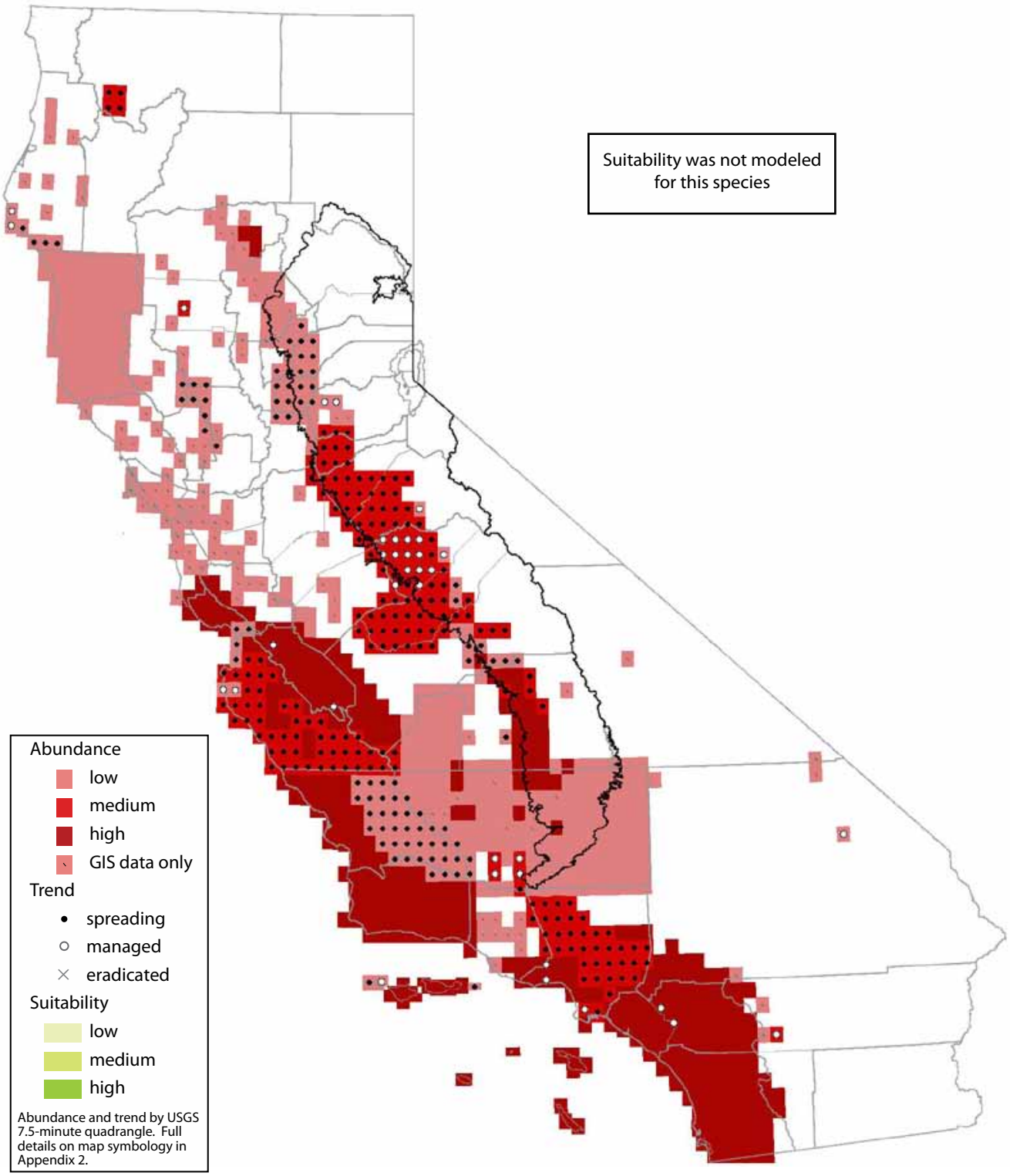
(*Centaurea melitensis*)

Ratings: Cal-IPC Moderate; CDFA C

Tocalote, or Malta starthistle, looks similar to yellow starthistle but is less common statewide. It grows as a simple to bushy winter annual or occasionally as a biennial. It inhabits open disturbed sites, grasslands, rangelands, and woodlands. Dense stands displace native plants and animals. It can be spread through human activities such as attaching to equipment or vehicles and as a seed or soil contaminant. As it is difficult to distinguish from the more familiar yellow starthistle, it may be more widespread than our maps indicate. We did not model suitability for this species.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	M	0	-	-	-	0	-	-	-
Plumas/Sierra	-	-	M	1	-	0	0	0	-	-	-
Butte	-	M	-	44	-	5	0	0	-	-	-
Yuba/Sutter	-	M	-	41	-	60	0	0	-	-	-
Nevada/Placer	-	M	-	37	-	91	0	0	-	-	-
Lake Tahoe Basin	-	-	M	0	-	-	-	0	-	-	-
El Dorado	-	H	-	26	-	42	0	0	-	-	-
Alpine	-	M	-	0	-	-	-	0	-	-	-
Amador	-	M	-	54	-	87	0	0	-	-	-
Central Sierra	-	M	-	46	-	92	0	0	-	-	-
Sierra/San Joaquin	-	M	-	52	-	55	0	0	-	-	-
Tulare	-	M	-	49	-	16	0	0	-	-	-
Kern	-	M	-	98	-	11	3	0	-	-	-
Eastern Sierra	-	-	M	2	-	0	0	0	-	-	-
All Sierra Nevada	-	M	-	42	-	46	1	0	-	-	-

Tocalote (*Centaurea melitensis*)



Yellow starthistle

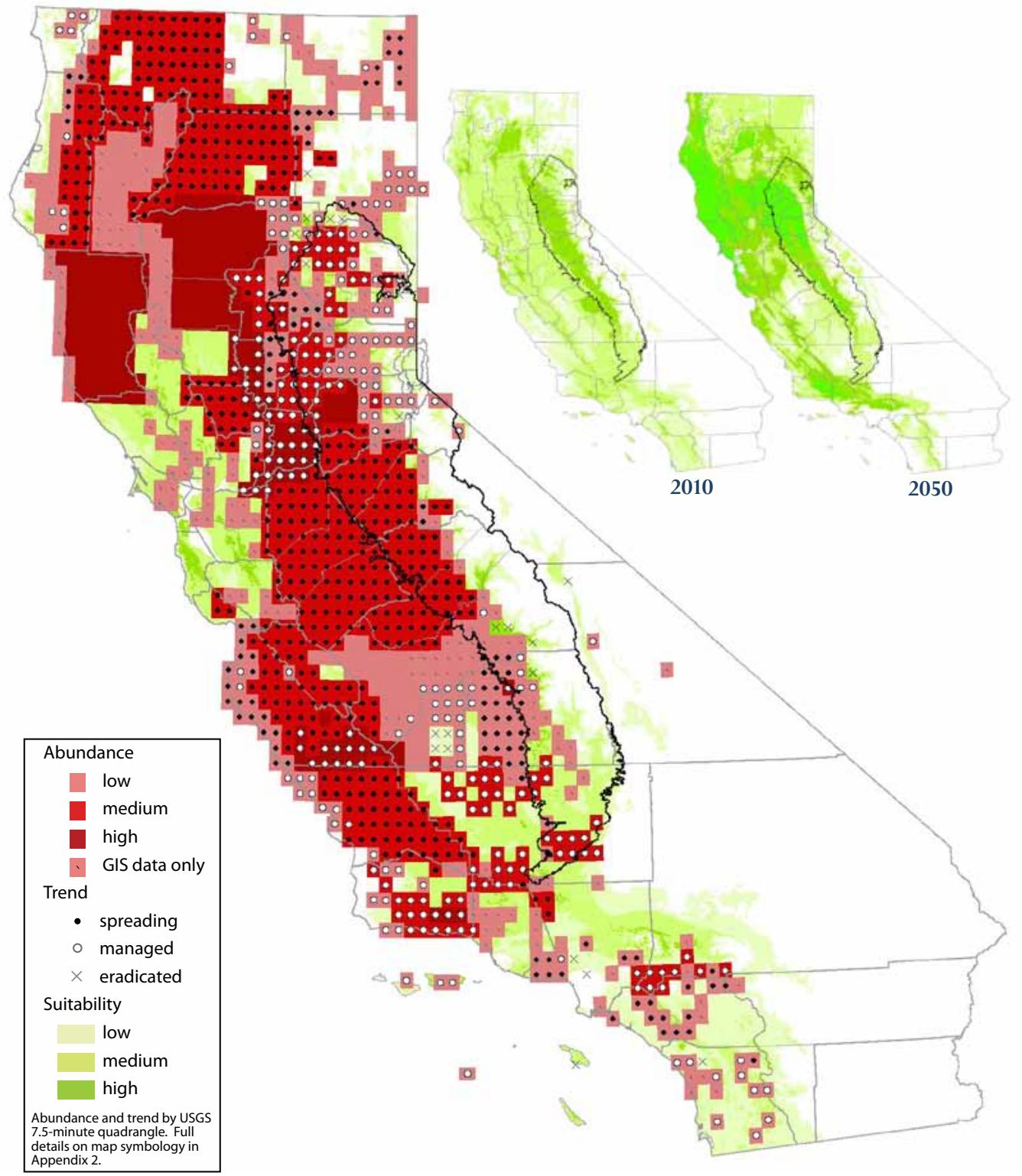
(*Centaurea solstitialis*)

Ratings: Cal-IPC High; CDFA B

Yellow starthistle infests more than 14 million acres in California and may be the most widely distributed invasive plant statewide. It grows as a simple to bushy winter annual or occasionally as a biennial. It inhabits open disturbed sites, grasslands, rangelands, and woodlands. Dense stands displace native plants and animals and reduce the quality of rangeland by reducing forage quality and yield. It can be spread through human activities such as attaching to equipment or vehicles and as a seed or soil contaminant. Grazing, mowing, burning, and cultivation can prevent seed production and control spread when properly timed and used for several years. We recommend containment as a high priority, in coordination with the existing Yellow Starthistle Leading Edge Project. Our modeling suggests that the amount of suitable range for yellow starthistle in the Sierra Nevada will remain relatively unchanged with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	H	-	36	38	46	12	4	55	97	↑
Plumas/Sierra	-	H	-	62	62	42	53	6	81	100	↑
Butte	-	H	-	98	98	21	4	0	100	100	-
Yuba/Sutter	-	H	-	78	100	59	0	0	100	100	-
Nevada/Placer	-	H	-	79	79	52	0	0	89	99	-
Lake Tahoe Basin	H	-	-	22	27	0	0	17	50	80	↑
El Dorado	-	H	-	72	73	36	0	9	86	94	-
Alpine	H	-	-	21	24	20	20	8	32	70	↑↑
Amador	-	H	-	89	89	88	0	7	92	96	-
Central Sierra	-	H	-	65	73	92	0	0	71	78	-
Sierra/San Joaquin	-	H	-	69	74	48	1	2	78	78	-
Tulare	-	H	-	52	55	60	14	1	79	86	-
Kern	-	H	-	41	46	52	55	0	82	65	↓
Eastern Sierra	H	-	-	1	4	0	67	0	8	18	↑↑
All Sierra Nevada	H	H	-	57	61	64	16	3	78	85	-

Yellow starthistle (*Centaurea solstitialis*)

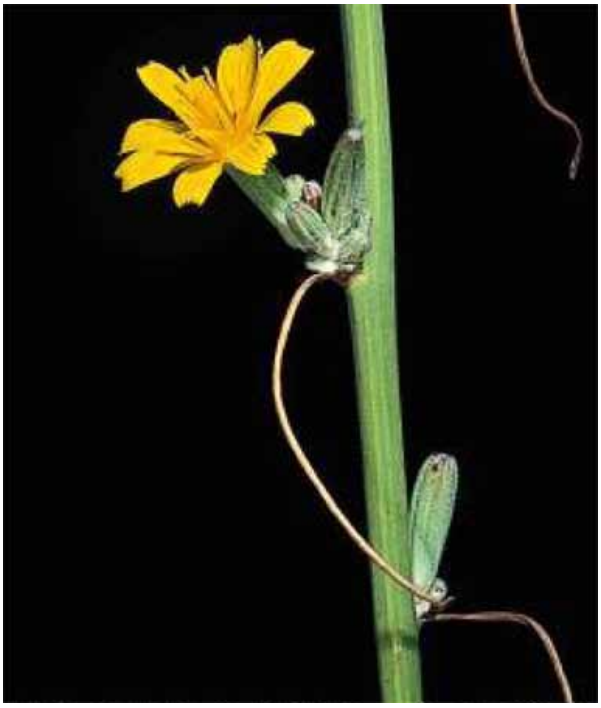


Rush skeletonweed

(*Chondrilla juncea*)

Ratings: Cal-IPC Moderate; CDFA A

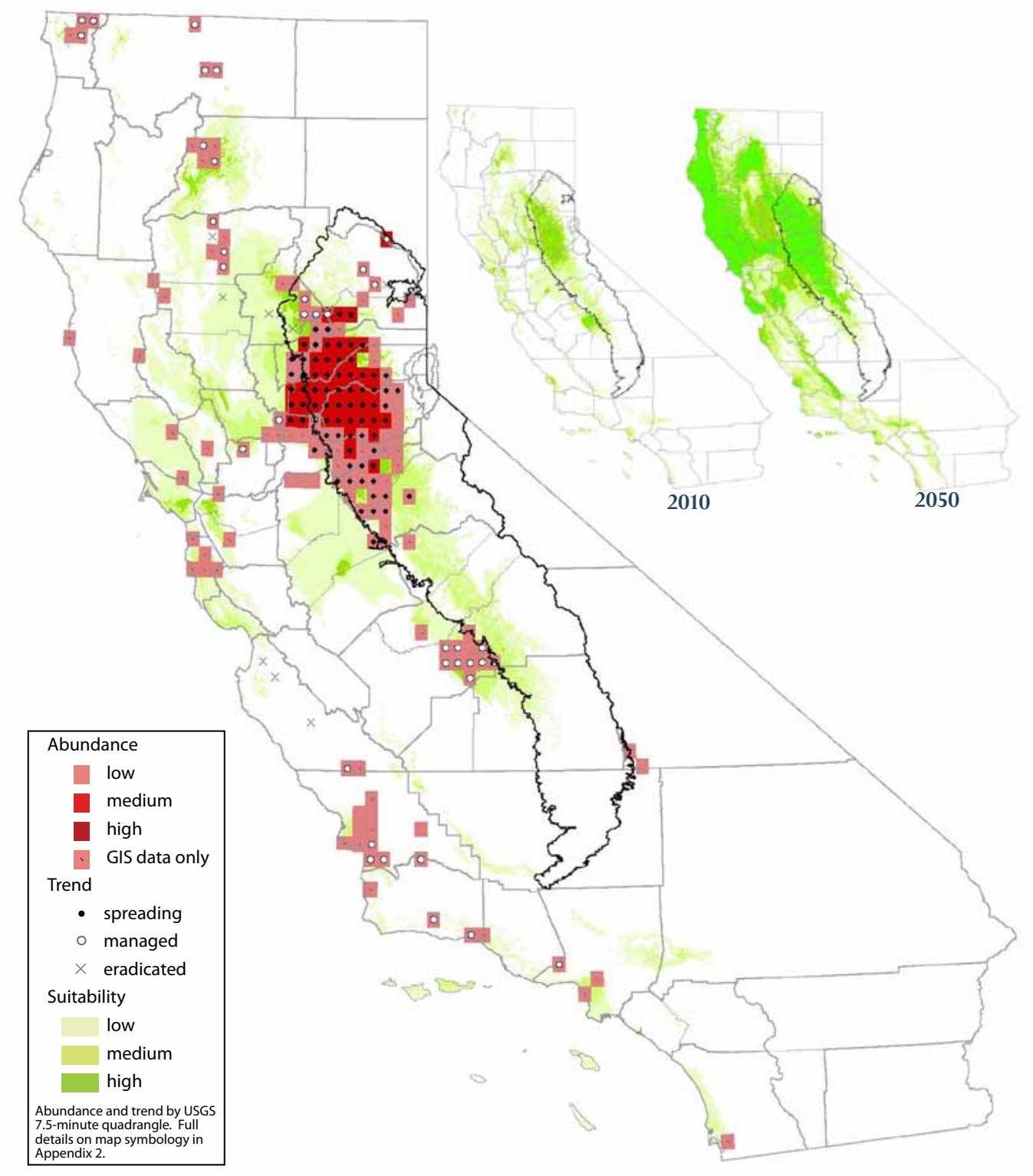
Rush skeletonweed is an herbaceous perennial or biennial that is highly competitive for water and soil nutrients, especially nitrogen. It grows best on well-drained sandy or gravelly soils in climate with cool winters and hot, relatively dry summer but it tolerates a wide range of environmental conditions. In California it is mainly a roadside invader but can expand away from roads. It is also a contaminant of hay. Our modeling suggests that the amount of suitable range for rush skeletonweed in the Sierra Nevada will increase with future climate change.



	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	H	-	-	2	50	0	0	0	1	14	↑↑
Plumas/Sierra	-	H	-	14	23	33	25	1	26	85	↑↑
Butte	-	H	-	15	15	29	14	6	87	100	-
Yuba/Sutter	-	H	-	38	54	79	7	0	97	100	-
Nevada/Placer	-	H	-	67	78	91	0	0	76	100	↑
Lake Tahoe Basin	-	-	H	0	0	-	-	6	4	97	↑↑
El Dorado	-	H	-	70	82	84	0	2	74	100	↑
Alpine	-	-	H	0	0	-	-	0	7	89	↑↑
Amador	-	H	-	71	71	60	0	0	88	100	-
Central Sierra	-	H	-	29	35	70	0	0	61	90	↑
Sierra/San Joaquin	H	-	-	7	11	7	64	0	32	53	↑
Tulare	-	-	H	3	7	0	67	0	20	22	-
Kern	-	-	M	1	3	0	0	0	3	10	↑↑
Eastern Sierra	M	-	-	1	10	0	0	0	0	6	↑↑
All Sierra Nevada	M	H		22	32	67	5	1	42	67	↑

Abundance, Trend and Suitability

Rush skeletonweed (*Chondrilla juncea*)



Canada thistle

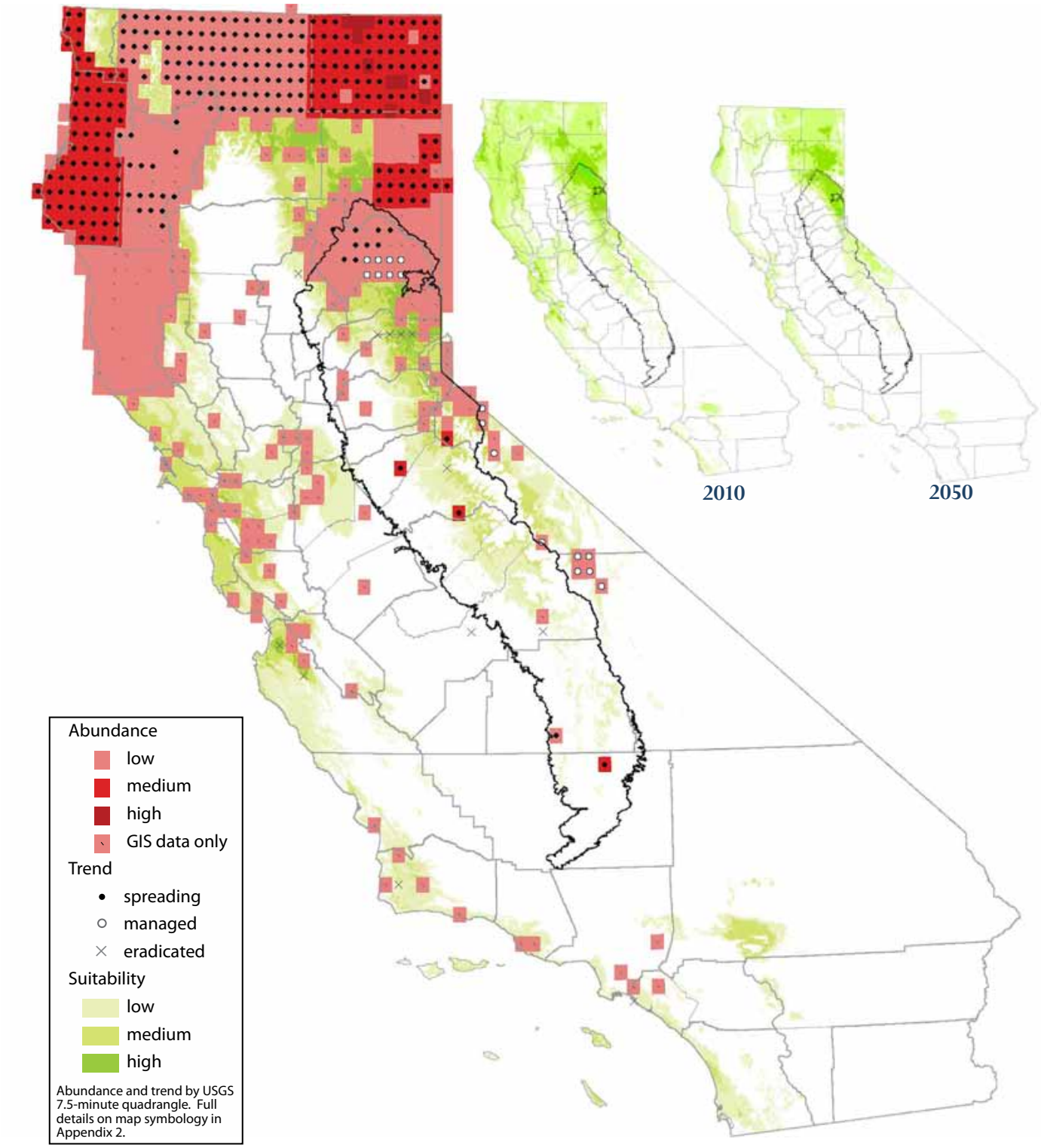
(*Cirsium arvense*)

Ratings: Cal-IPC Moderate; CDFA B

Canada thistle is a perennial species that forms dense patches with extensive creeping roots. It invades open disturbed sites, pastures, rangeland, and forest openings. It tolerates a wide range of soil types but grows best in areas with moist soils such as stream banks and moist depressions. It reproduces both vegetatively from creeping roots and from seeds. Repeated cultivation, mowing, and hand-cutting reduces and can eventually eliminate populations of perennial thistles. Our modeling suggests that the amount of suitable range for Canada thistle in the Sierra Nevada will decrease with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	M	-	82	82	35	0	0	99	96	-
Plumas/Sierra	-	M	-	80	80	25	12	0	100	77	↓
Butte	-	M	-	27	50	0	0	2	41	10	↓
Yuba/Sutter	-	M	-	8	23	0	0	0	32	0	↓
Nevada/Placer	-	M	-	16	22	0	0	6	60	22	↓
Lake Tahoe Basin	-	M	-	44	47	0	0	0	87	82	-
El Dorado	-	M	-	26	34	0	0	0	50	20	↓
Alpine	-	M	-	46	48	9	18	0	69	87	↑
Amador	M	-	-	11	20	0	0	0	36	7	↓
Central Sierra	M	-	-	4	5	100	0	1	36	32	-
Sierra/San Joaquin	M	-	-	2	3	33	33	1	18	11	↓
Tulare	M	-	-	1	2	100	0	0	8	4	↓
Kern	M	-	-	1	3	100	0	0	2	0	-
Eastern Sierra	M	-	-	4	9	0	82	0	14	16	↑
All Sierra Nevada	M	M		20	27	24	12	1	41	27	↓

Canada thistle (*Cirsium arvense*)



Bull thistle

(*Cirsium vulgare*)

