



[www.dfg.ca.gov/invasives](http://www.dfg.ca.gov/invasives)

[invasives@dfg.ca.gov](mailto:invasives@dfg.ca.gov)

(866) 440-9530

## In This Issue:

- 1 **Plants Gone Wild**
- 2 **Invasive Species! Not In My Garden!!!**
- 3 **Partner Spotlight: NPS**
- 4 **Invasive Weed Control on DFG Lands**
- 5 **Research Spotlight: UC**
- 6 **Do You Know This Is Invasive?**

## Plants Gone Wild

Invasive plants are all around us. They are budding in our gardens, blooming along our roadsides, and clogging our waterways. Non-native invasive plants have been spreading into California since the arrival of the European settlers in the 16th century. They are transported in soil, construction materials, and crops. Seed can travel on vehicles and equipment, boats, in animal fur, and on people's clothing, shoes, and recreational equipment. Some non-native invasive plants were introduced intentionally as erosion control, livestock forage, and aquarium and garden ornamentals.

Invasive plants disrupt natural habitats and displace native plant and wildlife species. Once established, invasive plant infestations are difficult to eradicate and control. In this issue of "Eye on Invasives," we discuss invasive plant species and their management and control.

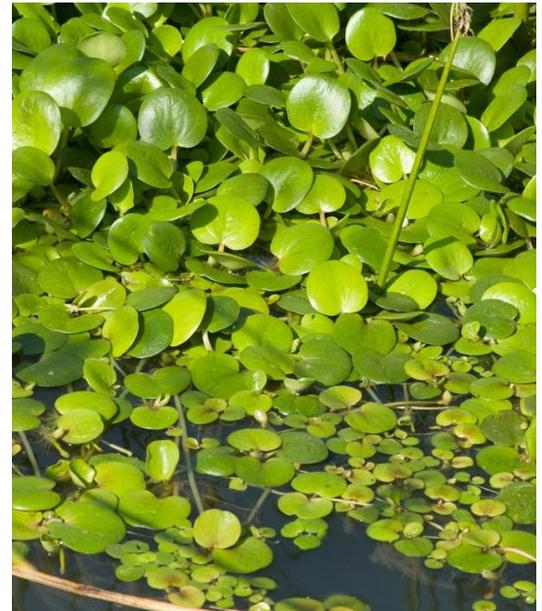
An invasive plant grows and reproduces rapidly, which allows it to spread and establish quickly over large areas. Seeds can be carried by wind, fire, water, or animals. Some invasive plants also spread vegetatively by sending out underground shoots that form new plants. Invasive plant infestations disrupt natural habitats and ecosystem processes such as soil chemistry, fire regimes, and hydrology. They compete with native plant species for resources, and can contribute to drastic declines in native species abundance and biodiversity. Invasive plant species are one of the greatest threats to rare plants.

Invasive plant species can impact human health and safety, and negatively affect commercial and recreational activities. They weaken flood control systems, disrupt crops and rangelands, and some are even toxic to livestock. Invasive aquatic plants, such as water hyacinth, clog waterways, impacting

boat access, water delivery, and sport fishing opportunities.

As with other invasive species, prevention is the most effective and cost-efficient form of control of non-native invasive plants. Once established, invasive plant infestations are difficult and costly to eliminate. The Department of Fish and Game (DFG) coordinates with other government agencies and non-governmental organizations to prevent and control the spread of non-native invasive species.

In this issue, we offer steps that the public can take to avoid contributing to the spread of non-native invasive plant species, and highlight some ongoing weed management techniques and weed control efforts in California.



**South American spongeplant (*Limnobium laevigatum*) - an invasive aquatic plant that has been introduced into northern and central California. Like water hyacinth, it also clogs waterways. CDFA file photo.**

# Invasive Species! Not In My Garden!!!

Nurseries stock includes many varieties of plants from familiar favorites to exciting new offerings. Unfortunately, more than 50 percent of invasive plants have been introduced into California through the nursery trade. These invasive plants can escape the confines of our gardens and cause serious harm to our economies and California's biodiversity. Although some invasive plants may not escape our garden, many have invaded natural areas and open spaces, displacing native species, and eliminating natural habitat.



