



# Eradicating weeds in Sierra meadows for climate change resilience

Elizabeth Brusati\*, Dana Morawitz, and Doug Johnson, California Invasive Plant Council (Cal-IPC), Berkeley, CA. \*edbrusati@cal-ipc.org, www.cal-ipc.org

## Introduction

Meadows play a vital role in the lives of almost every wildlife species in the Sierra Nevada, from songbirds to frogs to bears. The resiliency of these meadows to environmental change is critical to protecting the region's wildlife. With a warming climate, the Sierra Nevada will see increasing pressure from invasive plants, even at high elevations. Meadows are particularly vulnerable to invasive plants, which degrade habitat by replacing native plants on which wildlife depends. Some invasives may also alter hydrology and other abiotic processes.

The *National Fish, Wildlife and Plants Climate Adaptation Strategy* (2012) recommends addressing existing stressors such as invasive species as an immediate no-regrets action that we can take to help wildlife adapt. The California State Wildlife Action Plan lists invasive species more often than any other stressor on wildlife in California (CDFW 2015).

This project used partnerships with county agriculture departments, the US Forest Service, the California Conservation Corps, and local watershed groups to conduct two years of field work (2014-15) towards eradicating invasive plant populations from high-value meadows. Some of these species have limited distribution in California. Others are more widespread but can be prevented from reaching high-altitude meadows by targeting populations that are likely to spread into these areas. We also developed guidelines on climate resilience to help other land managers. We hope that this pilot project will inform future adaptation work on other Sierra Nevada meadows.

## Location and Methods

**Sites** were located in Sierra, Nevada, Placer, El Dorado, and Alpine Counties, California.

**Invasive Plant Control:** Cal-IPC worked with local partners in the Sierra Nevada to identify meadows where invasive plants were feasible to eradicate. We funded two field seasons of control work towards eradication of populations at these sites. Locations and species treated are recorded on the Calflora website to provide documentation of the species' occurrences. Land managers are writing short eradication plans for each site to describe plans for continuing progress.