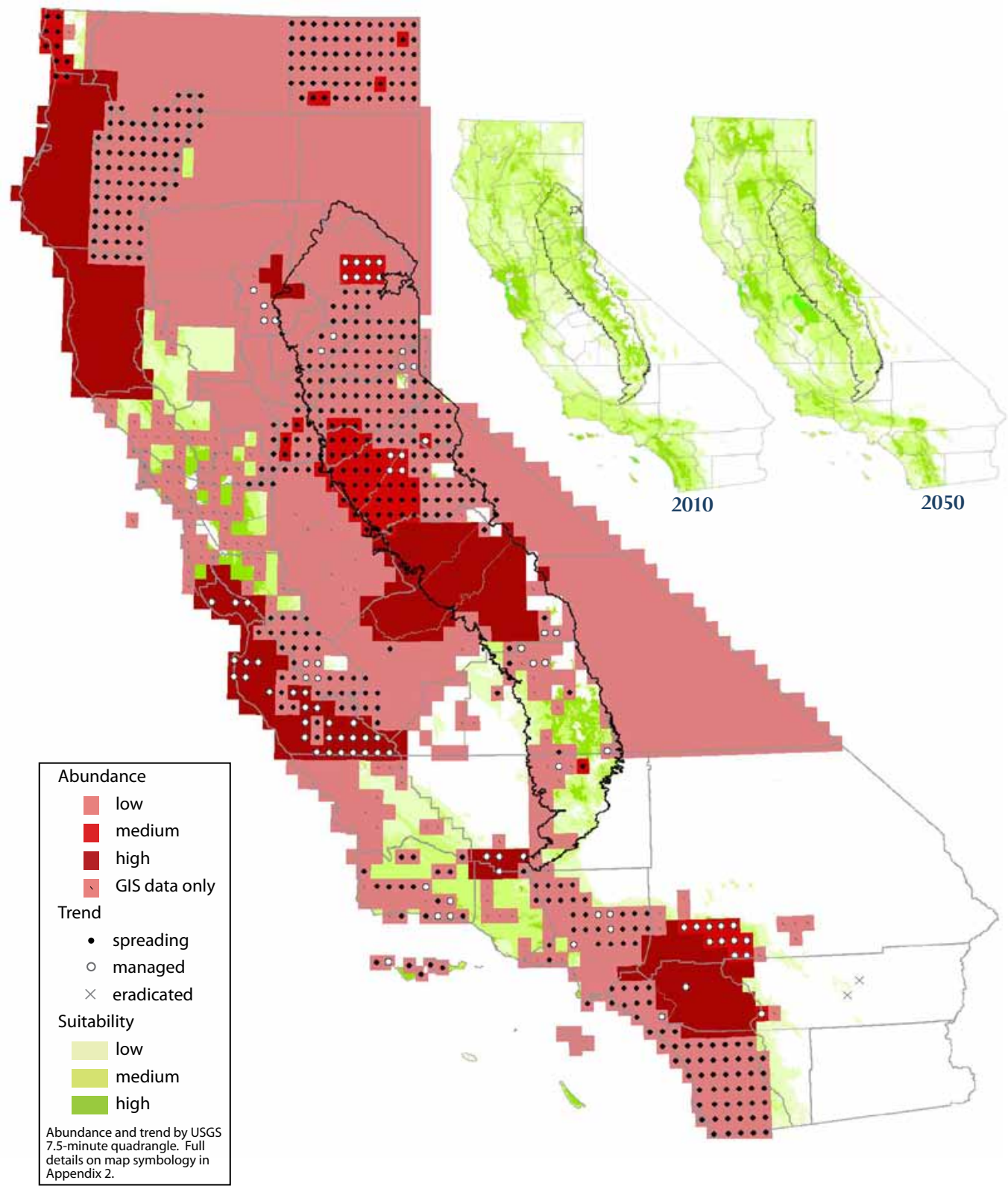
Ratings: Cal-IPC Moderate; CDFA C

Bull thistle is a biennial, sometimes annual or short-lived perennial that grows to 80 in. (2 m) tall. Regional biotypes vary in life cycle patterns, seed dormancy, and seed longevity. It invades open disturbed sites, pastures, rangeland, and forest openings, and recently logged and newly planted forestry sites. Bull thistle grows best on heavy fertile soils. Compared to other thistles, bull thistle can germinate under lower moisture conditions. It dominates recently clearcut forests in the Sierra Nevada. Bull thistle colonizes and maintains high population densities for up to six years in clearcuts in redwood and mixed evergreen forests in northwestern California. Our modeling suggests that the amount of suitable range for bull thistle in the Sierra Nevada will remain relatively unchanged with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	L	-	100	100	0	0	0	61	99	↑
Plumas/Sierra	-	L	-	100	100	20	9	0	93	99	-
Butte	-	L	-	100	100	2	0	0	100	100	-
Yuba/Sutter	-	L	-	76	100	43	0	0	100	100	-
Nevada/Placer	-	L	-	100	100	92	0	0	96	100	-
Lake Tahoe Basin	-	L	-	94	94	65	0	0	78	99	↑
El Dorado	-	L	-	98	98	93	0	0	94	100	-
Alpine	-	L	-	92	100	77	0	0	64	96	↑
Amador	-	L	-	100	100	100	0	0	97	100	-
Central Sierra	-	L	-	95	99	91	0	0	77	91	↑
Sierra/San Joaquin	-	L	-	92	100	6	2	0	44	84	↑
Tulare	-	M	-	39	46	15	10	0	59	90	↑
Kern	-	M	-	27	46	4	13	0	41	70	↑
Eastern Sierra	-	L	-	95	100	4	0	0	19	27	↑
All Sierra Nevada	-	L	-	84	85	42	4	0	80	92	-

Abundance, Trend and Suitability

Bull thistle (*Cirsium vulgare*)



Stinkwort

(*Dittrichia graveolens*)

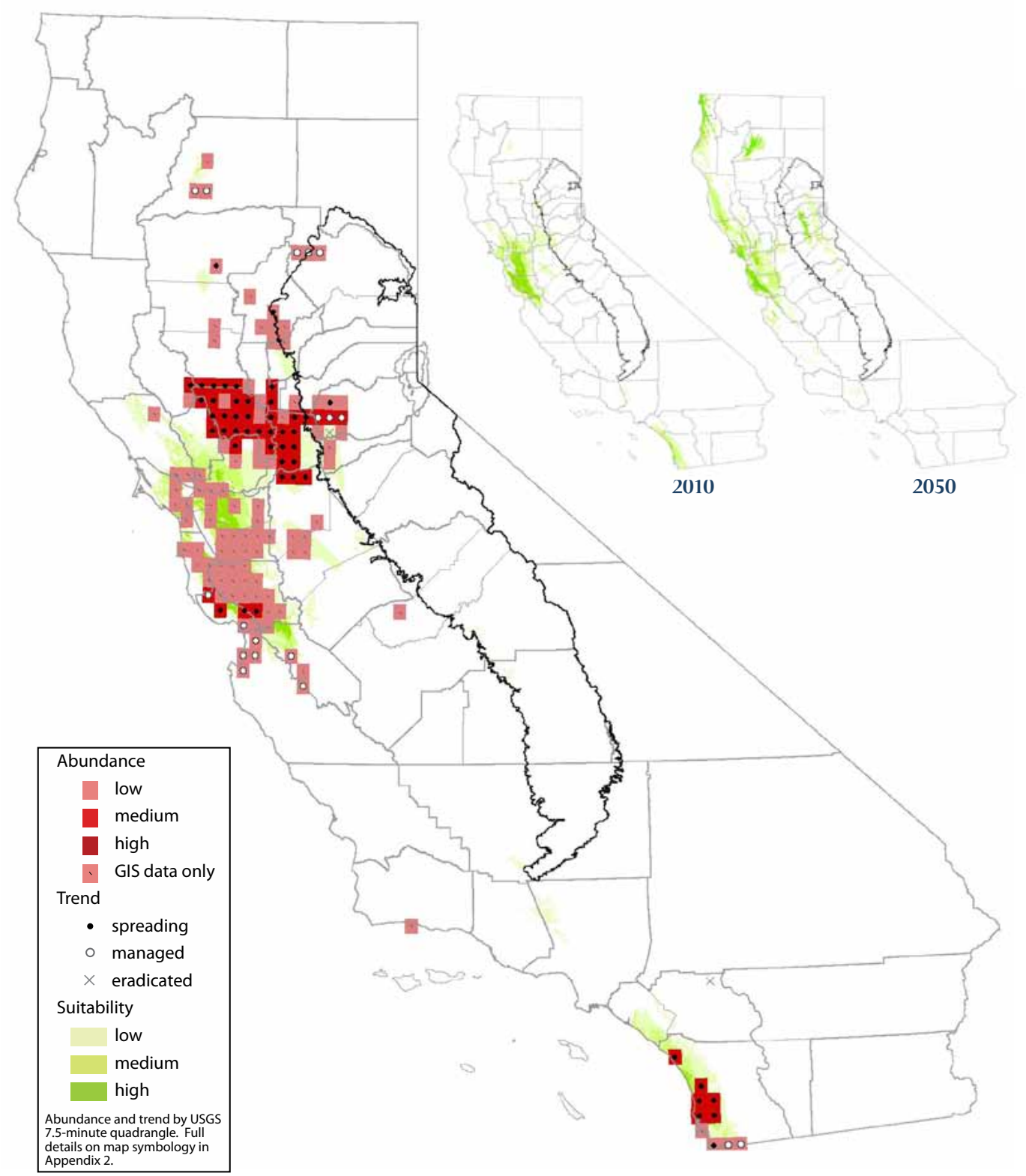
Ratings: Cal-IPC Moderate Alert, CDFA not rated

Stinkwort is a relatively new invasive species in California. It is an erect, fall-flowering, aromatic annual, with sticky glandular-hairy foliage. It resembles tarweeds. Stinkwort can form dense stands in late summer or early fall when there are few plant competitors. Because it is a new species to the state, little information exists on stinkwort's impacts, but it has been reported as spreading rapidly in some parts of California. Due to its limited distribution, the projected suitability map for this species may be too conservative. Our modeling suggests that the amount of suitable range for stinkwort in the Sierra Nevada will increase considerably with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	M	0	-	-	-	0	0	0	-
Plumas/Sierra	M	-	-	4	-	0	100	0	0	3	-
Butte	-	M	-	17	89	13	13	0	5	0	↓
Yuba/Sutter	-	M	-	24	90	33	0	0	13	0	↓
Nevada/Placer	-	-	M	10	40	50	17	0	4	19	↑↑
Lake Tahoe Basin	-	-	L	0	-	-	-	0	0	20	-
El Dorado	-	M	-	20	100	56	33	2	3	33	↑↑
Alpine	-	-	L	0	-	-	-	0	0	13	-
Amador	-	M	-	14	33	0	0	4	22	27	↑
Central Sierra	-	-	M	0	0	-	-	0	3	16	↑↑
Sierra/San Joaquin	-	-	M	1	13	0	0	0	0	2	↑↑
Tulare	-	-	L	0	0	-	-	0	1	0	↓
Kern	-	-	L	0	0	-	-	0	0	1	-
Eastern Sierra	-	-	-	0	-	-	-	0	0	0	-
All Sierra Nevada	-	H	-	4	39	30	30	0	3	8	↑↑

Abundance, Trend and Suitability

Stinkwort (*Dittrichia graveolens*)



Ox-eye daisy

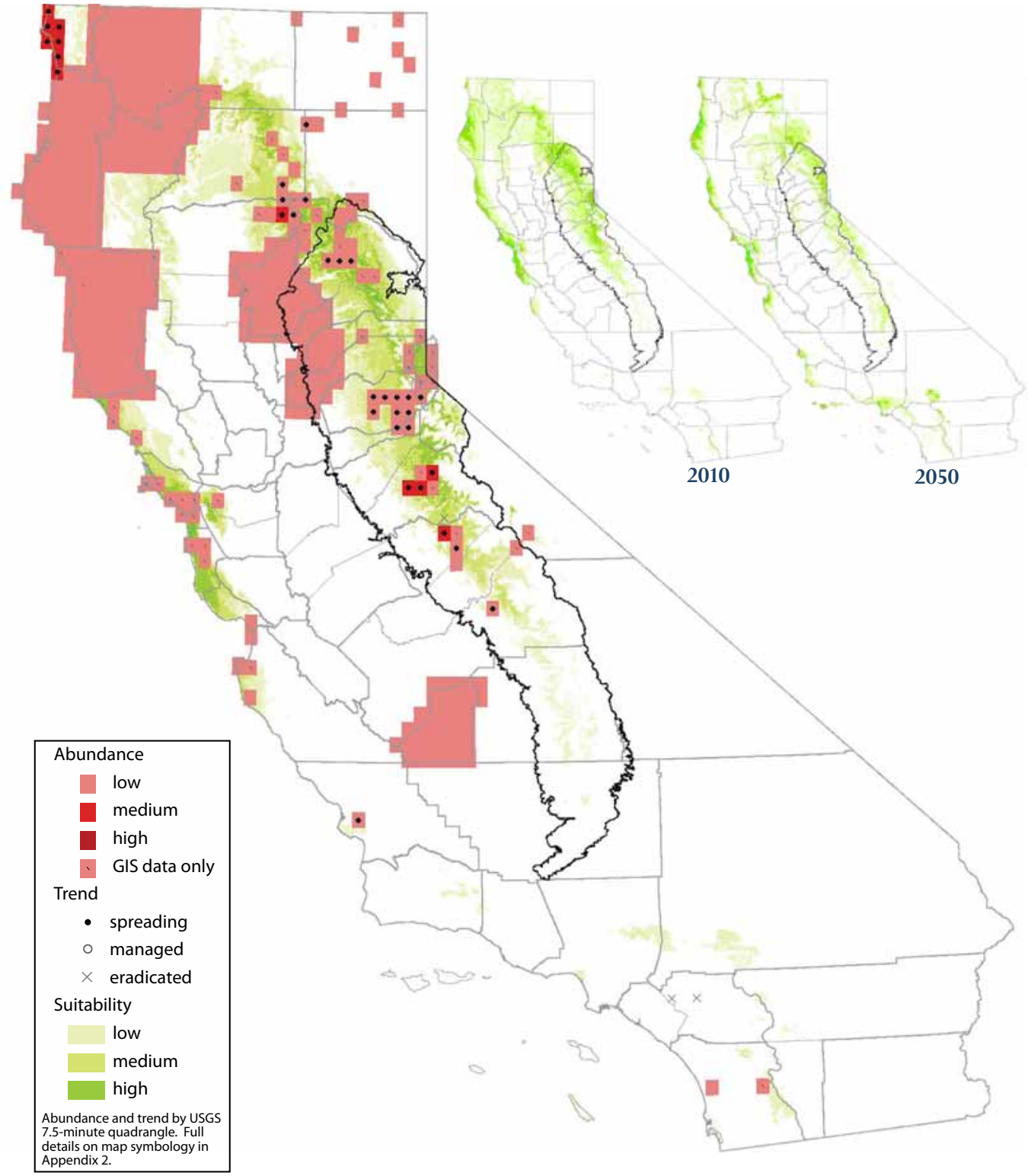
(*Leucanthemum vulgare*)

Ratings: Cal-IPC Moderate, CDFA not rated

Ox-eye daisy is a clumping perennial with white daisy flowers and creeping roots. It can develop dense colonies and most large herbivores avoid grazing on it. It inhabits disturbed sites, grassland, and coastal scrub, often grows on poor soil, and can thrive on moist clay soils. Root fragments can develop new plants. Seeds disperse with vehicles, soil movement and human activities and germinate wherever sufficient moisture is available. Ox-eye daisy also spreads as a component of wildflower seed mixes. Our modeling suggests that the amount of suitable range for ox-eye daisy in the Sierra Nevada will decrease with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	M	-	9	29	20	0	0	16	43	↑↑
Plumas/Sierra	-	M	-	27	29	22	0	0	78	59	↓
Butte	-	M	-	94	100	0	0	0	41	39	-
Yuba/Sutter	-	M	-	51	100	0	0	0	15	2	↓
Nevada/Placer	-	M	-	49	59	0	0	0	61	30	↓
Lake Tahoe Basin	-	M	-	50	53	22	0	0	76	82	-
El Dorado	-	M	-	39	41	56	0	0	75	36	↓
Alpine	-	-	M	4	5	0	0	0	53	74	↑
Amador	-	M	-	11	15	100	0	0	49	27	↓
Central Sierra	-	M	-	6	8	60	0	1	43	26	↓
Sierra/San Joaquin	-	M	-	8	21	18	0	1	15	13	↓
Tulare	-	-	M	8	19	0	0	0	7	19	↑↑
Kern	-	-	L	4	46	0	0	0	1	2	-
Eastern Sierra	M	-	-	1	5	0	0	0	1	13	↑↑
All Sierra Nevada	L	M	-	16	23	24	0	0	38	28	↓

Ox-eye daisy (*Leucanthemum vulgare*)



Scotch thistle

(*Onopordum acanthium*)

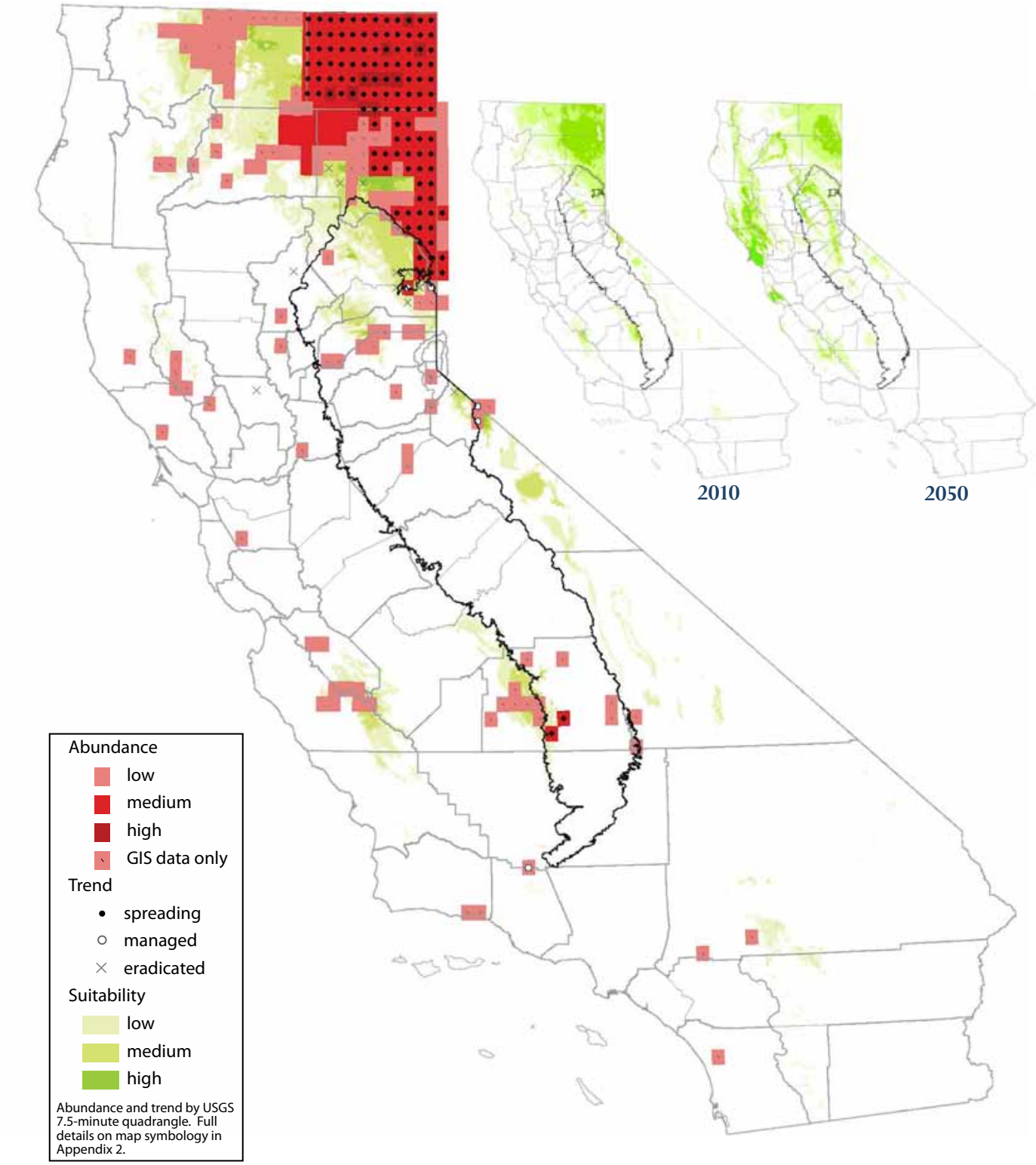
Ratings: Cal-IPC High, CDFA A

Scotch thistle is a coarse biennial, occasionally annual or short-lived perennial thistle with spines on the leaves, stems, and flower heads. It grows up to 10 feet (3 meters) tall. Scotch thistle can develop dense, impenetrable stands in some local areas, especially on fertile soils. It often grows on sites with high soil moisture. It invades disturbed areas, grasslands, riparian areas, canals and ditch banks. We recommend containment as a high priority to prevent the further spread of northern populations and eradication as a high priority throughout the Sierra. Our modeling suggests that the amount of suitable range for Scotch thistle in the Sierra Nevada will increase with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	H	-	78	78	49	1	4	98	89	-
Plumas/Sierra	H	-	-	16	17	50	14	6	66	73	-
Butte	-	-	M	2	8	0	0	2	6	33	↑↑
Yuba/Sutter	-	-	M	3	13	0	0	0	11	19	↑
Nevada/Placer	-	H	-	13	24	0	0	0	19	41	↑↑
Lake Tahoe Basin	H	-	-	11	29	0	0	6	10	31	↑↑
El Dorado	H	-	-	7	43	0	0	0	1	48	↑↑
Alpine	H	-	-	13	25	0	67	4	15	16	-
Amador	-	-	H	4	-	0	0	0	0	41	-
Central Sierra	H	-	-	3	50	0	0	0	0	25	↑↑
Sierra/San Joaquin	-	-	H	1	2	0	0	0	6	8	↑
Tulare	-	H	-	14	31	14	0	0	17	7	↓
Kern	-	-	H	1	8	0	50	0	1	7	↑↑
Eastern Sierra	H	-	-	2	5	0	40	0	9	7	↓
All Sierra Nevada	H	H	-	9	23	26	10	1	16	27	↑

Abundance, Trend and Suitability

Scotch thistle (*Onopordum acanthium*)



Houndstongue

(*Cynoglossum officinale*)

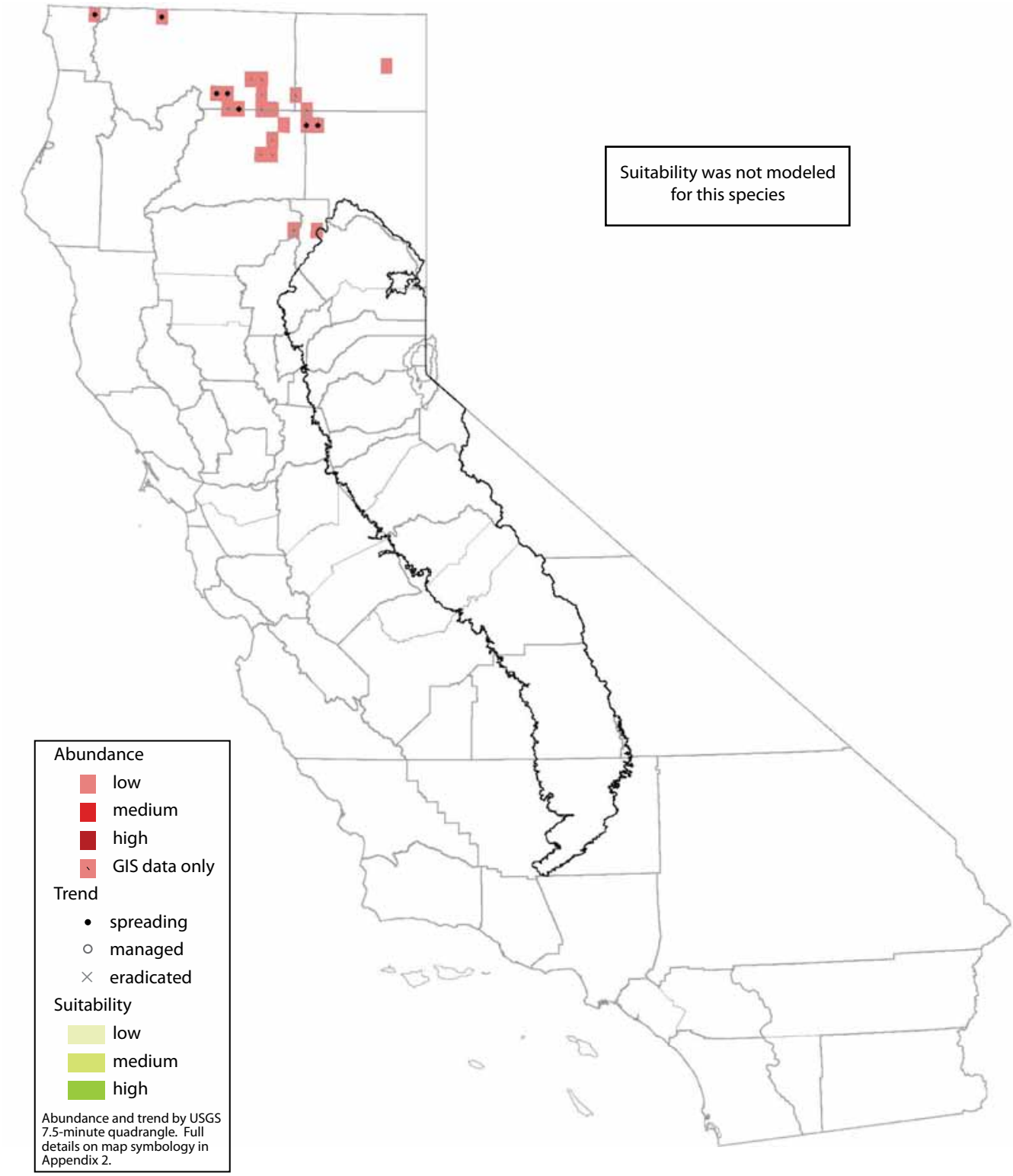
Ratings: Cal-IPC Moderate, CDFA not rated

Houndstongue is a biennial, sometimes annual or short-lived perennial species with leafy stems and panicles of reddish-purple flowers. It inhabits open disturbed, often moist places, including open woodland and forests, pastures, rangeland, sand dunes and canal banks. It often grows on sandy or gravelly soil and typically colonizes bare soil. Mowing flowering stems before nutlets develop greatly reduces seed production. (The stems of nonweedy native houndstongue, *Cynoglossum grande*, are not leafy.) We did not model suitability for this species.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	M	3	-	67	0	0	-	-	-
Plumas/Sierra	-	-	M	2	-	0	0	0	-	-	-
Butte	-	-	M	2	-	0	0	0	-	-	-
Yuba/Sutter	-	-	-	0	-	-	-	0	-	-	-
Nevada/Placer	-	-	-	0	-	-	-	0	-	-	-
Lake Tahoe Basin	-	-	-	0	-	-	-	0	-	-	-
El Dorado	-	-	-	0	-	-	-	0	-	-	-
Alpine	-	-	-	0	-	-	-	0	-	-	-
Amador	-	-	-	0	-	-	-	0	-	-	-
Central Sierra	-	-	-	0	-	-	-	0	-	-	-
Sierra/San Joaquin	-	-	-	0	-	-	-	0	-	-	-
Tulare	-	-	-	0	-	-	-	0	-	-	-
Kern	-	-	-	0	-	-	-	0	-	-	-
Eastern Sierra	-	-	-	0	-	-	-	0	-	-	-
All Sierra Nevada	-	-	L	0	-	0	0	0	-	-	-

Abundance, Trend and Suitability

Houndstongue (*Cynoglossum officinale*)



Lens-podded white-top and hoary cress

(*Cardaria chalepensis*, *C. draba*)