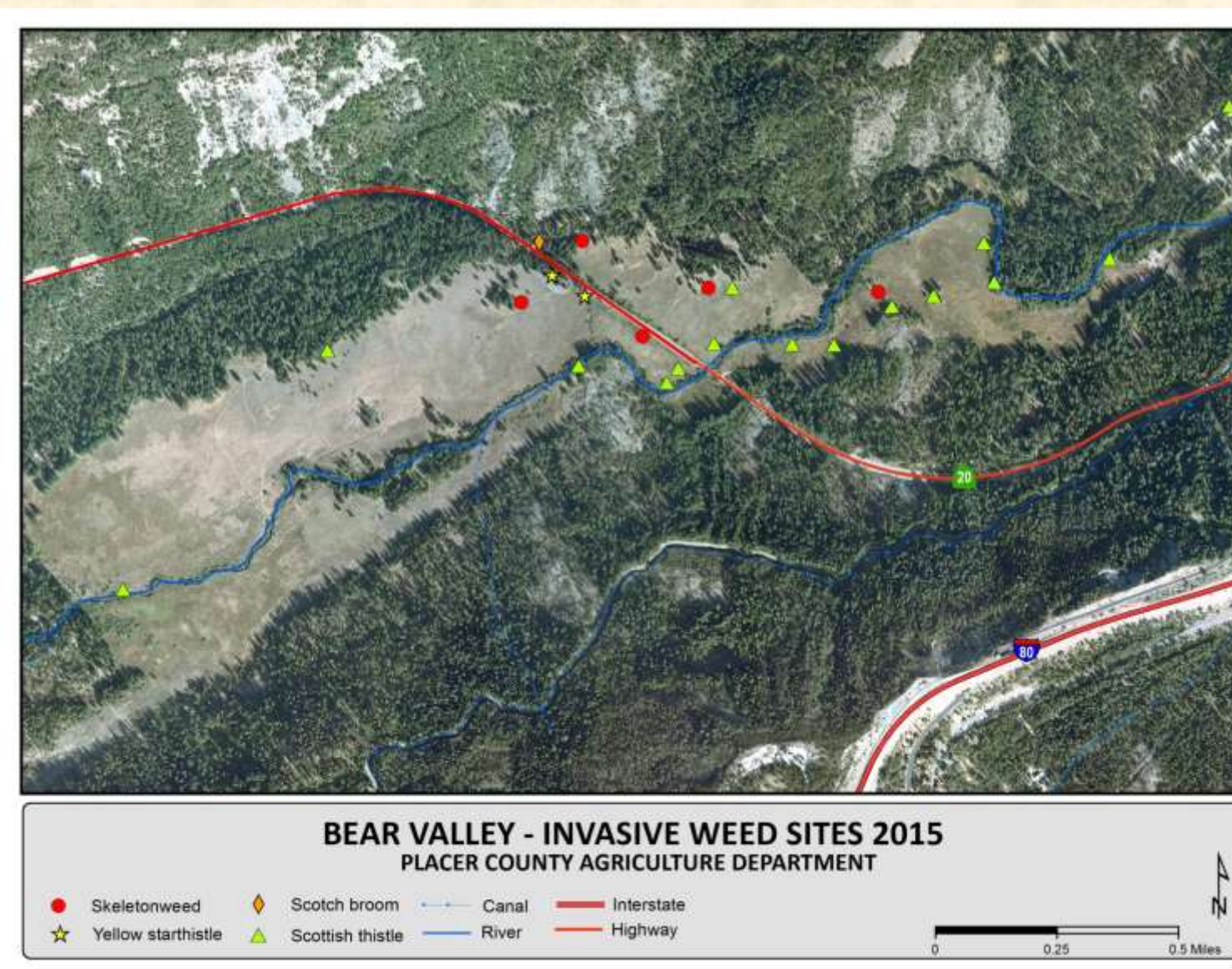
**Climate Resilience Planning:** We wrote guidance reports for land managers with suggestions on how to incorporate climate resilience ideas into invasive plant work (and vice versa). These guides will be available on the Cal-IPC website at the end of 2015.

## Results

**Bear Valley, Placer/Nevada County:** Placer Co. Dept. of Agriculture

Bear Valley sits along the Bear River on the border of Nevada and Placer Counties. It provides habitat for trout, willow flycatcher, and yellow-legged frog as well as a migration corridor and winter range for deer. Placer County Dept. of Agriculture crews removed rush skeletonweed (*Chondrilla juncea*), yellow starthistle (*Centaurea solstitialis*), Scotch broom (*Cytisus scoparius*), and Scotch thistle (*Onopordum acanthium*). Photos by Ed King, Placer. Co. Ag. Dept.

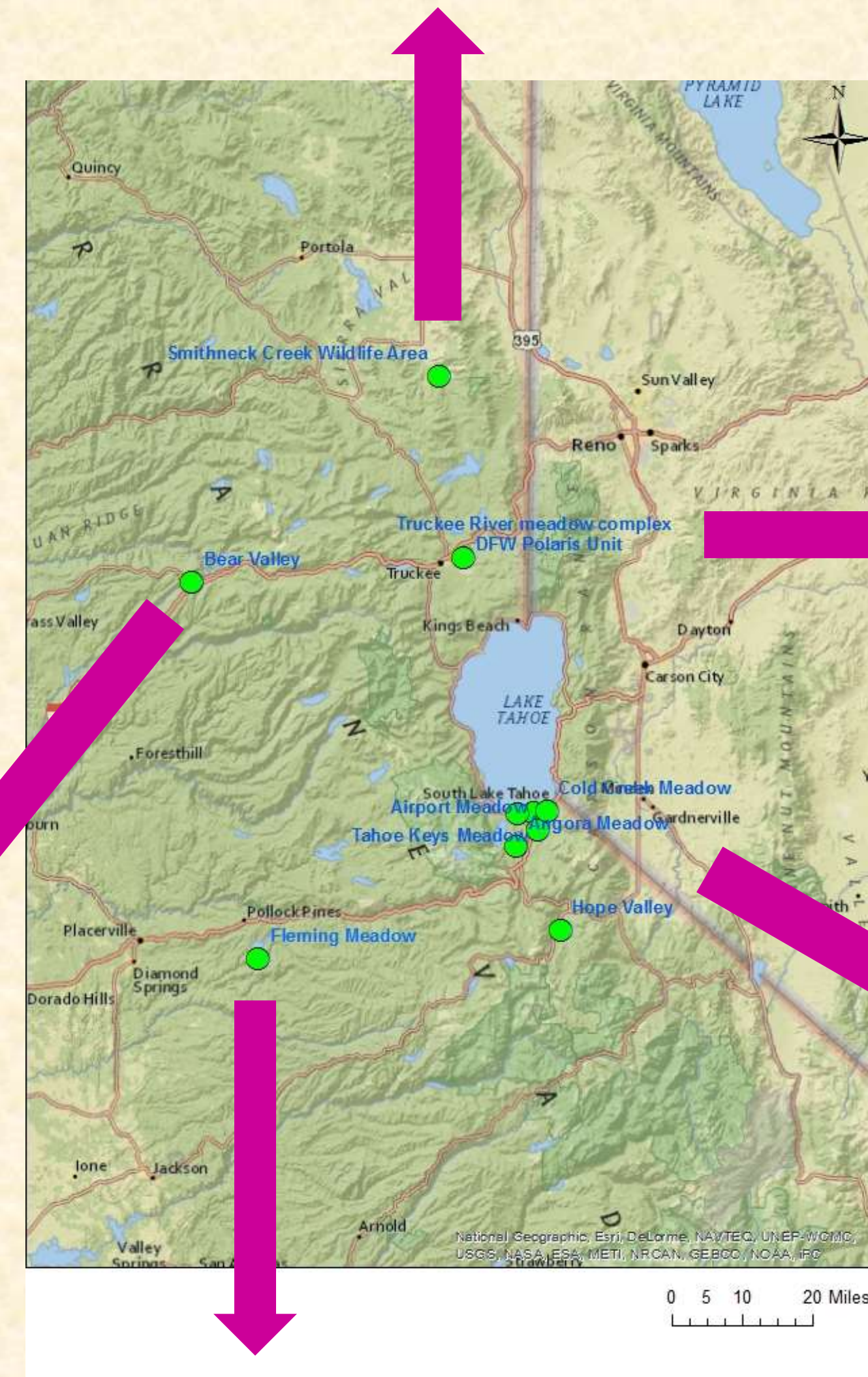
**Left: Placer County Agricultural Inspectors manually removing Scotch thistle rosettes, a rapidly-growing species that competes with native grasses. Right: Bear Valley control sites, 2015.**



**Smithneck Creek State Wildlife Area:** California Conservation Corps and California Dept. of Fish and Wildlife

The sagebrush-bitterbrush habitat at Smithneck Creek is a critical winter-range area for migratory deer and also supports goshawks, falcons, a variety of warbler species, and snowshoe hares. CCC crews worked with CDFW staff to remove musk thistle and Canada thistle, continuing work underway since 2009. Musk thistle (*Carduus nutans*) is encroaching upon the rare Sierra valley mouseltail (*Ivesia aperta*).

**Clipping flower heads off mature thistle plants (left); musk thistle seeds dispersing (right). Photos by Joel Trumbo, CDFW**