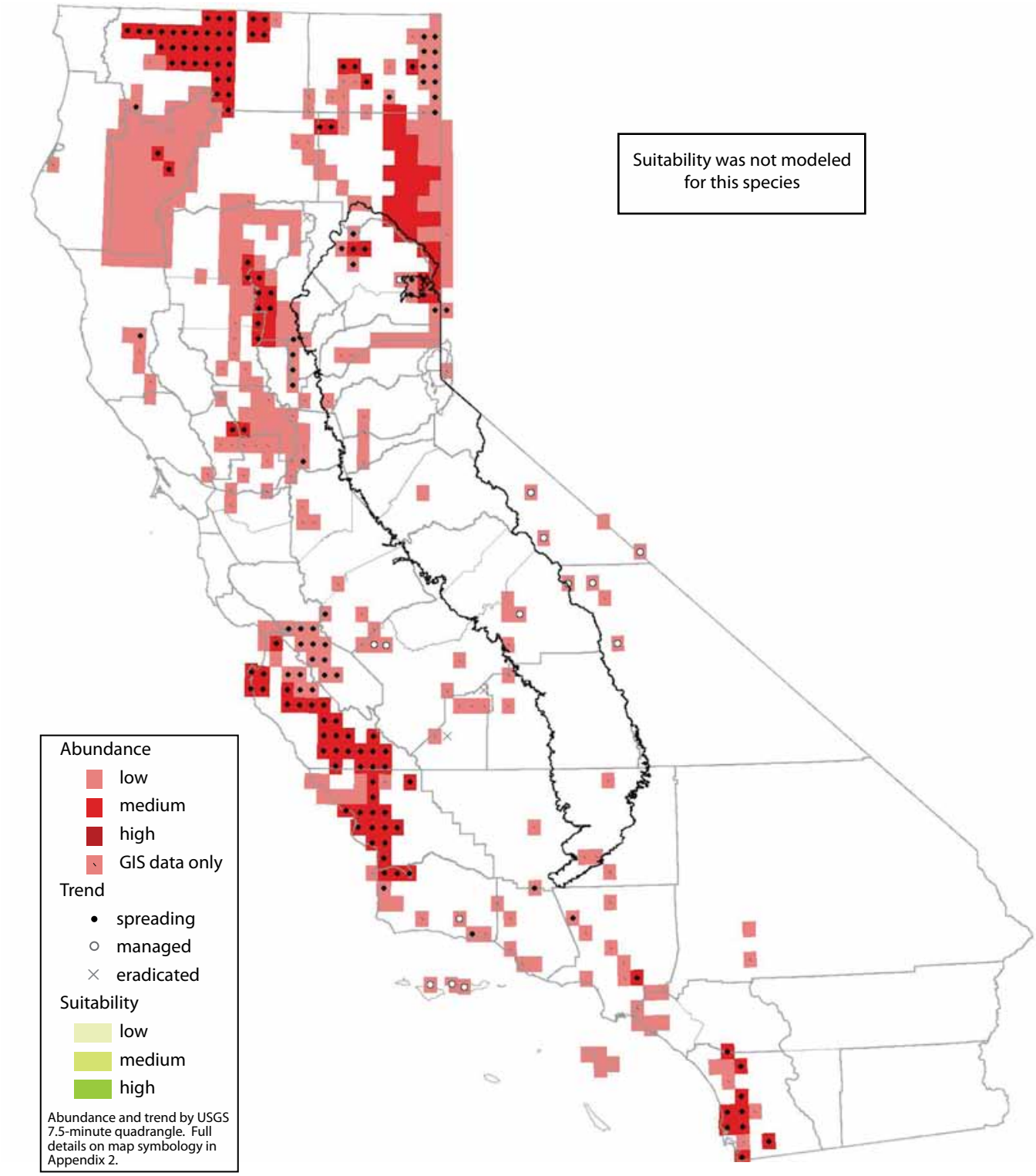
Ratings: *Cardaria chalepensis*: Cal-IPC Moderate Alert, CDFA B

C. draba: Moderate; CDFA B

We combined these closely-related species for the purposes of this project because they have similar habitat requirements. In the upcoming *Jepson Manual*, these species are reclassified as *Lepidium draba* subsp. *draba* and *Lepidium draba* subsp. *chalepense*. They are perennials that form clonal colonies from creeping roots and can alter plant community composition. While primarily agricultural pests, they may become a problem along waterways or in high rainfall areas. Seeds and root fragments can be spread by vehicles, machinery, and hay or crop seed. We did not model suitability for these species.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	M	-	61	-	7	0	0	-	-	-
Plumas/Sierra	-	M	-	23	-	60	5	1	-	-	-
Butte	-	M	-	46	-	41	0	0	-	-	-
Yuba/Sutter	-	M	-	27	-	10	0	0	-	-	-
Nevada/Placer	-	M	-	19	-	0	0	0	-	-	-
Lake Tahoe Basin	M	-	-	11	-	0	0	0	-	-	-
El Dorado	M	-	-	7	-	0	0	0	-	-	-
Alpine	-	-	M	0	-	-	-	0	-	-	-
Amador	M	-	-	11	-	0	0	0	-	-	-
Central Sierra	M	-	-	3	-	0	0	0	-	-	-
Sierra/San Joaquin	M	-	-	6	-	0	31	1	-	-	-
Tulare	-	-	M	3	-	0	0	1	-	-	-
Kern	M	-	-	4	-	17	0	0	-	-	-
Eastern Sierra	M	-	-	3	-	0	75	0	-	-	-
All Sierra Nevada	M	M	-	11	-	23	6	0	-	-	-

Lens-podded white-top and hoary cress (*Cardaria chalepensis*, *C. draba*)



Dyer's woad

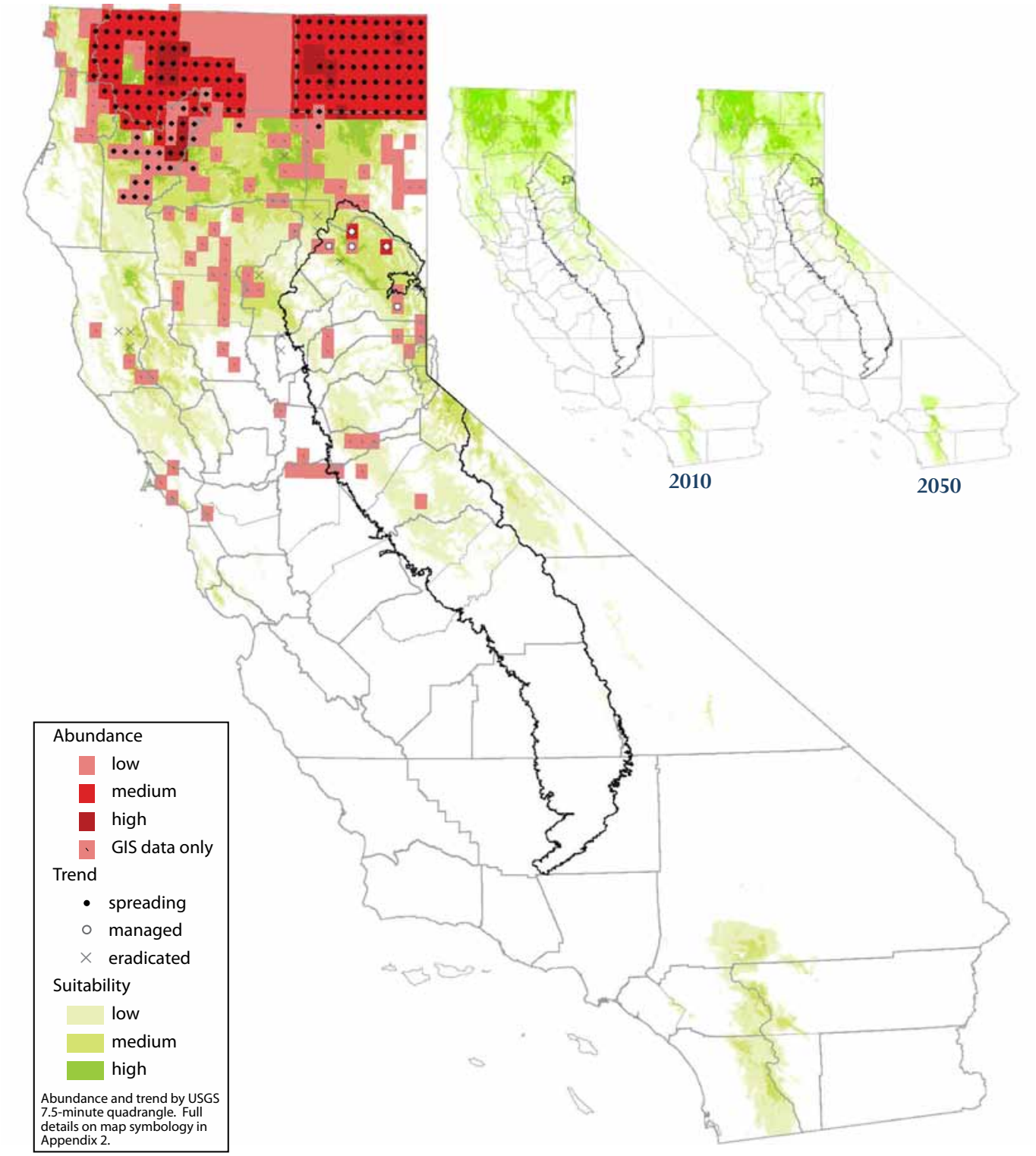
(*Isatis tinctoria*)

Ratings: Cal-IPC Moderate, CDFA B

Dyer's woad is an erect biennial, winter annual, or short-lived perennial species with bright yellow flowers and dark, pendant fruits. The fruits distinguish it from other mustards. It grows on both disturbed and undisturbed sites such as roadsides, pastures, forest, rangeland, and agricultural areas, often on dry, rocky, or sandy soils. It competes with native shrubs and can dominate plant communities. Its deep root system can reduce water for native species. Plants cut above the crown can grow new shoots and may persist as short-lived perennials. Dyer's woad is a serious problem further north in California but has invaded few areas in the Sierra, so we recommend eradication as a high priority. Our modeling suggests that the amount of suitable range for dyer's woad in the Sierra Nevada will decrease with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	H	-	-	30	32	35	3	1	76	97	↑
Plumas/Sierra	H	-	-	11	11	11	56	5	79	67	-
Butte	H	-	-	10	11	0	0	2	75	16	↓
Yuba/Sutter	-	-	H	5	13	0	0	0	26	2	↓
Nevada/Placer	H	-	-	10	12	0	0	0	40	16	↓
Lake Tahoe Basin	H	-	-	11	13	0	0	0	74	59	↓
El Dorado	-	-	H	0	0	-	-	0	49	19	↓
Alpine	-	-	H	0	0	-	-	0	67	65	-
Amador	-	H	-	18	21	0	0	0	40	13	↓
Central Sierra	H	-	-	5	6	0	0	0	40	21	↓
Sierra/San Joaquin	-	-	H	0	0	-	-	0	9	5	↓
Tulare	-	-	L	0	0	-	-	0	0	0	↓
Kern	-	-	L	0	-	-	-	0	0	0	-
Eastern Sierra	-	-	M	0	0	-	-	0	11	18	↑
All Sierra Nevada	H	-	-	5	8	4	22	1	33	20	↓

Dyer's woad (*Isatis tinctoria*)



Charlock mustard

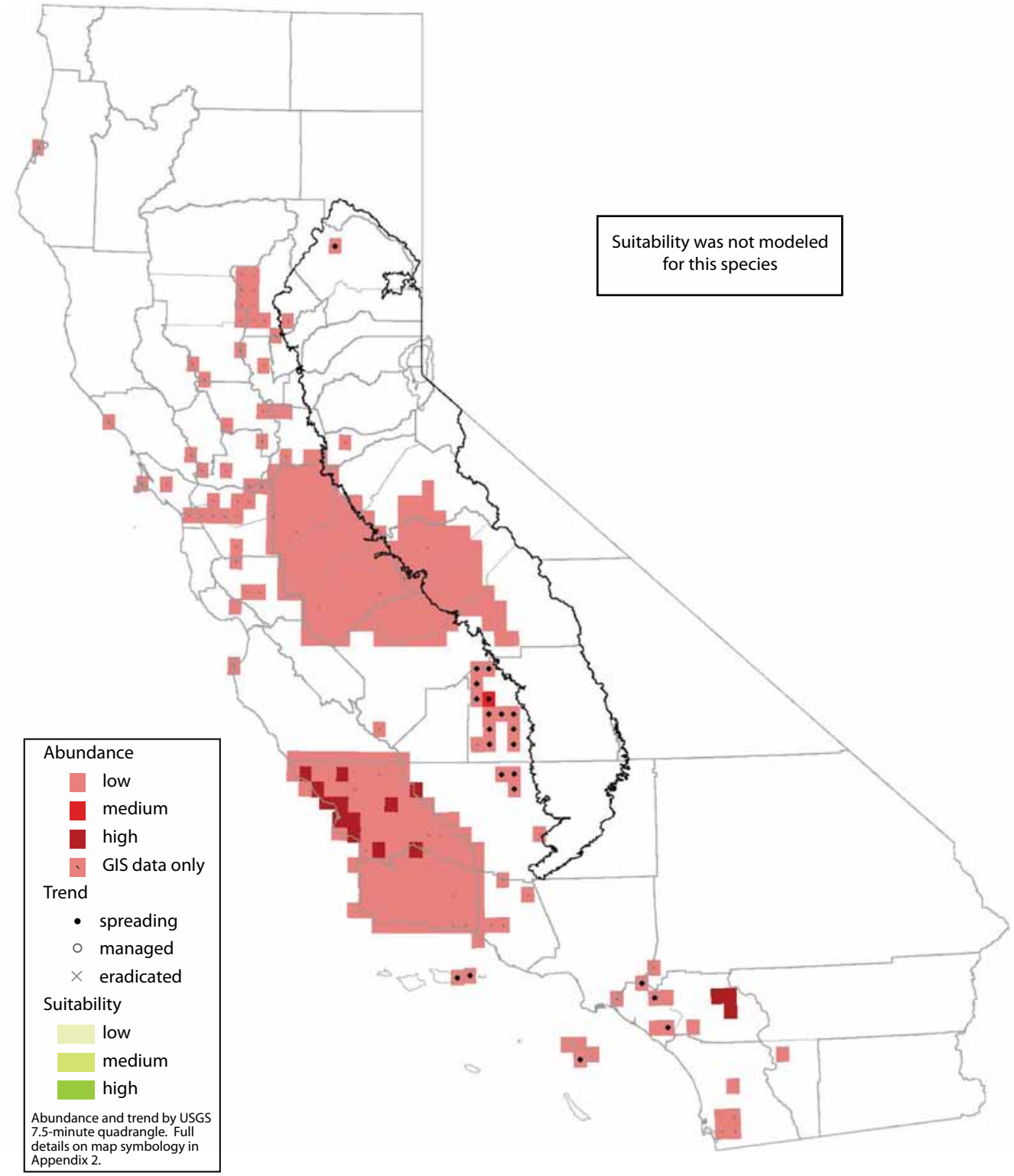
(*Sinapis arvensis*)

Ratings: Cal-IPC Limited, CDFA not rated

Charlock mustard grows as a winter or summer annual. Ingestion of large quantities of seed can be toxic to livestock, although the seeds are unpalatable. It mostly invades heavily disturbed areas such as roadsides and it also invasive in crops. It is infrequent in wildlands and does not typically spread. We did not model suitability for this species.

Weed Management Area	Opportunities			Statistics							
	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	L	0	-	-	-	0	-	-	-
Plumas/Sierra	M	-	-	1	-	100	0	0	-	-	-
Butte	L	-	-	23	-	0	0	0	-	-	-
Yuba/Sutter	-	-	L	16	-	0	0	0	-	-	-
Nevada/Placer	-	-	L	2	-	0	0	0	-	-	-
Lake Tahoe Basin	-	-	L	0	-	-	-	0	-	-	-
El Dorado	-	-	L	0	-	-	-	0	-	-	-
Alpine	-	-	L	0	-	-	-	0	-	-	-
Amador	L	-	-	14	-	0	0	0	-	-	-
Central Sierra	-	L	-	22	-	0	0	0	-	-	-
Sierra/San Joaquin	-	L	-	39	-	3	0	0	-	-	-
Tulare	-	-	L	13	-	92	0	0	-	-	-
Kern	-	-	L	12	-	16	0	0	-	-	-
Eastern Sierra	-	-	-	0	-	-	-	0	-	-	-
All Sierra Nevada	-	L	-	15	-	3	0	0	-	-	-

Charlock mustard (*Sinapis arvensis*)



Common and fuller's teasels

(*Dipsacus fullonum, D. sativus*)

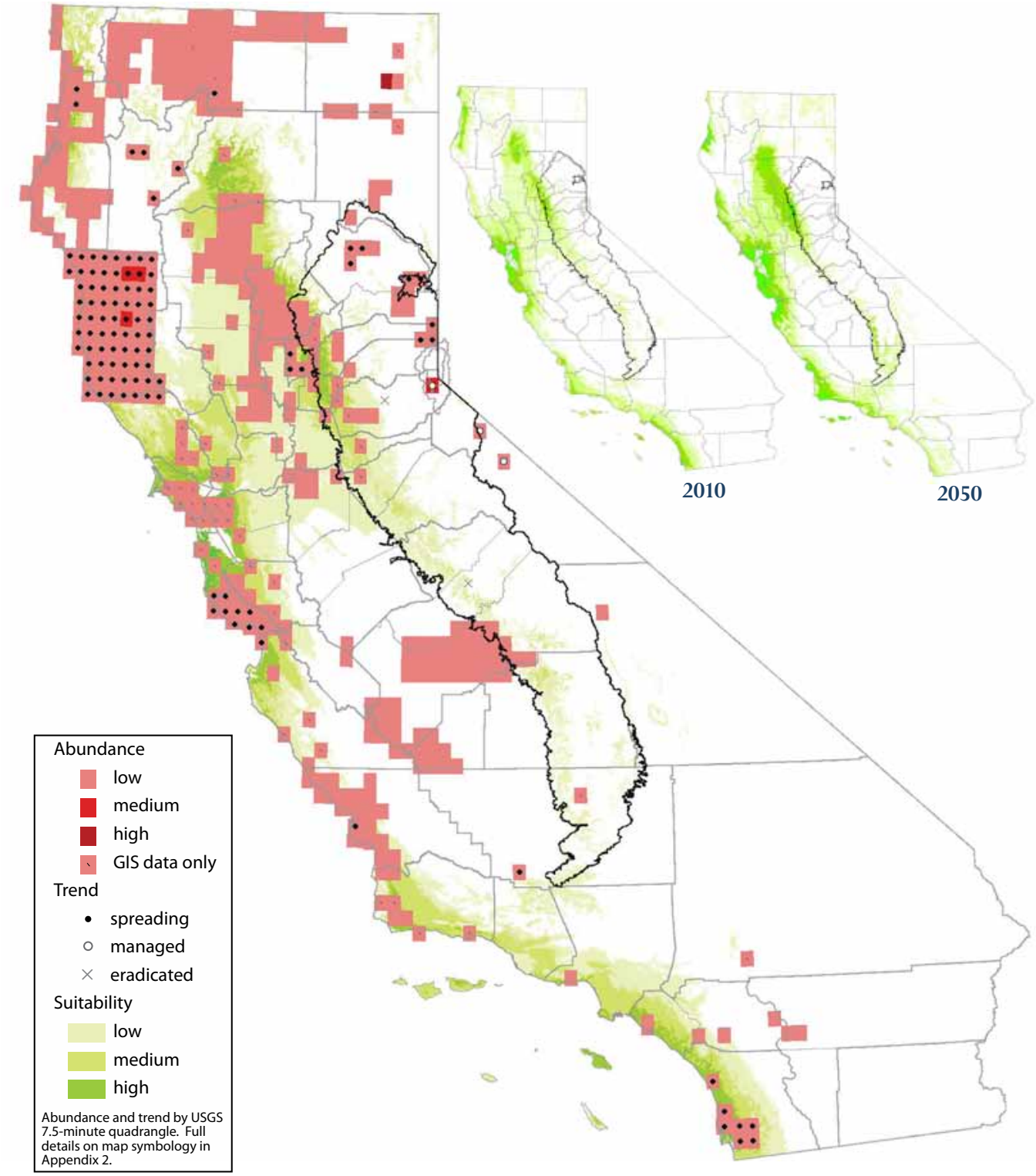
Ratings: Both species Cal-IPC Moderate, CDFA not rated

We combined the teasel species for this project due to the difficulty distinguishing them in the field and because they have similar habitat requirements. Both are biennials, occasionally short-lived perennials, with large spiny flower heads covered with lavender or white flowers. They grow in disturbed sites and establishment usually requires human-caused or natural disturbance. Teasels can form dominant stands, sometimes monocultures. They can be dispersed with water and soil movement and human activities. They are often found along steep roadside banks of new highways. Our modeling suggests that the amount of suitable range for both species in the Sierra Nevada will remain relatively unchanged with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	M	-	-	9	71	0	0	1	1	9	↑↑
Plumas/Sierra	-	M	-	13	33	55	0	0	6	0	
Butte	-	M	-	52	53	0	0	0	75	62	↓
Yuba/Sutter	-	M	-	35	50	0	0	0	85	76	-
Nevada/Placer	-	M	-	21	28	23	0	0	45	33	↓
Lake Tahoe Basin	M	-	-	11	100	100	50	0	1	0	-
El Dorado	-	M	-	15	25	14	14	2	40	25	↓
Alpine	-	-	M	4	17	0	100	0	2	1	-
Amador	M	-	-	11	13	0	0	0	61	48	↓
Central Sierra	M	-	-	1	2	0	0	0	37	22	↓
Sierra/San Joaquin	-	M	-	24	61	0	0	1	11	9	↓
Tulare	-	-	M	6	12	0	0	0	14	20	↑
Kern	M	-	-	4	10	17	0	0	9	25	↑↑
Eastern Sierra	M	-	-	1	6	0	67	0	1	7	↑↑
All Sierra Nevada	M	M	-	11	16	18	4	1	26	25	-

Abundance, Trend and Suitability

Common and fuller's teasels (*Dipsacus fullonum, D. sativus*)



Scotch broom

(*Cytisus scoparius*)

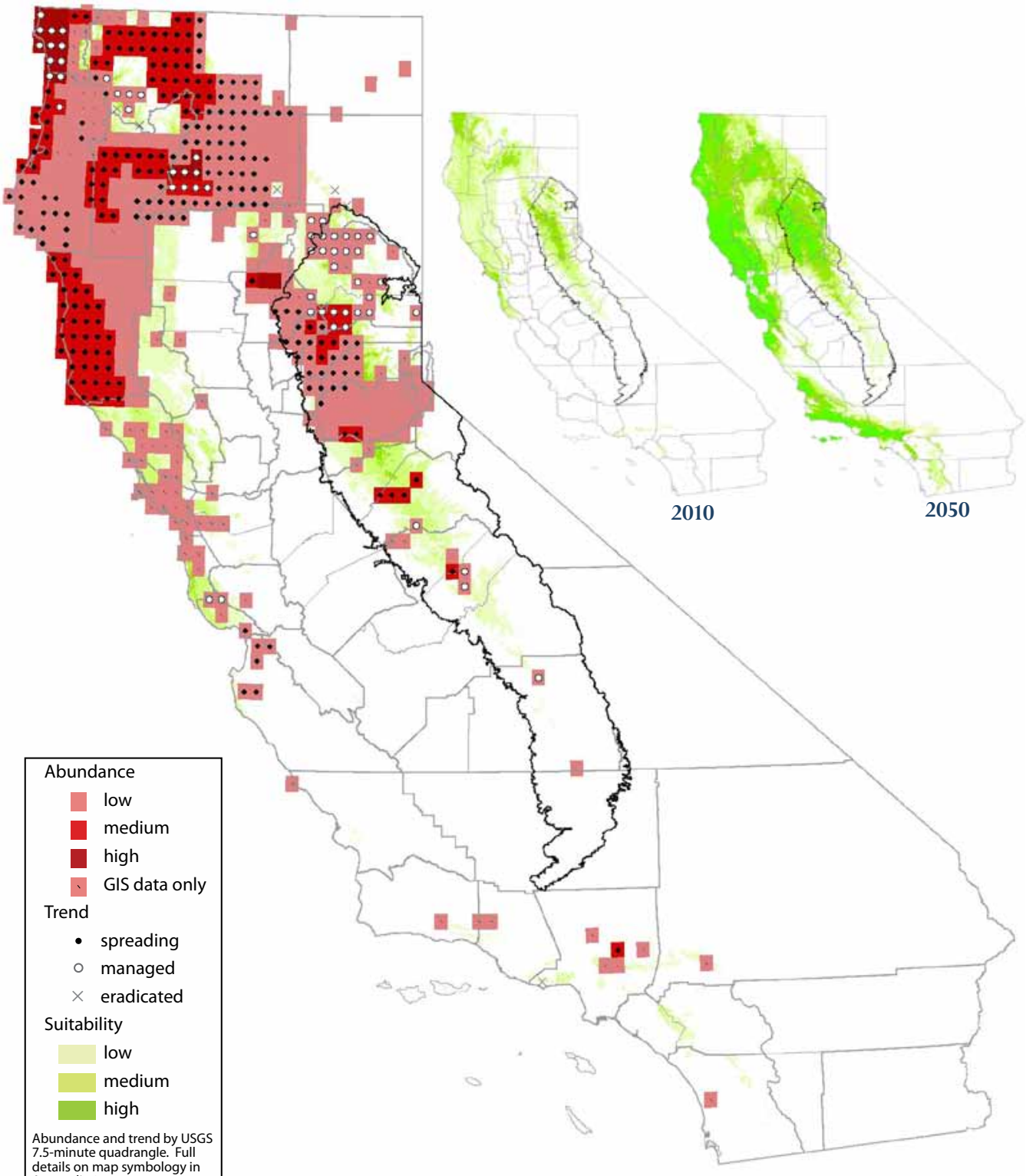
Ratings: Cal-IPC High, CDFA C

Scotch broom is a perennial shrub up to 16 ft (5 m) tall with green photosynthetic stems and pea-like flowers that range in color from yellow to red. Scotch broom inhabits a wide range of disturbed and undisturbed habitats and tolerates drought. Plants tolerate frost but die back after severe winter conditions. Brooms do not tolerate heavy shade. It was originally planted as an ornamental and for erosion control and now forms dense stands that displace native plants and wildlife. It also increases wildland fire hazard. Brooms also are nitrogen fixers that alter soil chemistry. Established populations are difficult to eliminate due to long-lived seedbanks. French broom is evergreen with leafy stems, while Scotch and Spanish brooms are deciduous and have few (Scotch) or no (Spanish) leaves on the stems. For all brooms, we recommend eradication in isolated quads and containment elsewhere as a high priority. Our modeling suggests that the amount of suitable range for Scotch broom in the Sierra Nevada will increase with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	H	-	14	59	13	19	2	9	41	↑↑
Plumas/Sierra	-	H	-	41	49	51	66	0	53	93	↑
Butte	-	H	-	54	74	27	4	0	52	100	↑
Yuba/Sutter	-	H	-	30	92	73	18	0	36	100	↑↑
Nevada/Placer	-	H	-	59	67	76	14	0	61	99	↑
Lake Tahoe Basin	-	H	-	56	71	0	0	0	21	90	↑↑
El Dorado	-	H	-	94	98	19	0	0	75	97	↑
Alpine	-	H	-	13	20	0	0	0	11	78	↑↑
Amador	-	H	-	43	48	17	0	0	65	99	↑
Central Sierra	-	H	-	11	17	44	0	0	44	67	↑
Sierra/San Joaquin	-	H	-	3	12	14	0	0	12	29	↑↑
Tulare	H	-	-	2	17	0	0	0	1	23	↑↑
Kern	-	-	H	1	-	0	0	0	0	6	-
Eastern Sierra	-	-	L	0	0	-	-	0	0	5	↑↑
All Sierra Nevada	H	H	-	24	44	45	19	0	33	60	↑

Abundance, Trend and Suitability

Scotch broom (*Cytisus scoparius*)



French broom

(*Genista monspessulana*)

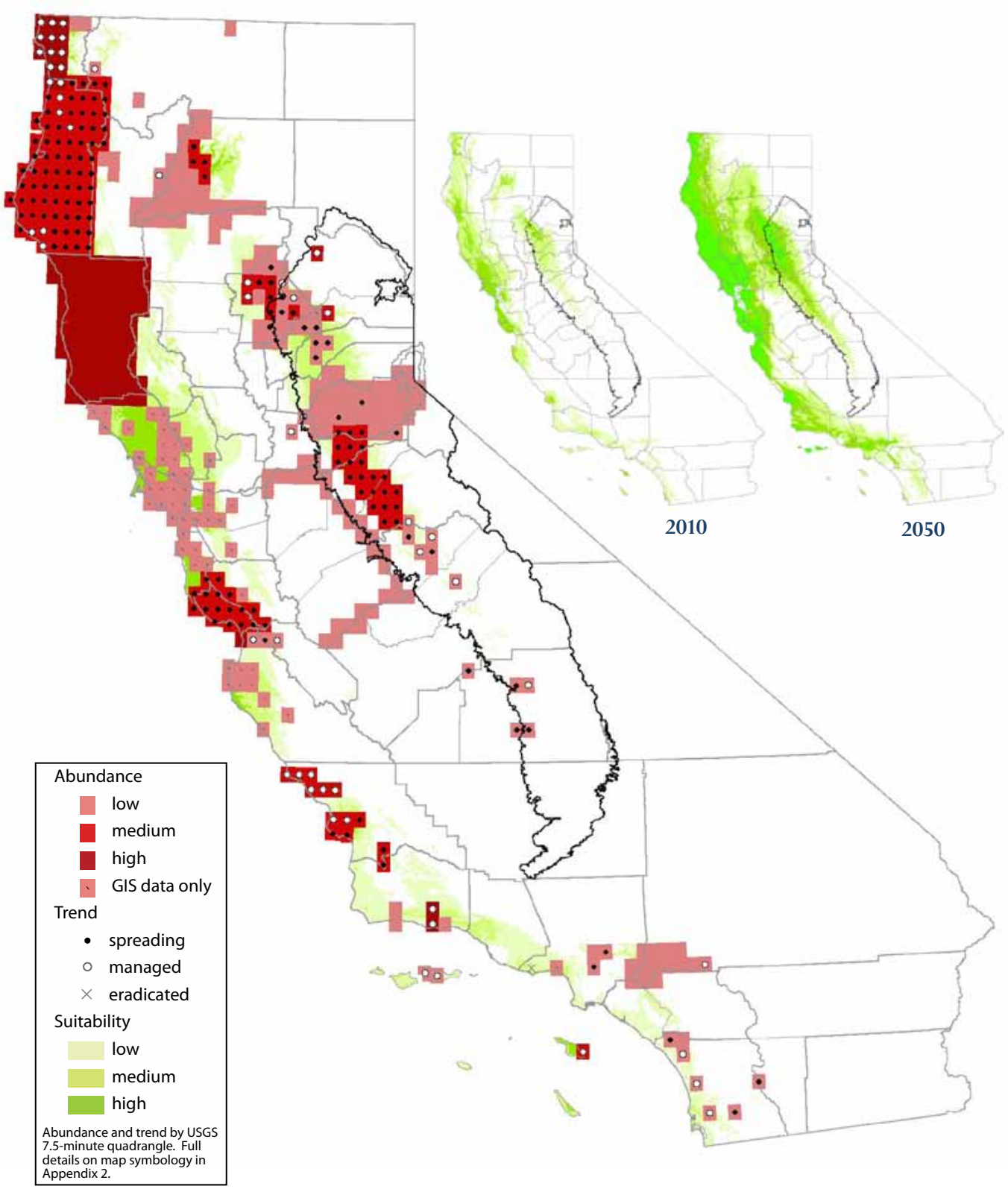
Ratings: Cal-IPC High, CDFA C

French broom is a perennial shrub with yellow pea-like flowers and green, photosynthetic stems. French broom inhabits a wide range of disturbed and undisturbed habitats and tolerates drought. Plants tolerate frost but die back after severe winter conditions. Brooms do not tolerate heavy shade. It was originally planted as an ornamental and for erosion control and now forms dense stands that displace native plants and wildlife. It also increases wildland fire hazard. Brooms are nitrogen fixers that alter soil chemistry. Established populations are difficult to eliminate due to long-lived seedbanks. French broom is evergreen with leafy stems, while Scotch and Spanish brooms are deciduous and have few (Scotch) or no (Spanish) leaves on the stems. For all brooms, we recommend eradication in isolated quads and containment elsewhere as a high priority. Our modeling suggests that the amount of suitable range for French broom in the Sierra Nevada will increase considerably with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	M	0	-	-	-	0	0	0	-
Plumas/Sierra	-	H	-	8	32	14	29	0	10	29	↑↑
Butte	-	H	-	58	67	32	0	0	64	96	↑
Yuba/Sutter	-	H	-	24	56	33	0	0	48	100	↑↑
Nevada/Placer	-	H	-	29	39	28	0	0	55	73	↑
Lake Tahoe Basin	-	H	-	50	-	0	0	0	0	1	-
El Dorado	-	H	-	89	100	15	0	0	53	70	↑
Alpine	-	H	-	13	100	0	0	0	0	2	↑↑
Amador	-	H	-	68	91	53	0	0	50	84	↑
Central Sierra	-	H	-	33	72	65	0	0	23	60	↑↑
Sierra/San Joaquin	-	H	-	11	55	17	0	0	4	26	↑↑
Tulare	H	-	-	5	63	80	20	0	0	15	↑↑
Kern	-	-	M	0	0	-	-	0	0	9	↑↑
Eastern Sierra	-	-	L	0	-	-	-	0	0	0	-
All Sierra Nevada	H	H	-	22	64	38	3	0	19	41	↑↑

Abundance, Trend and Suitability

French broom (*Genista monspessulana*)



Spanish broom

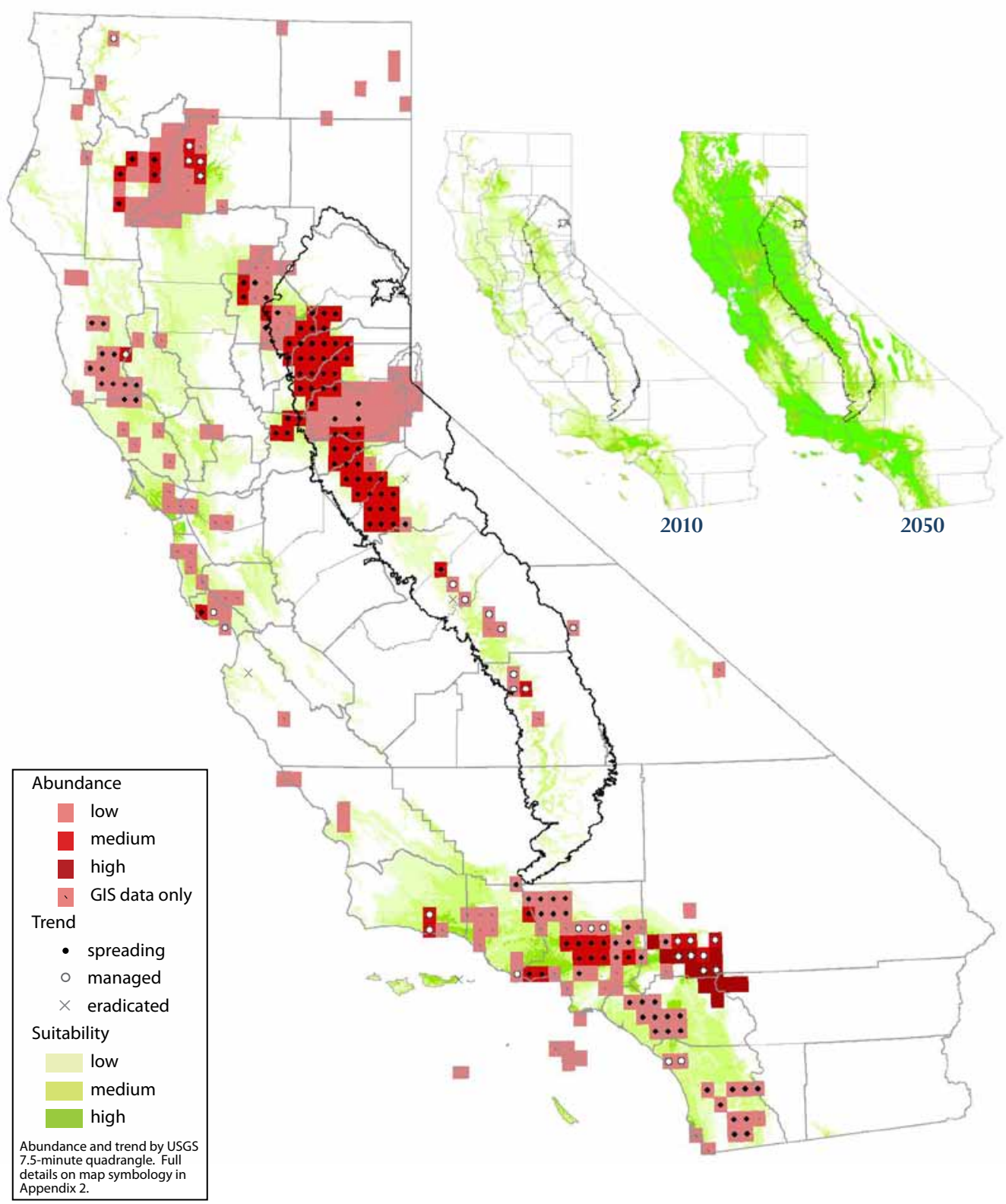
(*Spartium junceum*)

Ratings: Cal-IPC High, CDFA C

Spanish broom is a perennial shrub 10-16 ft. (3-5 m) tall with yellow pea-like flowers and green photosynthetic stems. Like other brooms, it inhabits a wide range of disturbed and undisturbed habitats and tolerates drought. However, Spanish broom seems less problematic than Scotch or French brooms in California. Plants tolerate frost but die back after severe winter conditions. Brooms do not tolerate heavy shade. It was originally planted as an ornamental and for erosion control and now forms dense stands that displace native plants and wildlife. It also increases wildland fire hazard. Brooms also are nitrogen fixers that alter soil chemistry. French broom is evergreen with leafy stems, while Scotch and Spanish brooms are deciduous and have few (Scotch) or no (Spanish) leaves on the stems. Established populations are difficult to eliminate due to long-lived seedbanks. For all brooms, we recommend eradication in isolated quads and containment elsewhere as a high priority. Our modeling suggests that the amount of suitable range for Spanish broom in the Sierra Nevada will increase considerably with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	H	1	100	0	0	0	0	21	↑↑
Plumas/Sierra	-	H	-	8	27	71	14	0	9	65	↑↑
Butte	-	H	-	46	49	41	0	0	73	98	↑
Yuba/Sutter	-	H	-	27	46	60	0	0	51	100	↑
Nevada/Placer	-	H	-	51	68	81	0	0	54	79	↑
Lake Tahoe Basin	-	H	-	50	-	0	0	0	0	26	-
El Dorado	-	H	-	89	100	29	0	0	56	76	↑
Alpine	-	H	-	13	100	0	0	0	0	25	↑↑
Amador	-	H	-	57	70	56	0	0	60	88	↑
Central Sierra	-	H	-	25	46	95	0	1	31	67	↑↑
Sierra/San Joaquin	-	H	-	4	12	33	11	1	14	56	↑↑
Tulare	-	H	-	4	11	0	75	0	13	51	↑↑
Kern	-	-	H	0	0	-	-	0	12	69	↑↑
Eastern Sierra	H	-	-	1	11	0	50	0	2	35	↑↑
All Sierra Nevada	H	H	-	22	40	57	5	0	28	68	↑↑

Spanish broom (*Spartium junceum*)



Black locust

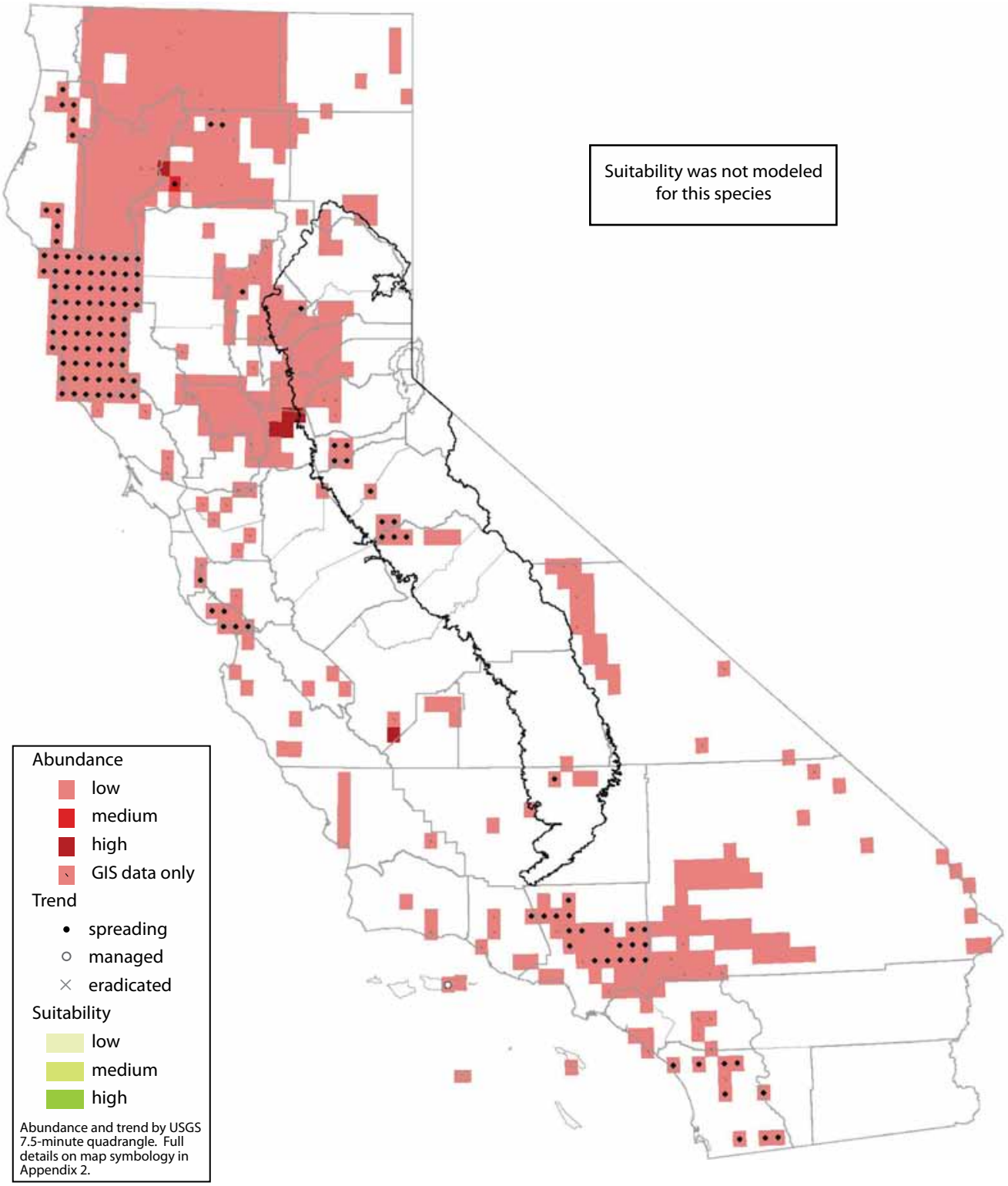
(*Robinia pseudoacacia*)

Ratings: Cal-IPC Limited, CDFA not rated

Black locust is a fast-growing, deciduous tree with pinnately-compound leaves and highly fragrant, pea-like flowers. It has escaped cultivation in some areas of California, including some old homesites. Most infestations in California are small and are not spreading. As an early succesional species, black locust needs open areas for colonization, such as clear-cuts, abandoned pastures, or roadsides. We did not model suitability for this species.

Weed Management Area	Opportunities			Statistics							
	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	L	-	10	-	0	0	0	-	-	-
Plumas/Sierra	-	L	-	13	-	0	0	0	-	-	-
Butte	-	L	-	58	-	11	0	0	-	-	-
Yuba/Sutter	-	L	-	65	-	4	0	0	-	-	-
Nevada/Placer	-	L	-	56	-	0	0	0	-	-	-
Lake Tahoe Basin	-	-	L	0	-	-	-	0	-	-	-
El Dorado	-	L	-	22	-	0	0	0	-	-	-
Alpine	-	-	L	0	-	-	-	0	-	-	-
Amador	-	L	-	14	-	100	0	0	-	-	-
Central Sierra	-	L	-	10	-	88	0	0	-	-	-
Sierra/San Joaquin	-	L	-	5	-	40	0	0	-	-	-
Tulare	L	-	-	3	-	0	0	0	-	-	-
Kern	-	L	-	4	-	17	0	0	-	-	-
Eastern Sierra	-	-	L	8	-	0	0	0	-	-	-
All Sierra Nevada	L	L	-	15	-	18	0	0	-	-	-

Black locust (*Robinia pseudoacacia*)



Red sesbania

(*Sesbania punicea*)

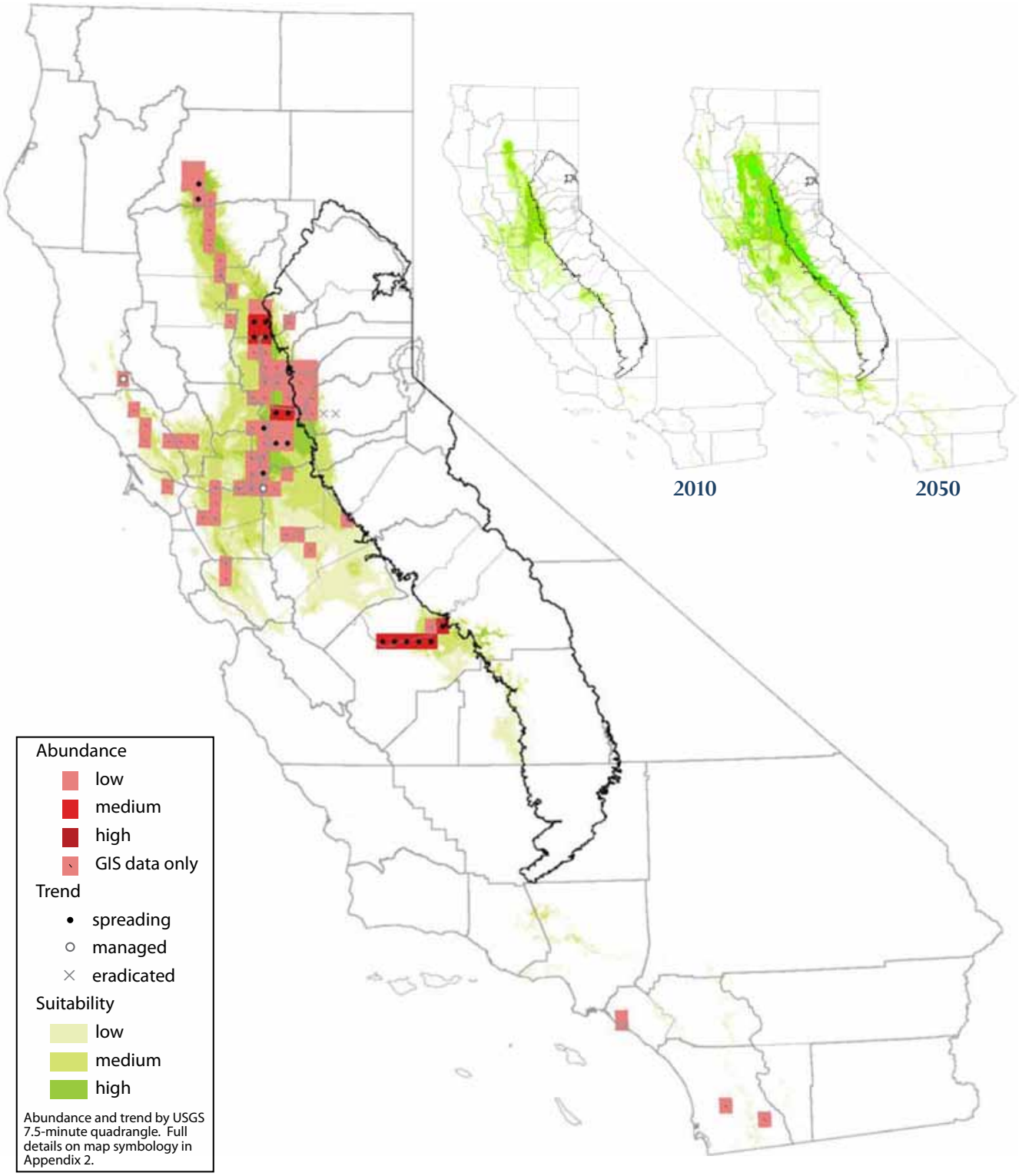
Ratings: Cal-IPC High Alert, CDFA B

Red sesbania is a deciduous shrub or small tree that spreads along riparian areas, in disturbed, moist places, and on the margins of ditches and canals. It creates dense thickets that reduce water flow, may increase stream roughness, and block both wildlife and humans from accessing streambanks. Its seedlings can regenerate in its own shade, giving it the potential to maintain dominance at a site through recurrent recruitment. Red sesbania was introduced as an ornamental plant. It is present at the western edge of the Sierra and we recommend eradication where possible at a high priority and containment at a high priority elsewhere. Our modeling suggests that the amount of suitable range for red sesbania in the Sierra Nevada will increase considerably with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	L	0	-	-	-	0	0	0	-
Plumas/Sierra	-	-	M	0	-	-	-	0	0	0	-
Butte	H	-	-	23	33	36	0	2	54	66	↑
Yuba/Sutter	H	-	-	35	52	31	0	0	73	81	-
Nevada/Placer	-	H	-	24	68	20	0	0	27	40	↑
Lake Tahoe Basin	-	-	-	0	-	-	-	0	0	0	-
El Dorado	-	H	-	9	40	0	0	4	15	42	↑↑
Alpine	-	-	-	0	-	-	-	0	0	0	-
Amador	-	-	H	0	0	-	-	0	33	66	↑↑
Central Sierra	-	-	H	1	7	0	0	0	9	36	↑↑
Sierra/San Joaquin	-	-	H	3	12	86	0	0	11	39	↑↑
Tulare	-	-	L	0	0	-	-	0	11	31	↑↑
Kern	-	-	-	0	0	-	-	0	1	11	↑↑
Eastern Sierra	-	-	-	0	-	-	-	0	0	0	-
All Sierra Nevada	H	H	-	4	16	24	0	0	11	28	↑↑

Abundance, Trend and Suitability

Red sesbania (*Sesbania punicea*)



Gorse

(*Ulex europaeus*)