**Truckee River:** River Watershed Council

**Musk thistle in the Truckee River Wildlife Area (Union Ice Unit).**

**Existing populations of musk thistle (red dots) and suitable range projected for 2050 climate.**



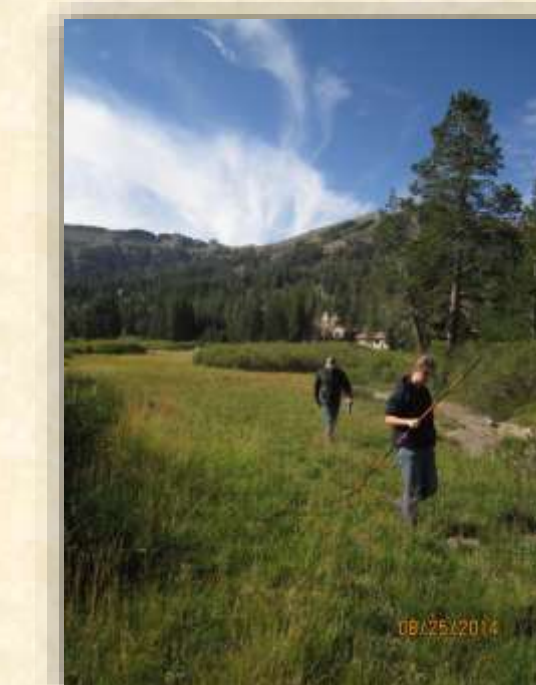
A complex of meadows forms a chain along the Truckee River near the town of Truckee. The Truckee River Watershed Council used contractors and volunteers at several sites, including the Truckee River Wildlife Area. Species removed included musk thistle (*Carduus nutans*), bull thistle (*Cirsium vulgare*), perennial pepperweed/tall white-top (*Lepidium latifolium*) and Russian knapweed (*Acroptilon repens*).



**Controlling Lepidium at the Union Ice Unit along the Truckee River. (Photos by Jeannette Halderman, TRWC)**



**Surveys in 2014 found invasive Canada thistle for the first time at Trout Creek Meadow.**



**Surveying the Kirkwood Meadow.**

**South Tahoe meadows:** El Dorado Co. Dept of Agriculture Meadows in El Dorado and Alpine Counties were surveyed for invasive plants. Sites included Kirkwood Meadow, Hope Valley Meadow, Sorensens Meadow, Angora Meadow, Trout Creek Meadow, Cold Creek Meadow, Airport Meadow, and Tahoe Keys Meadow. All populations of perennial pepperweed, diffuse knapweed (*Centaurea diffusa*), Canada thistle, and other noxious weeds were treated. Photos by LeeAnne Mila, El Dorado Ag. Dept.



**Eldorado National Forest:**

Yellow starthistle (*Centaurea solstitialis*), Maltese starthistle (*Centaurea melitensis*), Scotch broom (*Cytisus scoparius*), French broom (*Genista monspessulana*), barbed goatgrass (*Aegilops triuncialis*), and medusahead (*Elymus caput-medusae*) were removed from Fleming Meadow and Traverse Creek in summer 2015. At Fleming Meadows, species decreased by 50-75% at the end of the field season; at Traverse Creek species decreased 10-40%. Photos by Matt Brown, USFS



**Top: Follow-up hand-pulling after string trim treatment in Fleming Meadow.**

**Bottom: Pulling Scotch broom from Traverse Creek.**

## Literature Cited

- Calflora: Information on California plants for education, research and conservation. [web application]. 2015. Berkeley, California: The Calflora Database [a non-profit organization]. www.calflora.org
- CDFW. 2015. California State Wildlife Action Plan 2015 Update. California Department of Fish and Wildlife, Sacramento, CA. www.wildlife.ca.gov/SWAP/Final
- National Fish, Wildlife and Plants Climate Adaptation Partnership. 2012. National Fish, Wildlife and Plants Climate Strategy. Association of Fish and Wildlife Agencies, Council on Environmental Quality, Great Lakes Indian Fish and Wildlife Commission, Oceanic and Atmospheric Administration, and U.S. Fish and Wildlife Service. Washington, DC. www.wildlifeadaptationstrategy.gov

## Acknowledgments

This was a collaborative project relying on the on-the-ground expertise of partners in the Sierra Nevada: El Dorado/Alpine County Dept. of Agriculture, Nevada Co. Dept. of Agriculture, Placer Co. Dept. of Agriculture, California Conservation Corps, Truckee River Watershed Council, California Dept. of Fish and Wildlife, Eldorado National Forest, and Pacific Gas and Electric Company. Funded by the Wildlife Conservation Society's Climate Adaptation program.