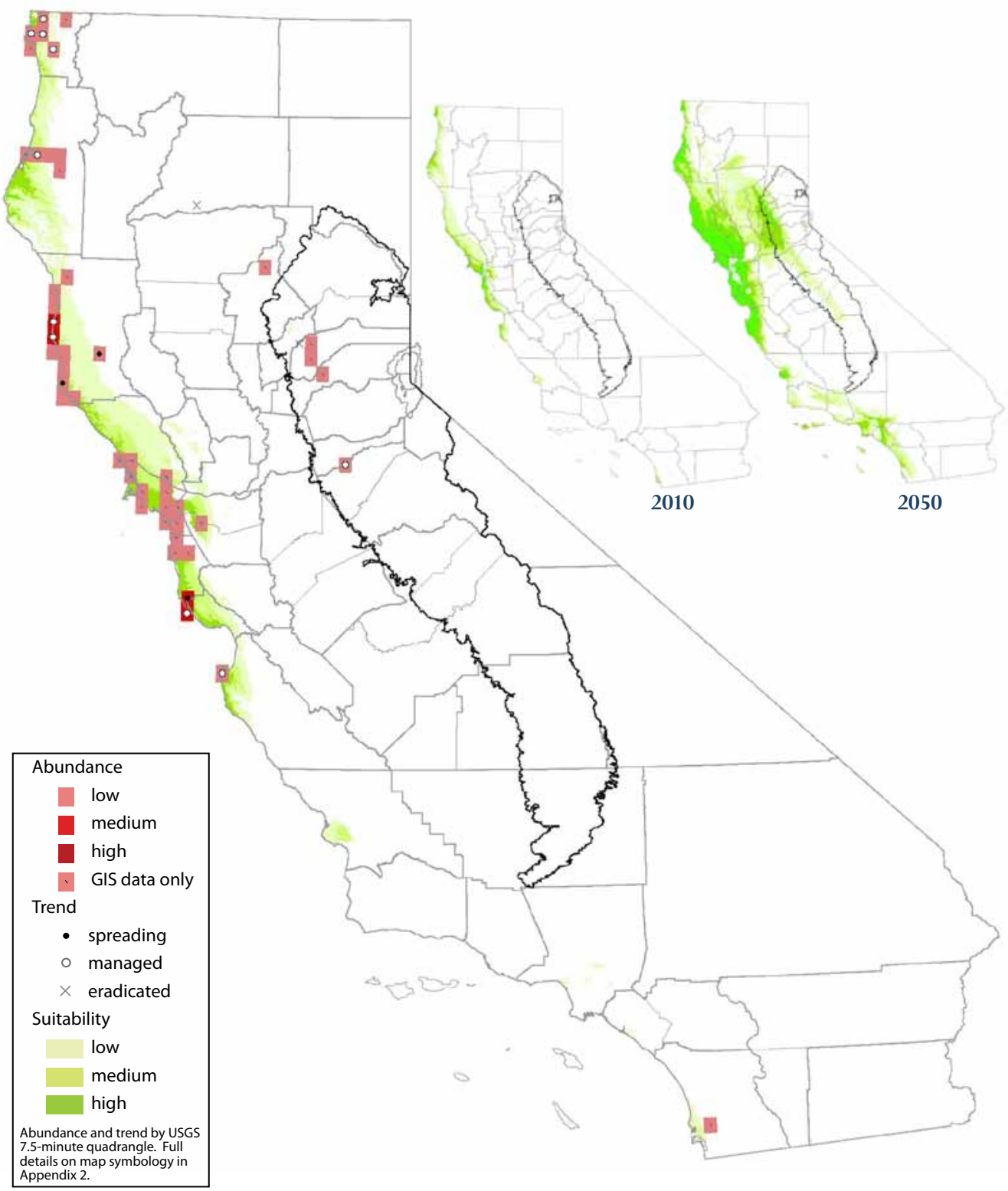
Ratings: Cal-IPC High, CDFA B

Gorse is a spiny, evergreen shrub with yellow pea-like flowers. It can form dense, impenetrable thickets and individual plants can live for 30 years. Older shrubs develop a layer of litter that is highly flammable. Gorse invades disturbed sites, sand dunes, coastal bluffs, fields, riparian corridors, logged areas and burned sites. Plants can resprout from the crown or roots even when cut or burned to ground level. In California, it was sometimes planted around mines and homesteads. Due to limited data available for our modeling, the risk maps may be too conservative, although this species does not seem to spread in the Sierra. Our modeling suggests that the amount of suitable range for gorse in the Sierra Nevada will increase considerably with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	-	0	-	-	-	0	0	0	-
Plumas/Sierra	-	-	L	0	-	-	-	0	0	8	-
Butte	-	-	L	2	50	0	0	0	1	84	↑↑
Yuba/Sutter	-	-	L	0	0	-	-	3	1	96	↑↑
Nevada/Placer	-	M	-	5	100	0	0	2	0	48	↑↑
Lake Tahoe Basin	-	-	L	0	-	-	-	0	0	0	-
El Dorado	-	-	L	0	-	-	-	0	0	38	-
Alpine	-	-	-	0	-	-	-	0	0	0	-
Amador	-	-	L	4	-	0	0	0	0	63	-
Central Sierra	M	-	-	1	-	0	0	0	0	30	-
Sierra/San Joaquin	-	-	-	0	-	-	-	0	0	18	-
Tulare	-	-	-	0	-	-	-	0	0	5	-
Kern	-	-	-	0	-	-	-	0	0	2	-
Eastern Sierra	-	-	-	0	-	-	-	0	0	0	-
All Sierra Nevada	L	-	-	1	100	0	0	0	0	23	↑↑

Abundance, Trend and Suitability

Gorse (*Ulex europaeus*)



Giant reed

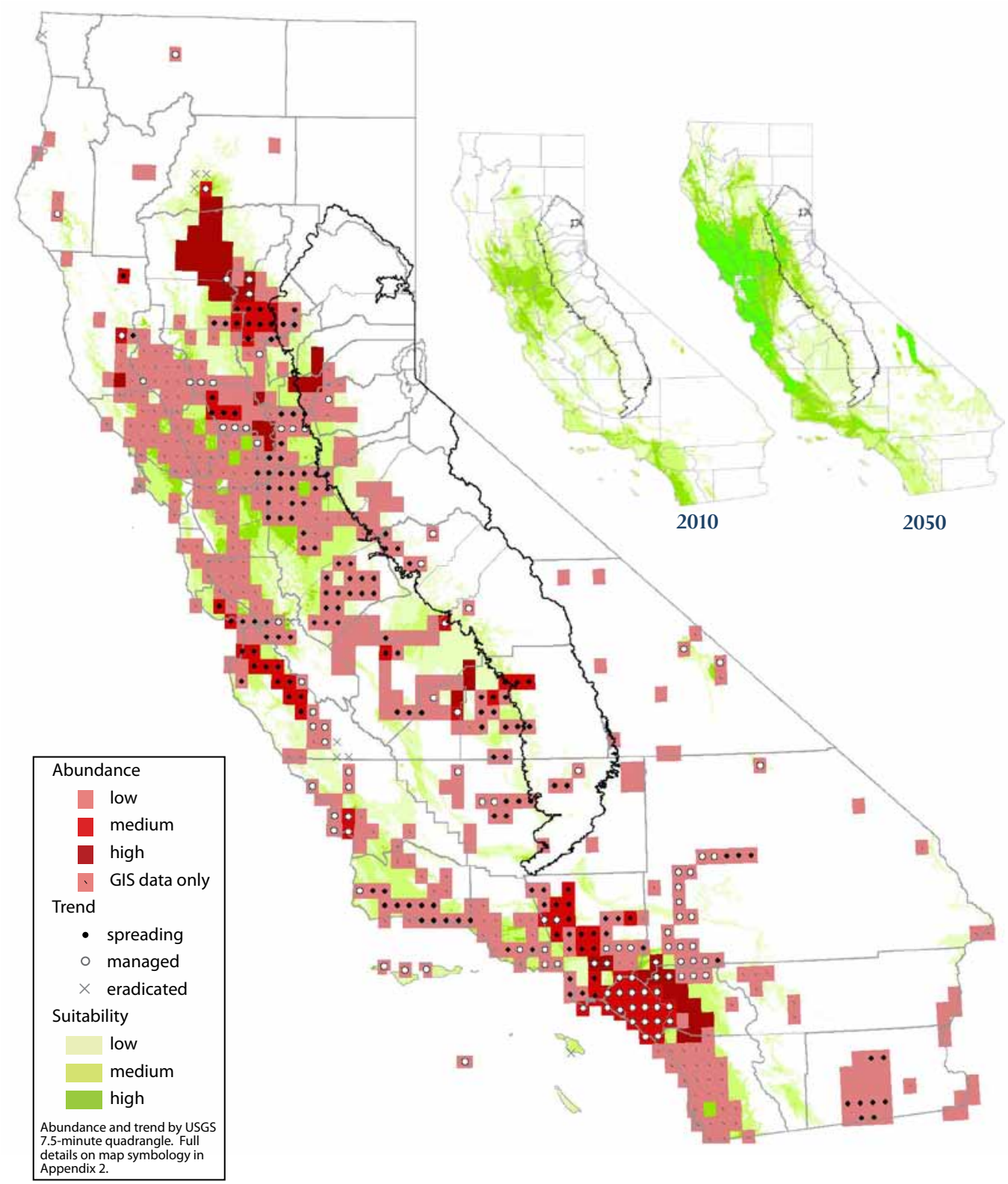
(*Arundo donax*)

Ratings: Cal-IPC High; CDFA B

Giant reed is a very large grass that forms clumps and grows up to 30 feet (9 m) tall in riparian areas or other locations where water is available. It tolerates a wide range of environmental conditions, including some salinity and extended drought, but does not grow well in areas with prolonged freezing temperatures. Giant reed can fill a stream channel, displacing native vegetation, increasing flooding, and increasing fire fuel loads. Birds nest much less in arundo compared to native willows and the insects they eat are less abundant in arundo. Giant reed reproduces vegetatively from fragments of roots and shoots; rhizomes can resprout even when buried under several feet of silt. We recommend containment as a high priority. Our modeling suggests that the amount of suitable range for giant reed in the Sierra Nevada will increase with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	L	0	-	-	-	0	0	0	-
Plumas/Sierra	-	-	H	0	0			0	1	8	↑↑
Butte	-	H	-	56	66	63	0	0	67	81	↑
Yuba/Sutter	-	H	-	46	63	35	0	0	85	96	-
Nevada/Placer	-	H	-	24	43	20	0	0	40	58	↑
Lake Tahoe Basin	-	-	L	0	-	-	-	0	0	0	-
El Dorado	-	H	-	22	42	10	0	0	35	51	↑
Alpine	-	-	L	0	-	-	-	0	0	0	-
Amador	-	H	-	21	29	33	0	0	58	71	↑
Central Sierra	-	H	-	20	41	19	0	0	27	47	↑
Sierra/San Joaquin	-	H	-	21	32	24	0	0	30	44	↑
Tulare	-	H	-	21	37	67	0	0	30	51	↑
Kern	-	H	-	15	28	42	17	0	14	50	↑↑
Eastern Sierra	M	-	-	3	33	0	0	0	2	13	↑↑
All Sierra Nevada	L	H	-	13	28	36	2	0	23	38	↑

Giant reed (*Arundo donax*)



Annual false brome

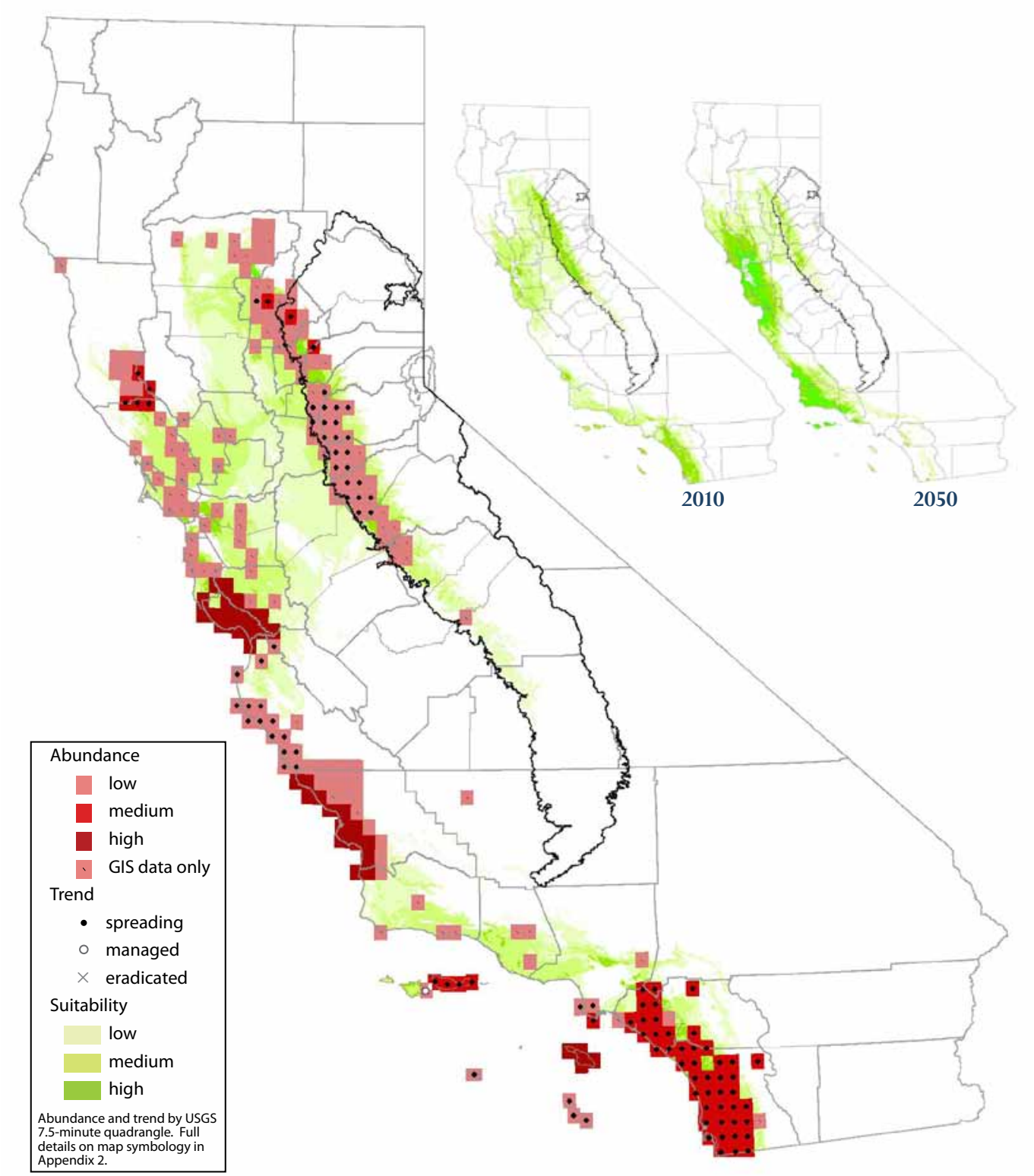
(*Brachypodium distachyon*)

Ratings: Cal-IPC Moderate; CDFA B

Annual false brome is a winter annual grass with spikes that often have a purplish color. It is locally abundant in some areas of California, especially on poor, rocky soils and it is a poor source of forage. It typically invades dry slopes and fields, roadsides, disturbed grasslands, and the margins of shrub thickets. It can also tolerate some shade in oak woodlands. False brome disperses when florets that fall near the parent plant are carried away by animals, vehicle tires, and human activities. Our modeling suggests that the amount of suitable range for annual false brome in the Sierra Nevada will remain relatively unchanged with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	L	0	-	-	-	0	0	0	-
Plumas/Sierra	-	-	L	1	50	0	0	0	0	1	↑↑
Butte	-	M	-	44	57	14	0	0	64	63	-
Yuba/Sutter	-	M	-	24	36	11	0	0	79	79	-
Nevada/Placer	-	M	-	18	33	55	0	0	38	39	-
Lake Tahoe Basin	-	-	L	0	-	-	-	0	0	0	-
El Dorado	-	M	-	22	46	100	0	0	35	35	-
Alpine	-	-	L	0	-	-	-	0	0	0	-
Amador	-	M	-	43	63	67	0	0	61	61	-
Central Sierra	-	M	-	23	46	44	0	0	38	34	-
Sierra/San Joaquin	M	-	-	3	11	0	0	0	12	6	↓
Tulare	-	-	M	0	0	-	-	0	5	1	↓
Kern	-	-	L	1	7	0	0	0	1	6	↑↑
Eastern Sierra	-	-	L	0	-	-	-	0	0	0	-
All Sierra Nevada	-	L	-	12	34	43	0	0	21	18	-

Annual false brome (*Brachypodium distachyon*)



Japanese brome

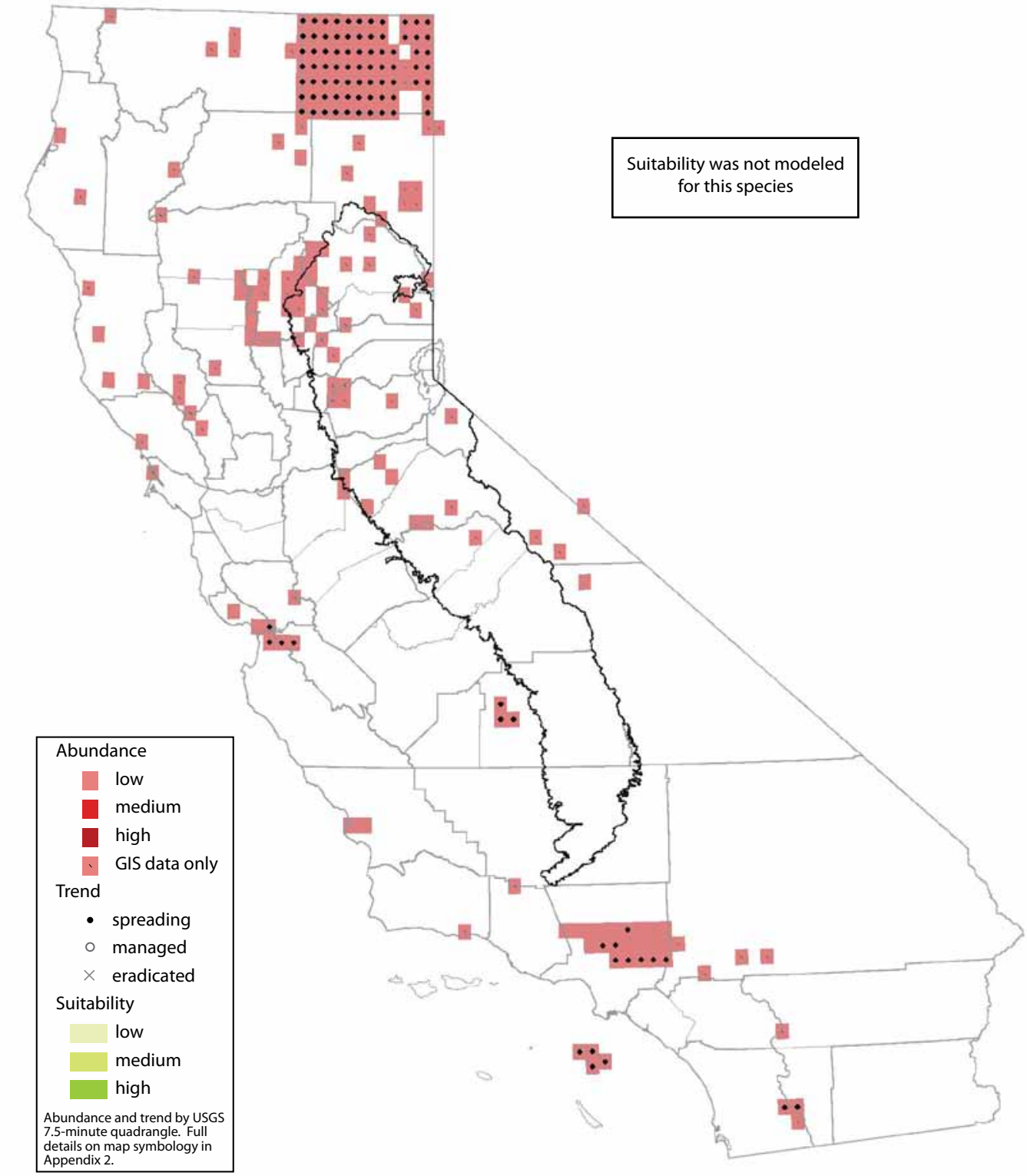
(*Bromus japonicus*)

Ratings: Cal-IPC Limited; CDFA not rated

Japanese brome is a cool season, annual grass. While it can provide desirable livestock forage early in the season when it is immature, Japanese brome also competes for moisture with other vegetation early in the season and displaces desirable perennial grasses that would extend the grazing season. Japanese brome occasionally hybridizes with soft brome (*Bromus hordeaceus*) and rattlesnake brome (*Bromus briziformis*). Japanese brome occurs throughout California but it more common in the north. Florets disperse with animals, vehicle tires, human activities, and as seed contaminants. Many land managers are not familiar with this species, so it is likely more widespread than our map indicates. We did not model suitability for this species.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	L	-	-	17	-	45	0	0	-	-	-
Plumas/Sierra	-	L	-	17	-	0	0	0	-	-	-
Butte	-	L	-	46	-	0	0	0	-	-	-
Yuba/Sutter	-	L	-	19	-	0	0	0	-	-	-
Nevada/Placer	-	L	-	10	-	0	0	0	-	-	-
Lake Tahoe Basin	-	-	L	0	-	-	-	0	-	-	-
El Dorado	-	L	-	11	-	0	0	0	-	-	-
Alpine	L	-	-	4	-	0	0	0	-	-	-
Amador	-	-	L	7	-	0	0	0	-	-	-
Central Sierra	-	L	-	10	-	0	0	0	-	-	-
Sierra/San Joaquin	L	-	-	2	-	0	0	0	-	-	-
Tulare	-	-	L	3	-	100	0	0	-	-	-
Kern	-	-	L	1	-	0	0	0	-	-	-
Eastern Sierra	-	-	L	1	-	0	0	0	-	-	-
All Sierra Nevada	L	L	-	8	-	0	0	0	-	-	-

Japanese brome (*Bromus japonicus*)



Red brome

(*Bromus madritensis* subsp. *rubens*)

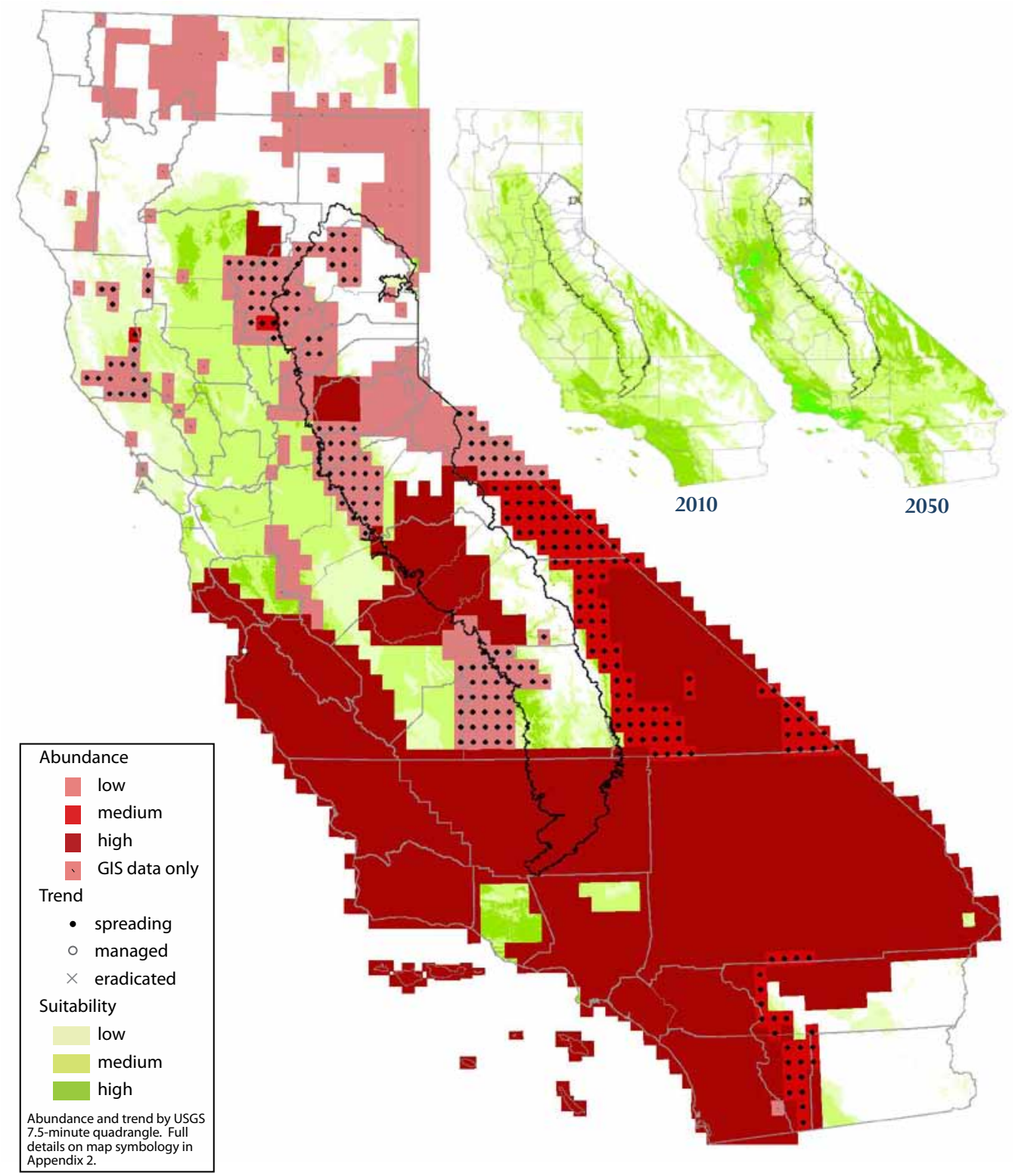
Ratings: Cal-IPC High; CDFA not rated

Red brome is a cool season, annual grass. Like other annual grasses, it is highly flammable when dry and can increase the spread and frequency of wildfires. It grows in open disturbed areas, roadsides, fields, rangelands, forestry sites, and many natural plant communities. Red brome occurs throughout California but it most abundant in the southern part of the state. Overgrazing can increase the dominance of brome grasses. Burning a site before spikelets shatter can reduce the seedbank but may increase the susceptibility of the site to reinvasion. Our modeling suggests that the amount of suitable range for red brome in the Sierra Nevada will decrease with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	M	-	64	100	3	0	0	23	60	↑↑
Plumas/Sierra	-	M	-	34	66	48	0	0	18	18	-
Butte	-	M	-	90	90	58	0	0	88	84	-
Yuba/Sutter	-	M	-	54	77	15	0	0	97	96	-
Nevada/Placer	-	M	-	62	98	10	0	0	50	44	-
Lake Tahoe Basin	-	M	-	78	100	0	0	0	3	2	-
El Dorado	-	M	-	94	100	9	0	0	41	25	↓
Alpine	-	M	-	83	100	5	0	0	5	4	↓
Amador	-	M	-	86	100	67	0	0	66	49	↓
Central Sierra	-	M	-	60	77	45	0	0	51	34	↓
Sierra/San Joaquin	-	M	-	52	53	8	0	0	79	65	↓
Tulare	-	M	-	52	53	69	0	0	85	68	↓
Kern	-	-	-	100	100	0	0	0	98	90	-
Eastern Sierra	-	H	-	85	100	95	0	0	68	72	-
All Sierra Nevada	-	M	-	62	77	25	0	0	59	47	↓

Abundance, Trend and Suitability

Red brome (*Bromus madritensis* subsp. *rubens*)



Jubatagrass

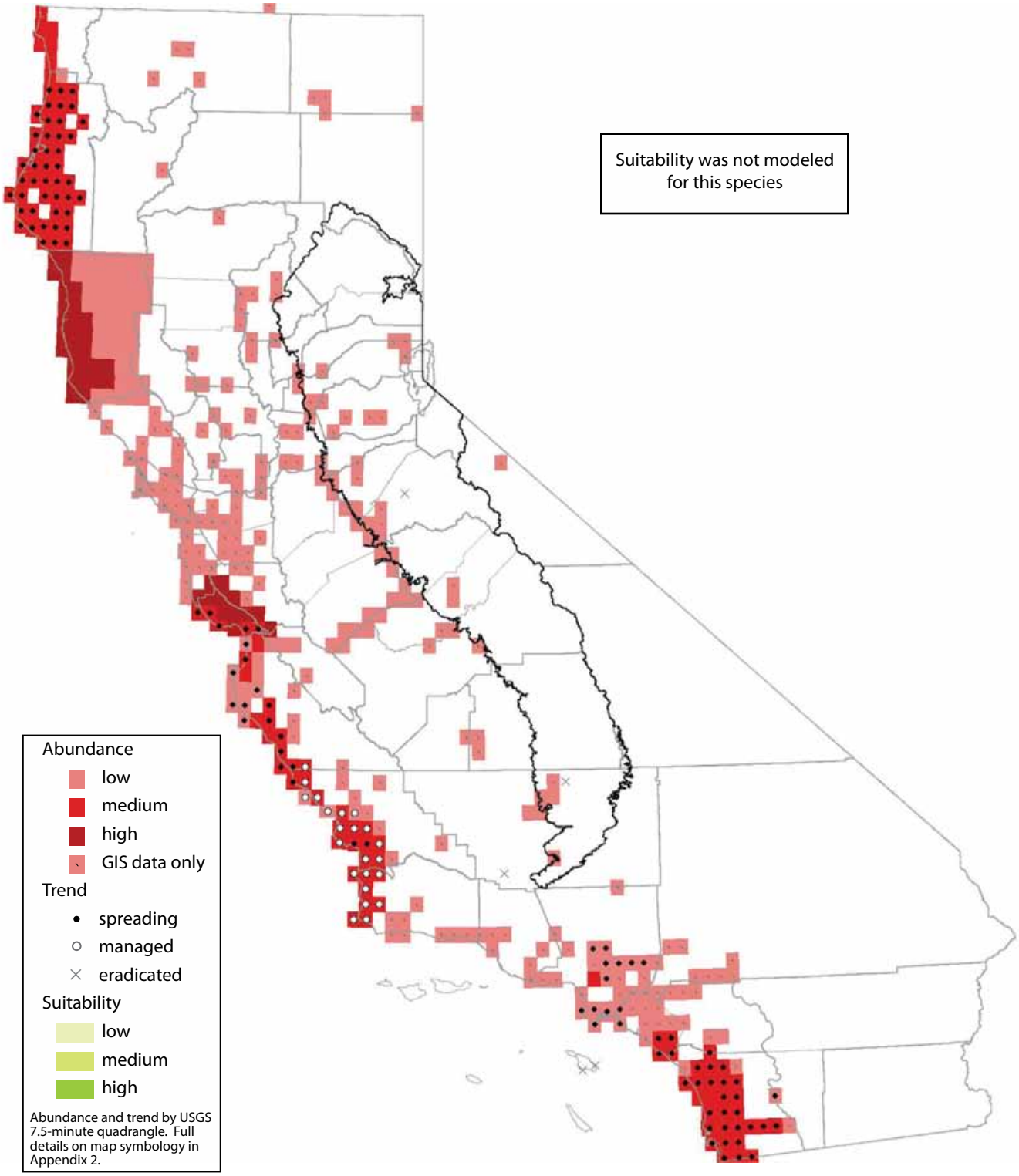
(*Cortaderia jubata*)

Ratings: Cal-IPC High, CDFA B

Cortaderia spp. are large perennial grasses with showy, plume-like inflorescences. Pampasgrass tolerates more climate variation than jubatagrass, but jubatagrass can reproduce asexually with apomictic seed while pampasgrass can only develop seed when male and female plants are within pollination range. Both species are serious problems in coastal California but less so in the Sierra Nevada. Due to the difficulty of distinguishing between them, we are not certain which species is present in mapped quads, so the abundance information should be viewed with caution. While commonly planted as ornamental species in the Sierra, *Cortaderias* are rarely seen spreading from plantings. We did not model suitability for this species.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	L	2	-	0	0	0	-	-	-
Plumas/Sierra		-	M	0	-	-	-	0	-	-	-
Butte	-	M	-	17	-	0	0	0	-	-	-
Yuba/Sutter	-	-	M	11	-	0	0	0	-	-	-
Nevada/Placer	-		M	14	-	0	0	0	-	-	-
Lake Tahoe Basin	-	M	-	6	-	0	0	0	-	-	-
El Dorado	-	M	-	13	-	0	0	0	-	-	-
Alpine	-	-	M	0	-	-	-	0	-	-	-
Amador	-	-	M	18	-	0	0	0	-	-	-
Central Sierra	-	M	-	15	-	0	0	1	-	-	-
Sierra/San Joaquin	M		-	10	-	0	0	0	-	-	-
Tulare	-	-	M	3	-	0	0	0	-	-	-
Kern	-	M	-	4	-	0	0	1	-	-	-
Eastern Sierra	-	-	M	0	-	0	0	0	-	-	-
All Sierra Nevada	-	L	-	9	-	0	0	0	-	-	-

Jubatagrass (*Cortaderia jubata*)



Pampasgrass

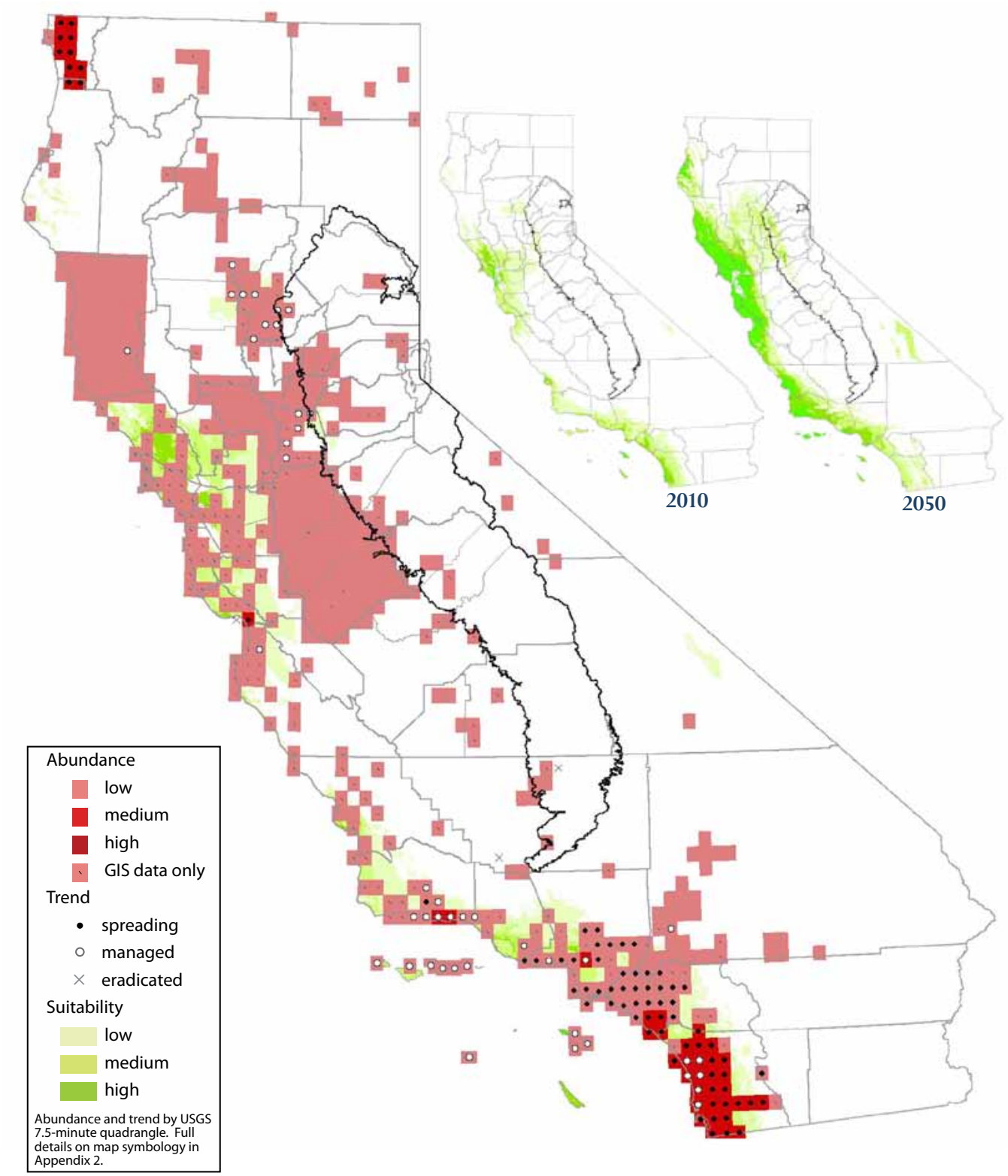
(*Cortaderia selloana*)

Ratings: Cal-IPC High, CDFA not rated

Cortaderia spp. are large perennial grasses with showy, plume-like inflorescences. Pampasgrass tolerates more climate variation than jubatagrass, but jubatagrass can reproduce asexually with apomictic seed while pampasgrass can only develop seed when male and female plants are within pollination range. Both species are serious problems in coastal California but less so in the Sierra Nevada. Due to the difficulty of distinguishing between them, we are not certain which species is present in mapped quads, so the abundance information should be viewed with caution. While commonly planted as ornamental species in the Sierra, *Cortaderia*s are rarely seen spreading from plantings. Our modeling suggests that the amount of suitable range for pampasgrass in the Sierra Nevada will increase considerably with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	L	3	-	0	0	0	0	0	-
Plumas/Sierra	M	-	-	2	-	0	0	0	0	1	-
Butte	-	M	-	48	85	0	0	0	21	64	↑↑
Yuba/Sutter	-	-	M	46	100	0	0	0	5	78	↑↑
Nevada/Placer	-	M	-	40	100	0	0	0	11	35	↑↑
Lake Tahoe Basin	-	M	-	6	-	0	0	0	0	0	-
El Dorado	-	M	-	24	100	0	0	0	8	26	↑↑
Alpine	-	-	M	0	-	-	-	0	0	0	-
Amador	-	-	M	14	80	0	0	0	7	30	↑↑
Central Sierra	-	M	-	17	-	0	0	0	0	8	-
Sierra/San Joaquin	-	M	-	12	-	0	0	0	0	1	-
Tulare	-	-	M	4	100	0	0	0	0	1	-
Kern	-	M	-	6	-	0	0	1	0	3	-
Eastern Sierra	-	-	M	1	36	0	0	0	1	9	↑↑
All Sierra Nevada	-	L	-	14	100	0	0	0	2	10	↑↑

Pampasgrass (*Cortaderia selloana*)



Orchardgrass

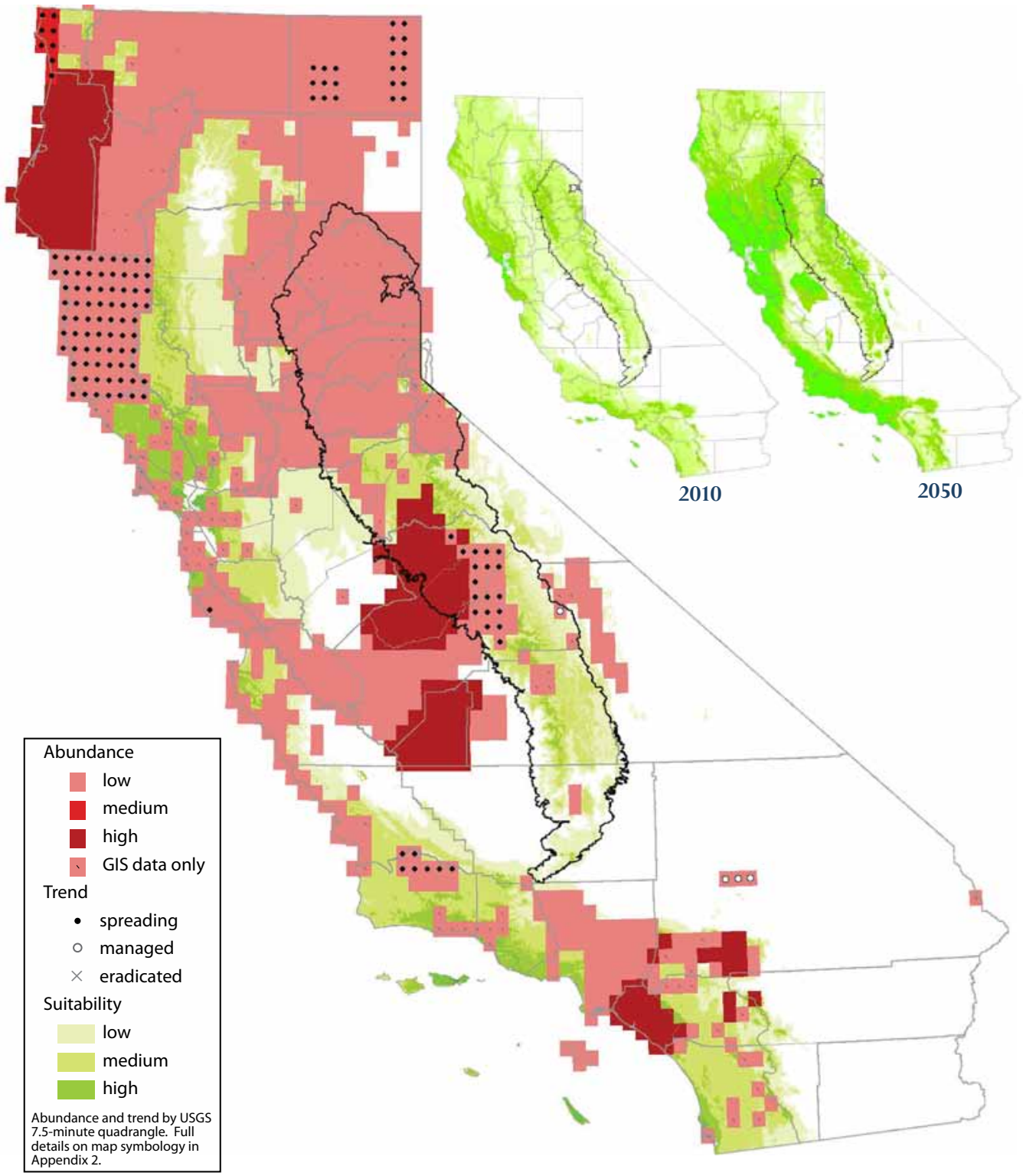
(*Dactylis glomerata*)

Ratings: Cal-IPC Limited, CDFA not rated

Orchardgrass is a tufted or clumping cool-season perennial grass with panicles of lumpy, spikelet clusters. Although cultivated as forage and as a cover crop, it is considered invasive because it can invade oak woodlands and serpentine habitats and is an emerging threat in coastal prairie grasslands. It has escaped cultivation and invaded many natural areas throughout the United States, although it seldom occurs in high densities and its impacts are low compared to other invasive plants. Our modeling suggests that the amount of suitable range for orchardgrass in the Sierra Nevada will remain relatively unchanged with future climate change.

Weed Management Area	Opportunities			Statistics							
	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	L	-	64	100	0	0	0	26	65	↑↑
Plumas/Sierra	-	L	-	99	100	0	0	0	88	98	-
Butte	-	L	-	98	100	0	0	0	100	100	-
Yuba/Sutter	-	L	-	73	100	0	0	0	100	100	-
Nevada/Placer	-	L	-	100	100	0	0	0	100	100	-
Lake Tahoe Basin	-	L	-	72	87	0	0	0	92	100	-
El Dorado	-	L	-	91	93	0	0	0	98	100	-
Alpine	-	L	-	75	82	0	0	0	92	97	-
Amador	-	L	-	68	68	0	0	0	99	100	-
Central Sierra	-	L	-	37	37	0	0	0	96	96	-
Sierra/San Joaquin	-	L	-	70	100	13	1	0	50	74	↑
Tulare	-	L	-	21	30	0	0	0	55	64	-
Kern	-	L	-	5	9	0	0	0	28	34	↑
Eastern Sierra	-	L	-	9	24	0	4	0	20	35	↑
All Sierra Nevada	-	L	-	58	60	6	0	0	84	91	-

Orchardgrass (*Dactylis glomerata*)



Common velvet grass

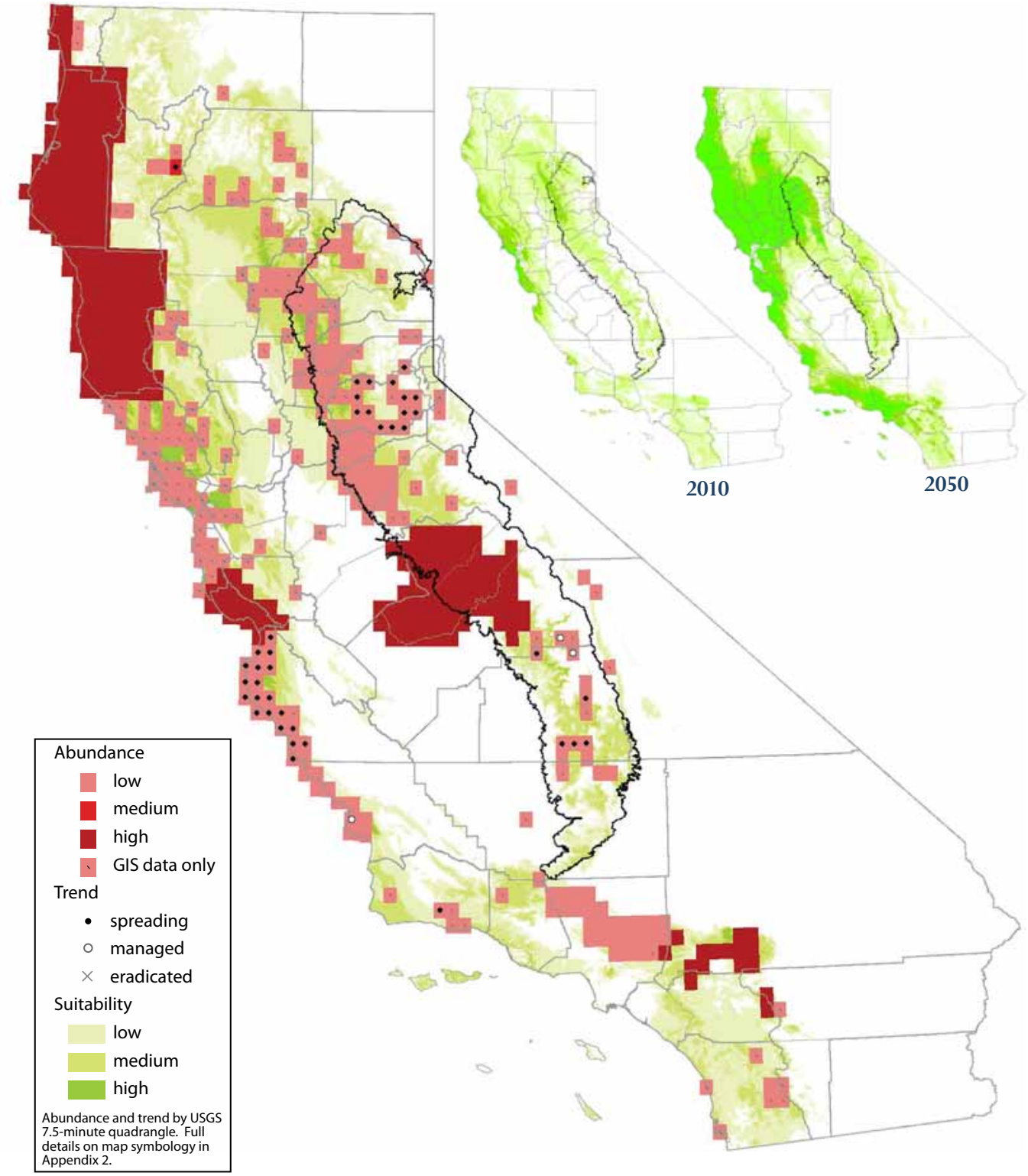
(*Holcus lanatus*)

Ratings: Cal-IPC Moderate, CDFA not rated

Common velvet grass is a tufted perennial grass with gray-green foliage. It is sometimes cultivated as a pasture grass for forage and hay but is considered invasive in coastal grasslands and wetlands in California. It tolerates high levels of heavy metals in the soil and sulphur dioxide in the air. It grows best in moist conditions, and is a facultative wetland indicator species, but can tolerate some drought. Velvet grass grows in disturbed grasslands, cultivated fields and other moist areas. Manual removal, burning, cultivation, intensive mowing or grazing, and elimination of irrigation can reduce velvetgrass. While most land managers in the foothills do not consider this species a priority, it is a serious concern at in national forests and national parks in the Sierra. We recommend eradication or containment at a medium priority, focused on preventing spread at higher elevations. Our modeling suggests that the amount of suitable range for common velvet grass in the Sierra Nevada will increase with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	M	-	4	11	0	0	0	17	72	↑↑
Plumas/Sierra	-	M	-	19	20	0	0	0	72	97	↑
Butte	-	M	-	46	46	0	0	0	99	99	-
Yuba/Sutter	-	M	-	32	48	0	0	0	89	100	-
Nevada/Placer	-	M	-	41	41	15	0	0	77	93	↑
Lake Tahoe Basin	-	-	M	22	27	50	0	0	43	70	↑
El Dorado	-	M	-	54	56	56	0	0	78	88	-
Alpine	-	M	-	13	14	0	0	0	35	77	↑↑
Amador	-	M	-	68	68	21	0	0	89	91	-
Central Sierra	-	M	-	30	36	0	0	0	63	83	↑
Sierra/San Joaquin	-	M	-	39	71	1	3	0	30	49	↑
Tulare	-	M	-	11	18	46	9	0	37	55	↑
Kern	-	M	-	4	8	0	0	0	21	31	↑
Eastern Sierra	-	M	-	1	7	0	0	0	4	35	↑↑
All Sierra Nevada	-	M	-	34	39	11	1	0	60	82	↑

Common velvet grass (*Holcus lanatus*)



Mediterranean barley

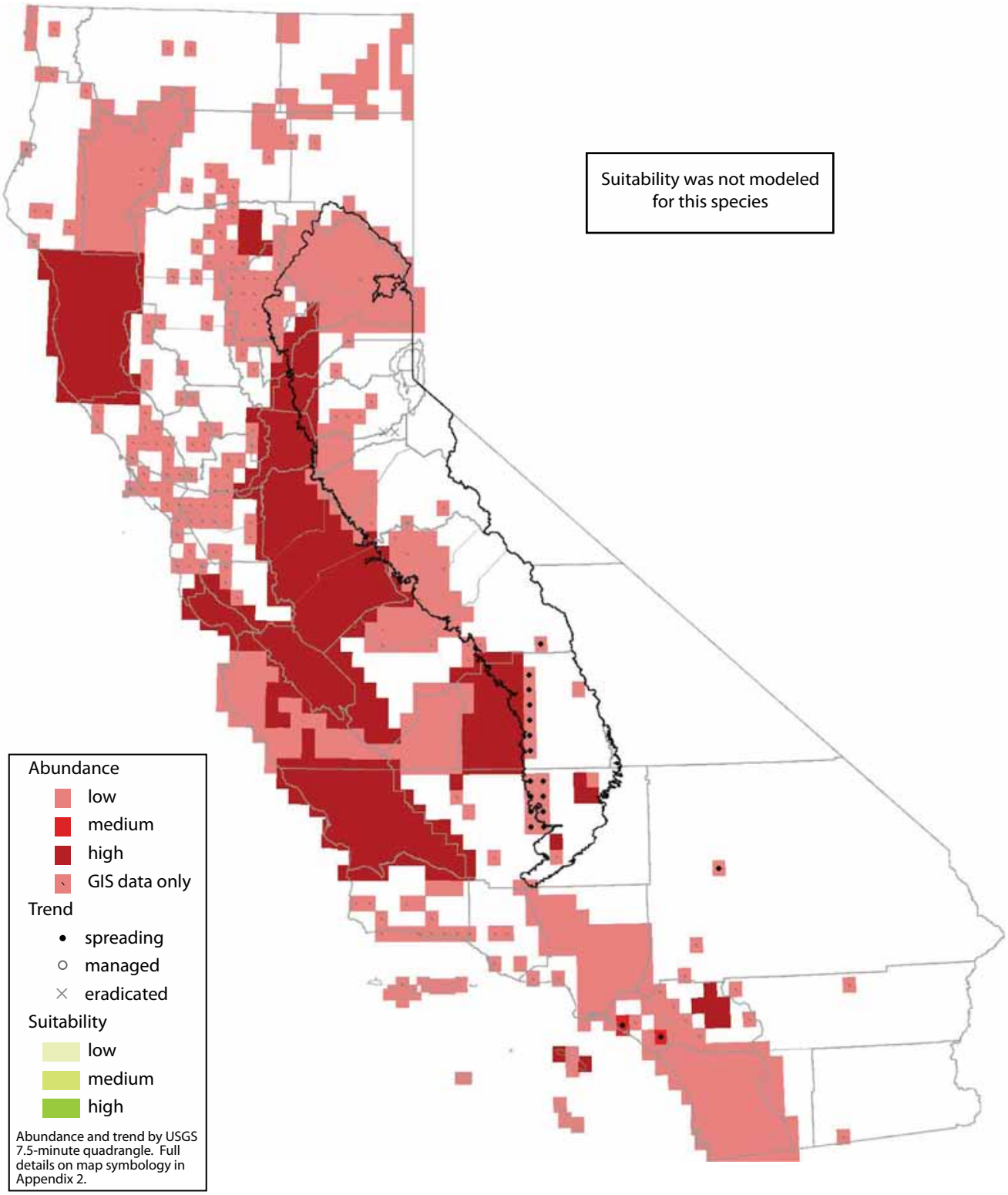
(*Hordeum marinum*)

Ratings: Cal-IPC Moderate, CDFA not rated

Hordeum species are cool-season annuals with dense, bristly spikes of stiff-awned spikelets. Before the flower spikes develop, barleys are livestock forage. However, the barbed awns and stiff bases on mature spikelets can injure animals. Mediterranean barley stems grow to 20 in. (50 cm) tall with leaves 2-8 in. (5-20 cm) while hare barley stems grow to 40 in. (1 m) with leaves often >8 in. (20 cm) long. Barleys grow in roadsides, fields, annual grassland, oak savannah, agricultural areas, and other disturbed sites. Mediterranean barley grows in moist or dry places while hare barley usually inhabits moist sites. Like other invasive annual grasses, *Hordeum* species outcompete native perennial grasses. Seeds disperse by clinging to vehicles, equipment, humans and animals. In pastures, close grazing early in the season or mowing to prevent seed production can control *Hordeum*. We did not model suitability for this species.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	M	-	24	-	0	0	0	-	-	-
Plumas/Sierra	-	M	-	93	-	0	0	0	-	-	-
Butte	-	M	-	88	-	0	0	0	-	-	-
Yuba/Sutter	-	M	-	62	-	0	0	0	-	-	-
Nevada/Placer	-	M	-	57	-	0	0	0	-	-	-
Lake Tahoe Basin	-	-	M	0	-	-	-	0	-	-	-
El Dorado	-	M	-	28	-	0	0	4	-	-	-
Alpine	-	-	M	0	-	-	-	0	-	-	-
Amador	-	M	-	54	-	0	0	7	-	-	-
Central Sierra	-	M	-	30	-	0	0	0	-	-	-
Sierra/San Joaquin	-	M	-	43	-	1	0	0	-	-	-
Tulare	-	M	-	53	-	11	0	0	-	-	-
Kern	-	M	-	26	-	19	0	0	-	-	-
Eastern Sierra	-	-	M	0	-	-	-	0	-	-	-
All Sierra Nevada	-	M	-	45	-	7	0	0	-	-	-

Mediterranean barley (*Hordeum marinum*)



Hare barley

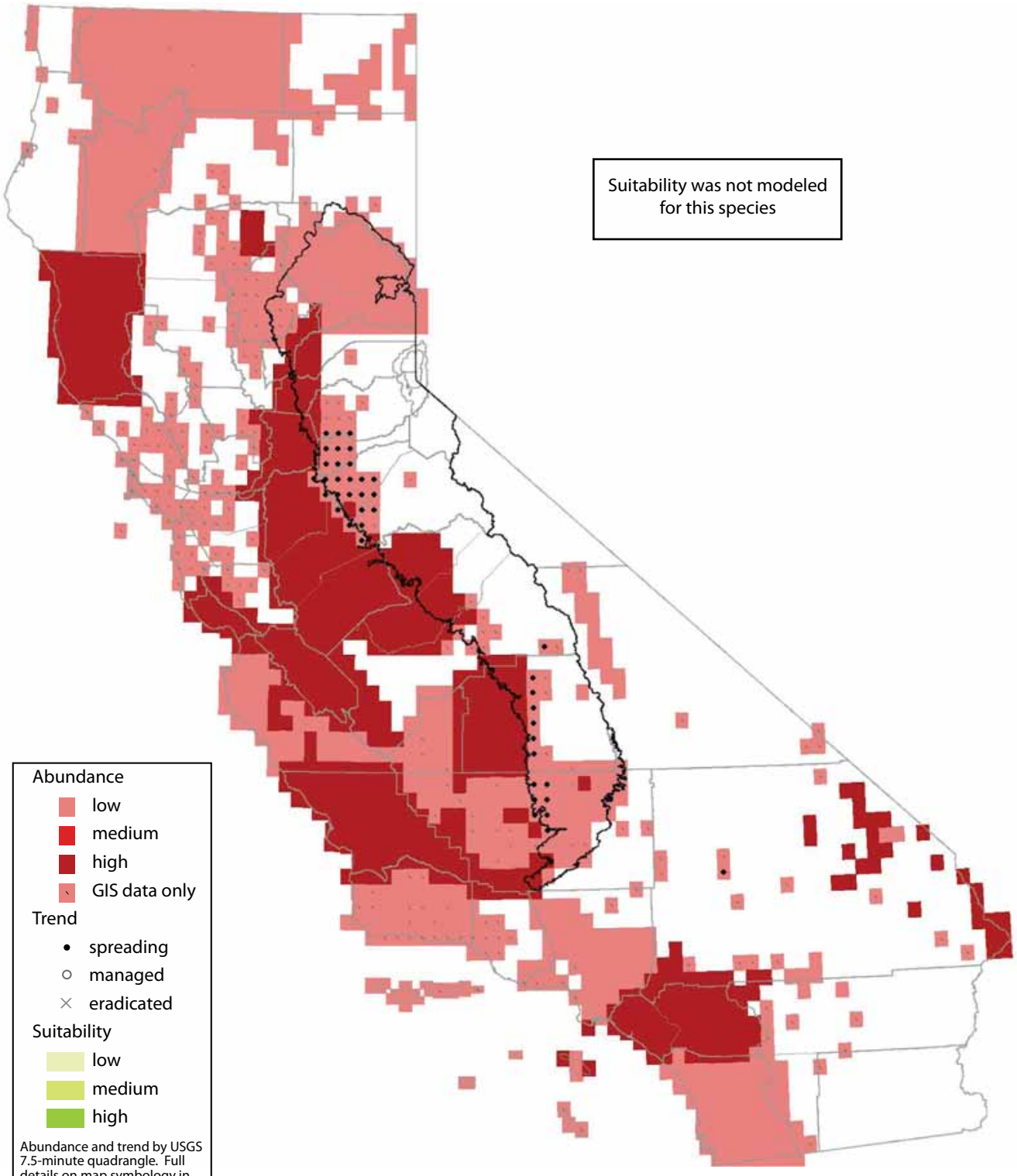
(*Hordeum murinum*)

Ratings: Cal-IPC Moderate; CDFA not rated

Hordeum species are cool-season annuals with dense, bristly spikes of stiff-awned spikelets. Before the flower spikes develop, barleys are livestock forage. However, the barbed awns and stiff bases on mature spikelets can injure animals. Mediterranean barley stems grow to 20 in. (50 cm) tall with leaves 2-8 in. (5-20 cm) while hare barley stems grow to 40 in. (1 m) with leaves often >8 in. (20 cm) long. Barleys grow in roadsides, fields, annual grassland, oak savannah, agricultural areas, and other disturbed sites. Mediterranean barley grows in moist or dry places while hare barley usually inhabits moist sites. Like other invasive annual grasses, *Hordeum* species outcompete native perennial grasses. Seeds disperse by clinging to vehicles, equipment, humans and animals. We did not model suitability for this species.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	M	-	25	-	0	0	0	-	-	-
Plumas/Sierra	-	M	-	94	-	0	0	0	-	-	-
Butte	-	M	-	90	-	0	0	0	-	-	-
Yuba/Sutter	-	M	-	65	-	0	0	0	-	-	-
Nevada/Placer	-	M	-	56	-	0	0	0	-	-	-
Lake Tahoe Basin	-	-	M	0	-	-	-	0	-	-	-
El Dorado	-	M	-	30	-	21	0	0	-	-	-
Alpine	-	-	M	0	-	-	-	0	-	-	-
Amador	-	M	-	54	-	80	0	0	-	-	-
Central Sierra	-	M	-	29	-	78	0	0	-	-	-
Sierra/San Joaquin	-	M	-	45	-	1	0	0	-	-	-
Tulare	-	M	-	64	-	9	0	0	-	-	-
Kern	-	M	-	76	-	6	0	0	-	-	-
Eastern Sierra	-	-	M	8	-	0	0	0	-	-	-
All Sierra Nevada	-	M	-	54	-	15	0	0	-	-	-

Hare barley (*Hordeum murinum*)



Italian ryegrass

(*Lolium multiflorum* and *L. perenne*)

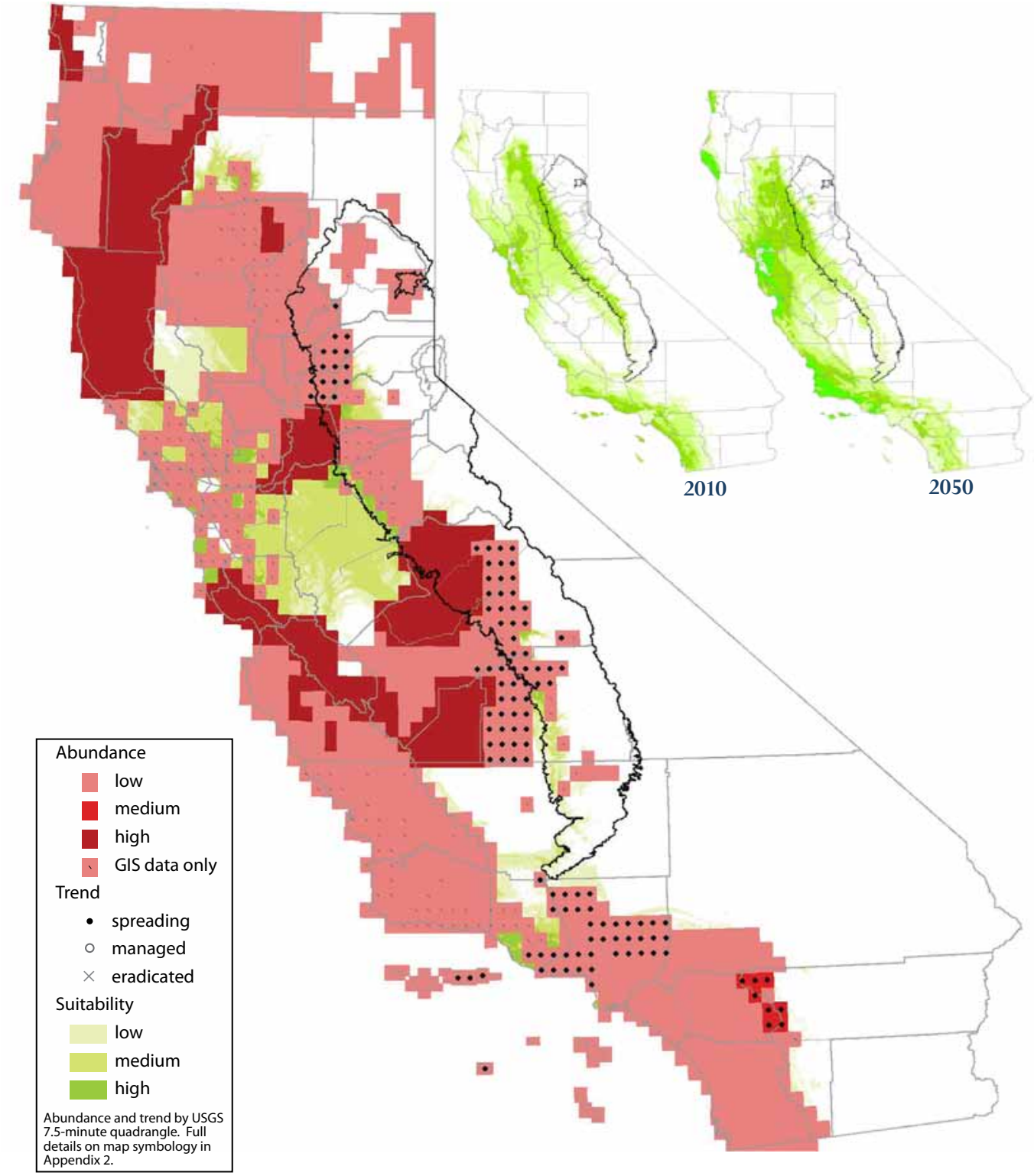
Ratings: Cal-IPC Moderate, CDFA not rated

Annual (*Lolium multiflorum*) and perennial (*L. perenne*) Italian ryegrasses are extremely widespread grasses widely planted for pasture forage and as cover crops. Both species have spikelike inflorescences to 3 ft. (0.9 m) tall. They readily hybridize and recent research indicates that they may be genetically the same species. Ryegrasses are considered invasive because they can move into relatively undisturbed grasslands where they displace native species and threaten vernal pools. Our modeling suggests that the amount of suitable range for Italian ryegrass in the Sierra Nevada will remain relatively unchanged with future climate change.

Weed Management Area	Opportunities			Statistics							
	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	M	-	12	-	0	0	0	0	0	-
Plumas/Sierra	-	M	-	35	100	7	0	0	3	3	-
Butte	M	-	-	94	98	4	0	0	77	72	-
Yuba/Sutter	M	-	-	78	100	35	0	0	88	84	-
Nevada/Placer	M	-	-	44	67	86	0	0	46	44	-
Lake Tahoe Basin	-	-	M	0	0	NA	NA	0	0	0	-
El Dorado	-	M	-	33	65	20	0	0	53	42	↓
Alpine	-	-	M	0	0	-	-	0	1	0	-
Amador	-	M	-	71	80	0	0	0	67	59	-
Central Sierra	-	M	-	38	55	0	0	0	46	40	-
Sierra/San Joaquin	-	M	-	74	100	19	0	0	39	50	↑
Tulare	-	M	-	47	71	75	0	0	38	23	↓
Kern	-	M	-	18	35	13	0	0	21	33	↑
Eastern Sierra	-	-	L	0	0	-	-	0	0	0	-
All Sierra Nevada	-	M	-	40	66	28	0	0	37	35	-

Abundance, Trend and Suitability

Italian ryegrass (*Lolium multiflorum* and *L. perenne*)



Japanese knotweed

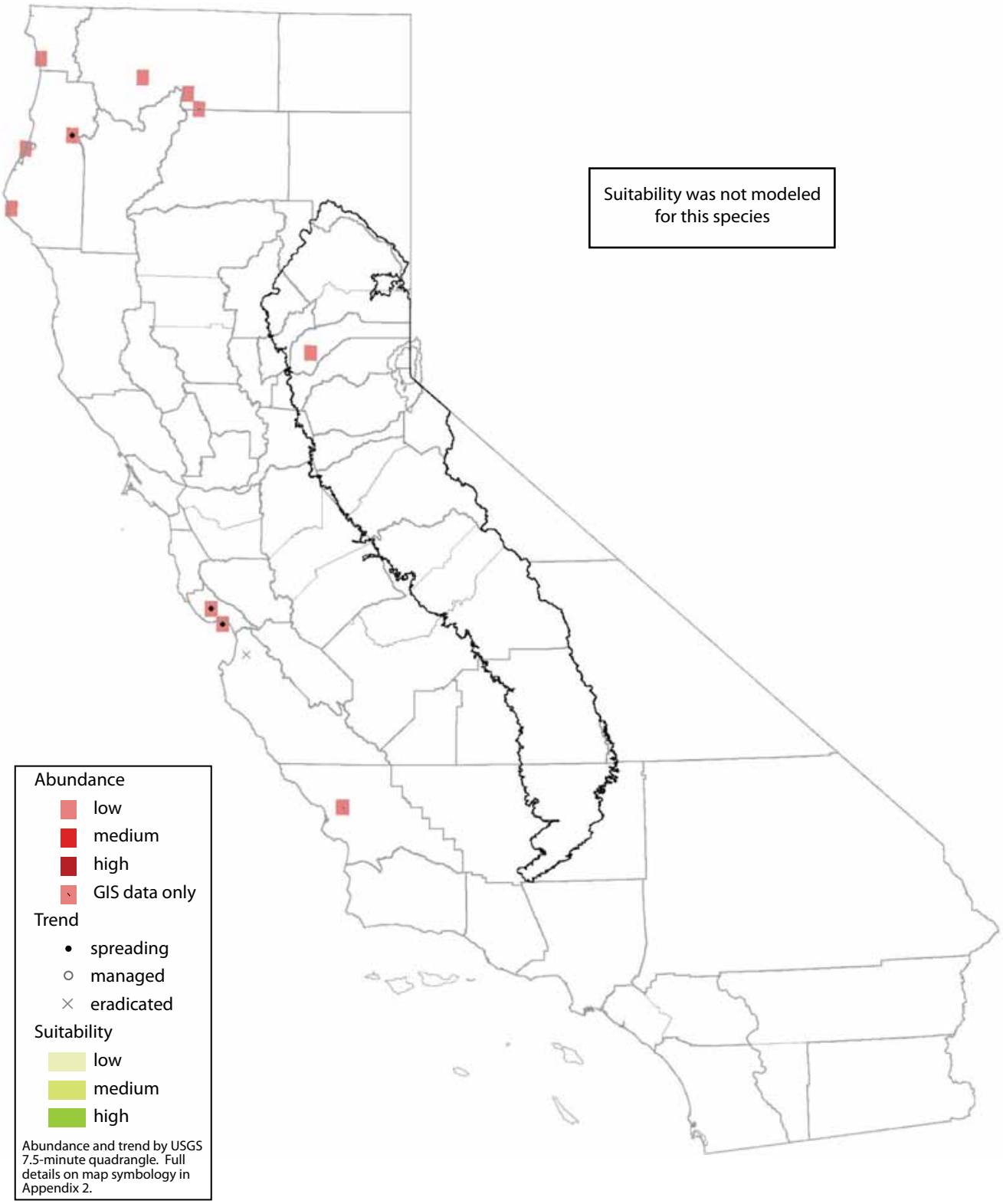
(*Polygonum cuspidatum*)

Ratings: Cal-IPC Moderate Alert, CDFA B

Knotweeds have very limited distribution in California but cause serious problems in Pacific Northwest wetlands and riparian areas. They grow as large clumping perennials with coarse foliage, hollow stems, and aggressive, creeping rhizomes. Fragments of rhizomes can develop into new plants. Knotweeds create dense colonies that displace other vegetation and are extremely difficult to remove. Japanese and giant knotweed readily hybridize. Japanese knotweed also grows in upland sites with shallow water tables or sufficient seasonal rainfall. It can tolerate a wide range of soil types, including volcanic soils, and some soil dryness. *Polygonum cuspidatum* is also known as *Fallopia japonica*. We did not model suitability for this species.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	-	0	-	-	-	0	-	-	-
Plumas/Sierra	-	-	L	0	-	-	-	0	-	-	-
Butte	-	-	-	0	-	-	-	0	-	-	-
Yuba/Sutter	-	-	L	0	-	-	-	0	-	-	-
Nevada/Placer	M	-	-	2	-	0	0	0	-	-	-
Lake Tahoe Basin	-	-	-	0	-	-	-	0	-	-	-
El Dorado	-	-	-	0	-	-	-	0	-	-	-
Alpine	-	-	-	0	-	-	-	0	-	-	-
Amador	-	-	-	0	-	-	-	0	-	-	-
Central Sierra	-	-	-	0	-	-	-	0	-	-	-
Sierra/San Joaquin	-	-	-	0	-	-	-	0	-	-	-
Tulare	-	-	-	0	-	-	-	0	-	-	-
Kern	-	-	-	0	-	-	-	0	-	-	-
Eastern Sierra	-	-	-	0	-	-	-	0	-	-	-
All Sierra Nevada	L			0	-	0	0	0	-	-	-

Japanese knotweed (*Polygonum cuspidatum*)



Giant knotweed

(*Polygonum sachalinense*)

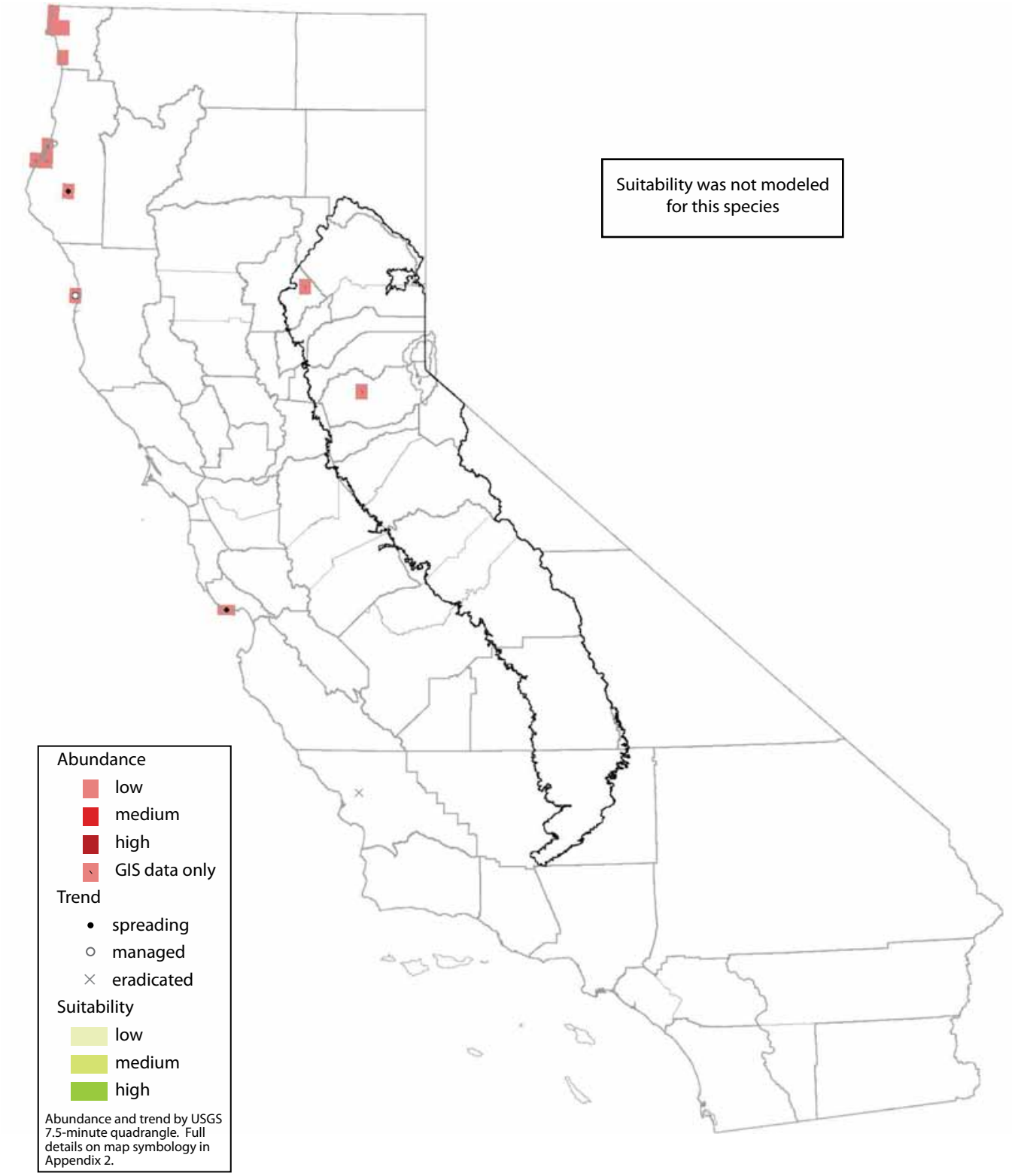
Ratings: Cal-IPC Moderate Alert, CDFA B

Knotweeds have very limited distribution in California but cause serious problems in Pacific Northwest wetlands and riparian areas. They grow as large clumping perennials with coarse foliage, hollow stems, and aggressive, creeping rhizomes. Fragments of rhizomes can develop into new plants. Knotweeds create dense colonies that displace other vegetation and are extremely difficult to remove. Japanese and giant knotweed readily hybridize. We did not model suitability for this species.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	-	0	-	-	-	0	-	-	-
Plumas/Sierra	-	-	-	0	-	-	-	0	-	-	-
Butte	L	-	-	2	-	0	0	0	-	-	-
Yuba/Sutter	-	-	-	0	-	-	-	0	-	-	-
Nevada/Placer	-	-	-	0	-	-	-	0	-	-	-
Lake Tahoe Basin	-	-	-	0	-	-	-	0	-	-	-
El Dorado	L	-	-	2	-	0	0	0	-	-	-
Alpine	-	-	-	0	-	-	-	0	-	-	-
Amador	-	-	-	0	-	-	-	0	-	-	-
Central Sierra	-	-	-	0	-	-	-	0	-	-	-
Sierra/San Joaquin	-	-	-	0	-	-	-	0	-	-	-
Tulare	-	-	-	0	-	-	-	0	-	-	-
Kern	-	-	-	0	-	-	-	0	-	-	-
Eastern Sierra	-	-	-	0	-	-	-	0	-	-	-
All Sierra Nevada	L	-	-	0	-	0	0	0	-	-	-

Abundance, Trend and Suitability

Giant knotweed (*Polygonum sachalinense*)



Dalmatian toadflax

(*Linaria genistifolia* subsp. *dalmatica*)

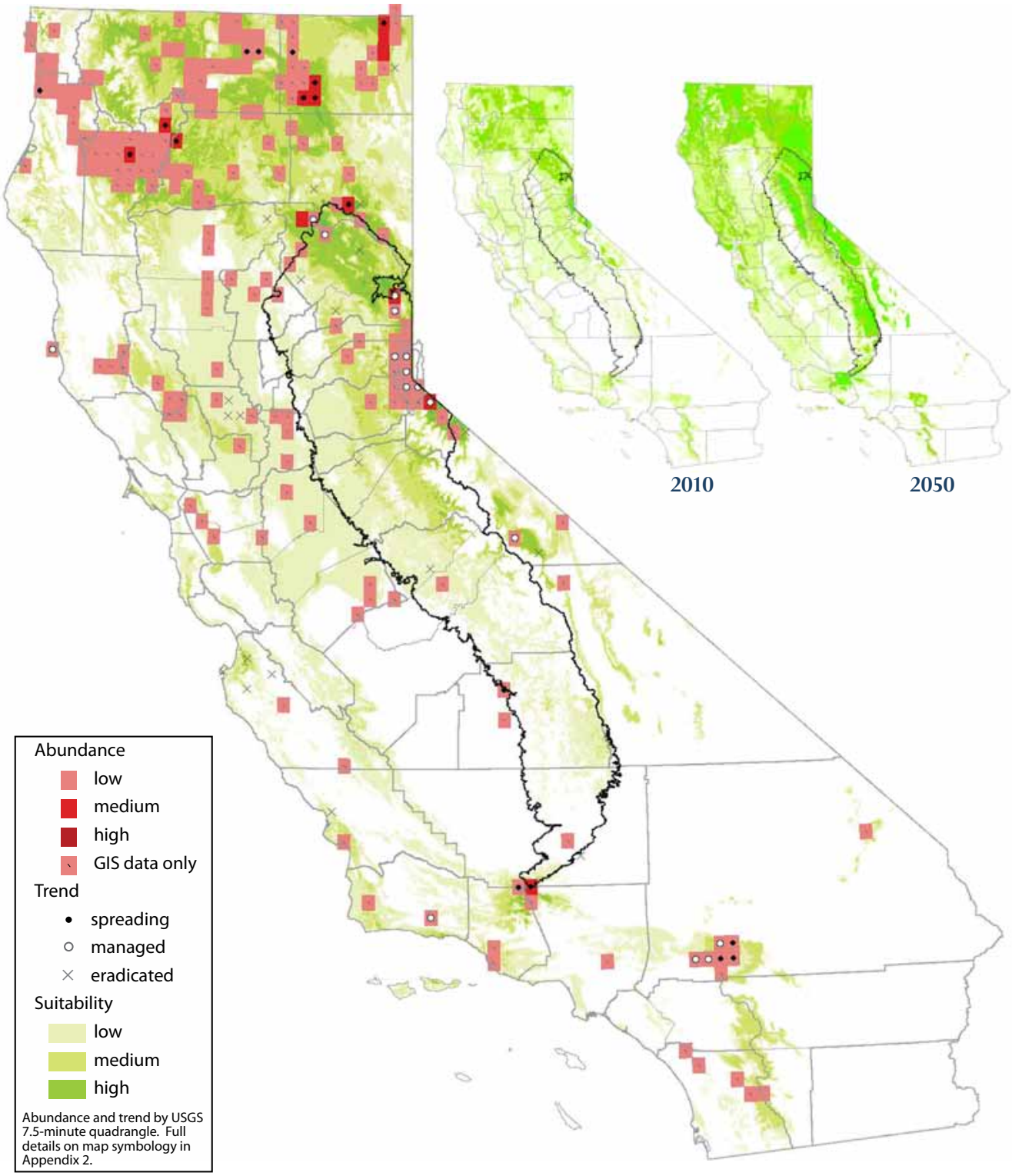
Ratings: Cal-IPC Moderate, CDFA A

Dalmatian toadflax is an herbaceous perennial to 4 ft. (1.2 m) tall with creeping roots and yellow flowers. Plants outcompete other species for soil moisture and can develop large colonies that displace other vegetation. Dalmatian toadflax roots can extend > 80 in. (2 m) deep. Dalmatian toadflax is unable to survive rapid or extreme temperature changes. Toadflaxes have limited distribution in California but create significant problems in the Pacific Northwest by reducing livestock carrying capacity on infested rangeland. Toadflaxes invade disturbed open sites, fields, pastures, forest clearings and crops. Dalmatian toadflax prefers cool, semiarid climates, and dry, coarse soils with neutral to alkaline pH. We recommend eradication as a high priority in isolated quads and containment as a high priority elsewhere. Our modeling suggests that the amount of suitable range for Dalmatian toadflax in the Sierra Nevada will increase with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	H	-	10	10	18	27	3	90	100	-
Plumas/Sierra	H	-	-	13	13	9	36	4	94	100	-
Butte	H	-	-	8	9	0	0	2	67	79	↑
Yuba/Sutter	-	-	H	5	8	0	0	0	62	94	↑
Nevada/Placer	-	H	-	19	19	25	25	0	79	90	-
Lake Tahoe Basin	-	H	-	67	80	50	50	0	79	100	↑
El Dorado	-	H	-	20	20	33	33	0	89	77	-
Alpine	-	H	-	21	22	40	40	0	63	97	↑
Amador	-	-	H	0	0	-	-	4	92	74	↓
Central Sierra	-	-	H	0	0	-	-	1	71	67	-
Sierra/San Joaquin	H	-	-	2	2	0	0	1	33	68	↑↑
Tulare	-	-	H	2	3	50	0	0	24	74	↑↑
Kern	H	-	-	2	4	33	33	1	12	42	↑↑
Eastern Sierra	H	-	-	1	3	0	25	1	20	50	↑↑
All Sierra Nevada	H	H	-	7	8	31	28	1	60	77	↑

Abundance, Trend and Suitability

Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*)



Yellow toadflax

(*Linaria vulgaris*)

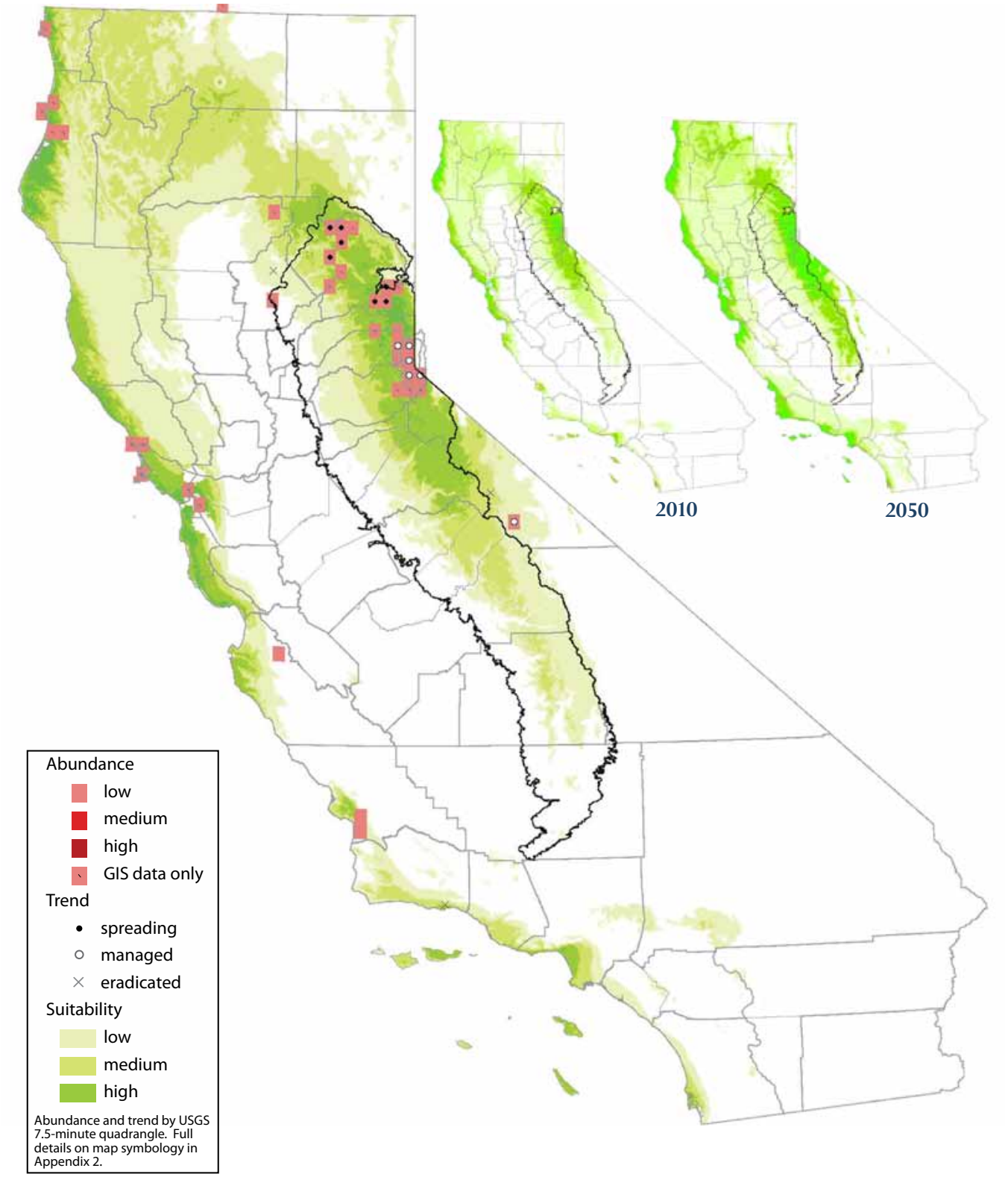
Ratings: Cal-IPC Moderate, CDFA not rated

Yellow toadflax is an herbaceous perennial to 4 ft. (1.2 m) tall with creeping roots and yellow flowers. Plants outcompete other species for soil moisture and can develop large colonies that displace other vegetation. Toadflaxes have limited distribution in California but create significant problems in the Pacific Northwest by reducing livestock carrying capacity on infested rangeland. Toadflaxes invade disturbed open sites, fields, pastures, forest clearings and crops. Yellow toadflax also invades relatively undisturbed prairies and riparian habitats. Yellow toadflax often inhabits moist, coarse soils and can tolerate subarctic conditions. We recommend eradication as a high priority in isolated quads and containment as a high priority elsewhere. Our modeling suggests that the amount of suitable range for yellow toadflax in the Sierra Nevada will increase with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	H	3	3	67	0	0	47	70	↑
Plumas/Sierra	-	H	-	13	13	64	0	0	95	99	-
Butte	-	H	-	2	3	0	0	2	47	100	↑↑
Yuba/Sutter	-	-	H	0	0	-	-	0	24	100	↑↑
Nevada/Placer	-	H	-	10	12	50	50	0	70	100	↑
Lake Tahoe Basin	-	H	-	50	60	56	56	0	99	100	-
El Dorado	-	H	-	15	16	43	43	0	89	100	-
Alpine	-	-	H	8	9	50	50	0	99	100	-
Amador	-	-	H	0	0	-	-	0	64	100	↑
Central Sierra	-	-	H	0	0	-	-	1	72	97	↑
Sierra/San Joaquin	-	-	M	0	0	-	-	0	38	54	↑
Tulare	-	L	-	0	0	-	-	0	34	56	↑
Kern	-	L	-	0	0	-	-	0	2	15	↑↑
Eastern Sierra	H	-	-	0	1	0	100	0	24	35	↑
All Sierra Nevada	H	H	-	5	6	52	22	0	62	85	↑

Abundance, Trend and Suitability

Yellow toadflax (*Linaria vulgaris*)



Family Simaroubaceae

Tree-of-heaven

(*Ailanthus altissima*)

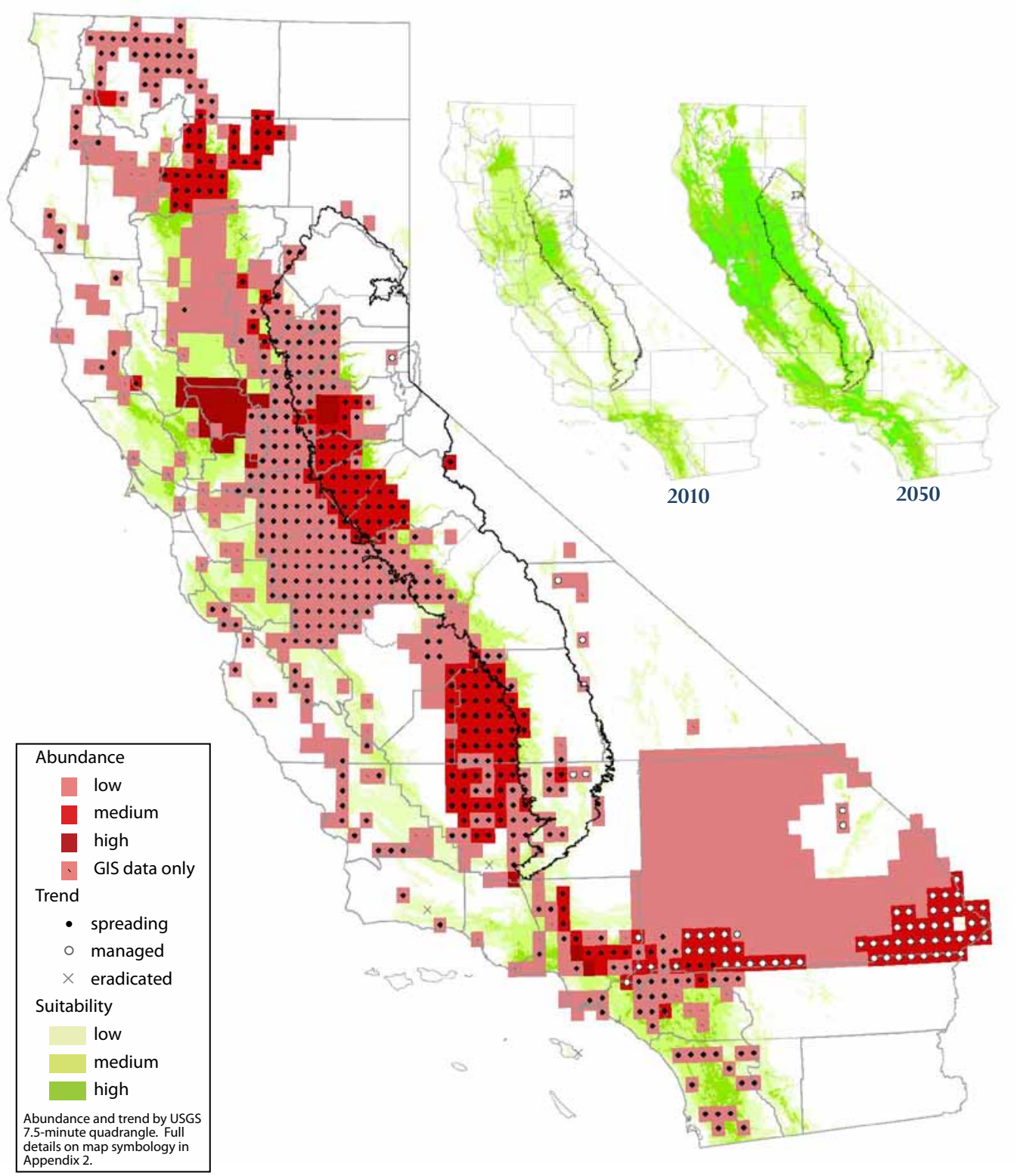
Ratings: Cal-IPC Moderate; CDFA not rated

Tree of heaven is deciduous tree that grows 30-60 feet (9-18 m) high, with gray bark, large compound leaves, and root sprouts. It mostly invades riparian areas but can invade forests and grasslands. Tree-of-heaven displaces riparian vegetation and produces allelopathic chemicals that prevent other plants from growing around it. In the Sierra foothills, it invades disturbed semi-natural habitat. It has been used as a street tree and for revegetating acidic mine soils. Gardeners sometimes share tree of heaven seedlings. Tree-of-heaven produces many seeds, produces root sprouts up to 50 feet from the nearest shoot, and resprouts when cut, making it difficult to remove. Our modeling suggests that the amount of suitable range for tree-of-heaven in the Sierra Nevada will increase with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	L	3	38	0	0	0	2	25	↑↑
Plumas/Sierra	-	M	-	11	41	100	0	0	3	31	↑↑
Butte	-	M	-	67	71	44	0	0	74	88	↑
Yuba/Sutter	-	M	-	65	89	71	0	0	87	98	-
Nevada/Placer	-	M	-	57	75	94	3	0	57	68	↑
Lake Tahoe Basin	H	-	-	6	100	0	100	0	0	7	↑↑
El Dorado	-	M	-	52	75	67	0	0	55	65	↑
Alpine	-	-	M	4	20	100	0	0	1	14	↑↑
Amador	-	M	-	71	80	85	0	0	73	79	-
Central Sierra	-	M	-	44	64	100	0	0	50	58	↑
Sierra/San Joaquin	-	M	-	33	52	67	0	0	40	70	↑
Tulare	-	M	-	49	79	94	2	0	34	74	↑↑
Kern	-	M	-	39	62	80	3	1	36	80	↑↑
Eastern Sierra	H	-	-	9	23	4	12	0	5	29	↑↑
All Sierra Nevada	L	M	-	37	55	83	2	0	44	62	↑

Abundance, Trend and Suitability

Tree-of-heaven (*Ailanthus altissima*)



Tree tobacco

(*Nicotiana glauca*)

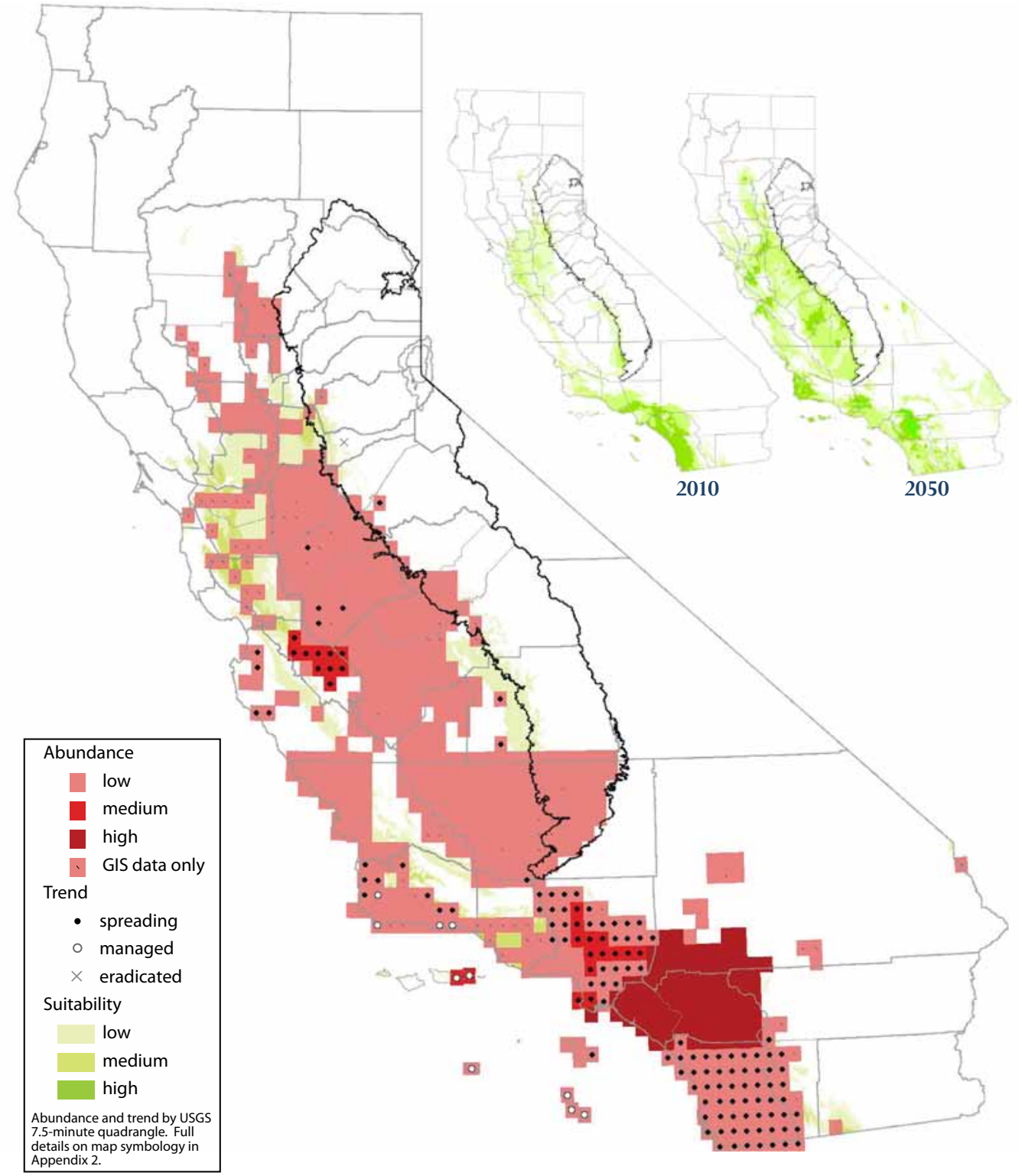
Ratings: Cal-IPC Moderate, CDFA not rated

Tree tobacco is a shrub or tree that grows up to 23 ft. (7 m) tall with tubular flowers. Its foliage has a strong, unpleasant scent and all plant parts are toxic to humans and livestock. It inhabits roadsides, fields, disturbed areas, and riparian areas, and often grows on open, sandy, or gravelly slopes. Tree tobacco escaped from gardens where it was planted as an ornamental and today many infestations occur downstream from old dwellings. It is seen occasionally in the Sierra and appears to have cyclical abundance. In California, it is currently more of a problem south of the Tehachapi Mountains. Our modeling suggests that the amount of suitable range for tree tobacco in the Sierra Nevada will increase with future climate change.

	Opportunities			Statistics							
Weed Management Area	Eradication	Containment	Surveillance	% Infested	% Suitable Infested	% Spreading	% Managed	% Eradicated	% Suitable 2010	% Suitable 2050	Suitability Change
Lassen	-	-	L	0	-	-	-	0	0	0	-
Plumas/Sierra	-	-	L	0	-	-	-	0	0	0	-
Butte	-	-	M	35	90	0	0	0	12	17	↑
Yuba/Sutter	-	-	M	27	83	0	0	0	20	42	↑↑
Nevada/Placer	-	-	M	3	17	0	0	0	10	4	↓
Lake Tahoe Basin	-	-	L	0	-	-	-	0	0	0	-
El Dorado	M	-	-	4	22	0	0	0	9	1	↓
Alpine	-	-	L	0	-	-	-	0	0	0	-
Amador	M	-	-	11	23	0	0	4	30	15	↓
Central Sierra	M	-	-	11	50	33	0	0	4	10	↑↑
Sierra/San Joaquin	-	M	-	47	100	1	0	0	7	41	↑↑
Tulare	-	-	M	21	51	10	0	0	21	43	↑↑
Kern	-	M	-	72	100	0	0	0	16	48	↑↑
Eastern Sierra	-	-	L	0	100	0	0	0	0	5	↑↑
All Sierra Nevada	L	L	-	17	69	5	0	0	9	12	↑

Abundance, Trend and Suitability

Tree tobacco (*Nicotiana glauca*)



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Appendix 1 – Species List

Study species with ratings from Cal-IPC (Cal-IPC 2006) and the California Department of Food and Agriculture (CDFA 2010). Some closely-related species were combined for the purposes of this project when identification is difficult and they grow in the same habitats.

Species	Scientific Name	Cal-IPC	CDFA
Family Apiaceae			
Poison-hemlock	*Conium maculatum*	Moderate	
Family Asteraceae			
Russian knapweed	*Acroptilon repens*	Moderate	B
Musk thistle	*Carduus nutans*	Moderate	A
Italian thistle & slenderflower thistle	*Carduus pycnocephalus &* *C. tenuiflorus*	Moderate Limited	C C
Woolly distaff thistle	*Carthamus lanatus*	Moderate-Alert	B
Diffuse knapweed	*Centaurea diffusa*	Moderate	A
Spotted knapweed	*Centaurea maculosa*	High	A
Tocalote	*Centaurea melitensis*	Moderate	
Yellow starthistle	*Centaurea solstitialis*	High	C
Rush skeletonweed	*Chondrilla juncea*	Moderate	A
Canada thistle	*Cirsium arvense*	Moderate	B
Bull thistle	*Cirsium vulgare*	Moderate	C
Stinkwort	*Dittrichia graveolens*	Moderate	
Ox-eye daisy	*Leucanthemum vulgare*	Moderate	
Scotch thistle	*Onopordum acanthium*	High	A
Family Boraginaceae			
Houndstongue	*Cynoglossum officinale*	Moderate	
Lens-podded white-top & hoary cress	*Cardaria chalepensis &* *C. draba*	Moderate-Alert Moderate	B B
Family Brassicaceae			
Dyer's woad	*Isatis tinctoria*	Moderate	B
Charlock mustard	*Sinapis arvensis*	Limited	
Family Dipsacaceae			
Common teasel & fuller's teasel	*Dipsacus fullonum &* *D. sativus*	Moderate Moderate	
Family Fabaceae			
Scotch broom	*Cytisus scoparius*	High	C
French broom	*Genista monspessulana*	High	C
Spanish broom	*Spartium junceum*	High	C
Black locust	*Robinia pseudoacacia*	Limited	
Red sesbania	*Sesbania punicea*	High	B
Gorse	*Ulex europaeus*	High	B

FAMILY POACEAE			
Giant reed	*Arundo donax*	High	B
Annual false-brome	*Brachypodium distachyon*	Moderate	
Japanese brome	*Bromus japonicus*	Limited	
Red brome	*Bromus madritensis* subsp. *rubens*	High	
Jubatagrass	*Cortaderia jubata*	High	B
Pampasgrass	*Cortaderia selloana*	High	
Orchardgrass	*Dactylis glomerata*	Limited	
Common velvet grass	*Holcus lanatus*	Moderate	
Mediterranean barley	*Hordeum marinum*	Moderate	
Hare barley	*Hordeum murinum*	Moderate	
Italian ryegrass	*Lolium multiflorum*	Moderate	
Family Polygonaceae			
Japanese knotweed	*Polygonum cuspidatum*	Moderate-Alert	B
Giant knotweed	*Polygonum sachalinense*	Moderate-Alert	B
Family Scrophulariaceae			
Dalmation toadflax	*Linaria genistifolia* subsp. *dalmatica*	Moderate	A
Yellow toadflax	*Linaria vulgaris*	Moderate	
Family Simaroubaceae			
Tree-of-heaven	*Ailanthus altissima*	Moderate	
Family Solanaceae			
Tree tobacco	*Nicotiana glauca*	Moderate	

Appendix 2 – Map Symbology

All abundance, spread, and management values are based on USGS 7.5-minute quadrangles (hereafter referred to as "quads"). This grid offers fairly uniform rectangles across the U.S. Quads measure approximately 8.5 miles north to south, and range from approximately 7.2 miles east to west on the southern border of the state to 6.5 miles east to west on the northern border of the state.

Data on abundance, spread, and management are primarily based on interviews with local natural resource managers to collect "expert knowledge". The online risk mapping system in development will document who has contributed information for a given quad and will allow ongoing updates. As a secondary source, we also used GIS data sets collected from organizations throughout the state, as well as invasive plant location data aggregated in the Calflora and Consortium of California Herbaria online databases. These data appear in quads only where resource managers indicated that they are not aware of a plant species' presence. A small "\" symbol and shading for low abundance indicate quads where presence is assumed due only to GIS data. Actual presence in these quads should be confirmed on the ground, since the GIS data may not be current or accurate.

Abundance: Red shading indicates three categories for abundance: low, medium and high. These are relative values based on the typical invasion curve, where abundance starts low (during the "lag phase"), then increases rapidly, and finally levels off when the ecological niche is saturated. In our schema, "low" represents an infestation that is early on the invasion curve. "Medium" represents the expansion phase of invasion, where abundance is increasing. "High" represents the final stage where an infestation has filled the available ecological niche and is no longer increasing appreciably. Depending on the extent of the ecological niche for a given species, the actual area infested can vary considerably from species to species.

Spread: A black dot in the center of a quad indicates that the species is spreading. No dot means the infestation is stable and not increasing. Quads where abundance is low can be stable or spreading. Quads where abundance is medium are, by definition, spreading, unless there is active management. Quads where abundance is high are, by definition, not able to spread any further.

Management: A white dot in the center of a quad indicates that the species is under active management. Management does not imply that the infestation is necessarily decreasing; in some cases the overall trend in the quad may still be that the infestation is increasing. However, we do not show that information on these maps. Quads where the species has previously been eradicated and is no longer present are shown with an "×" symbol.

Suitability: Green shading indicates three categories of climatic suitability: low, medium, and high. These are based on output from models based on current populations in California. In general, we believe our range maps are conservative and may underestimate the potential range of a given species, because: (1) they are based only on places where a plant has already invaded in the state, (2) they are based only on places where we have data on that plant, and (3) we calibrated the models to restrict estimates to only areas that are very similar climatically to those areas already invaded. Suitability projections for 2050 use an A2 emissions scenario (IPPC 2007), downscaled climate data from the Canadian Centre for Climate Modeling and Analysis, and Maxent software (Phillips et al. 2006) to extrapolate from current plant locations to potential range.