**The yellow pond lily (*Nuphar polysepala*) is one alternative aquatic plant. Photo by Gerald and Buff Corsi © California Academy of Sciences.**

So how can we avoid spreading an invasive species from our own backyard? The first step is deciding what type(s) of plants we need: lawn, accents, shrub, groundcover, etc. Next, do a little research to identify the worst invasive species offenders, and don't select any of these! Some of the worst invasive weeds are highlighted below, along with some great alternatives. Many great non-invasive alternatives can be found at your local nursery or hardware store. Many native California plants and their cultivated varieties are excellent low-maintenance garden choices, and it is usually worth your time to seek them out. Finally, if you do find something that you would like to plant, check before you buy to make sure it is not an invasive! Your garden, your neighbors, and your local habitats will thank you!

**LAWNS. INVASIVE:** Bermuda grass. **ALTERNATIVES:** Hybrids that don't reproduce by seed such as Tifgreen®, and Santa Ana®, and natives like red fescue, junegrass, California thingrass, and sedge species. UC Verde™ buffalo grass is a great turf cultivar.

**ACCENT GRASSES. INVASIVE:** Pampas grass and fountain grass. **ALTERNATIVES:** Wildrye species, tufted hairgrass, and deergrass. Lavender also makes a great accent alternative.



**Bunchberry dogwood (*Cornus canadensis*) is an alternative shrub that is considered non-invasive. Photo by Gerald and Buff Corsi © California Academy of Sciences.**

**SHRUBS. INVASIVE:** Brooms, several species of acacias, and scarlet wisteria. **ALTERNATIVES:** Western redbud, bush marigold, California sagebrush, currant species, bush poppy, Ceanothus species, dogwood, and bush anemone are all excellent choices.

**GROUNDCOVERS. INVASIVE:** periwinkle, many ice plant species, English, Irish, or Algerian ivy. **ALTERNATIVES:** jasmine, California strawberry, California rose, Anchor Bay/Point Reyes Ceanothus, and California fuchsia (keep an eye on this one though as it can spread quickly!).

**AQUATICS. INVASIVE:** Water hyacinth, Brazilian waterweed, and Eurasian water milfoil. **ALTERNATIVES:** Fairy fern, water smartweed, monkeyflower species, cardinal flower, yellow pond lily, and rush species are all great selections next to pools and for pond edges.

A number of additional resources exist to assist gardeners in selecting non-invasive plant species for their garden.

Local nurseries, [PlantRight](#), and the [California Native Plant Society](#) can direct gardeners to diverse non-invasive species for every situation. With the wide array of plants now available, it is up to gardeners to help avoid invasives, while still satisfying their garden and landscaping needs.



**The California rose (*Rosa californica*) is a native plant that is great for groundcover. Photo by Keir Morse.**

# Partner Spotlight: National Park Service's California Exotic Plant Management Team

Bobbi Simpson, National Park Service

The California Exotic Plant Management Program (EPMT) serves 14 national parks that reside within California Floristic Province. The EPMT's role is to support parks management of invasive plants through provision of funding, technical assistance, and expanded networking. With 14 percent of the California EPMT parks 2.1 million acres infested, we prioritize projects that maximize efficiencies.

The last year of our first decade of operation has been the most productive year; accomplishing treatment of 46 species on 277 sites covering 294 net infested acres. This represents a 42 percent increase in net infested acres treated from the previous year. Our projects ranged from complex landscape-scale efforts, to early detection treatments and mapping.

**Landscape Scale Projects:** Five parks focused on yellow starthistle (YST). This annual plant was introduced from Eurasia and has remarkable invasion feature; one plant can produce 150,000 seeds per plant every year, and its root system out-competes native plants ability to tap water. EPMT sponsored YST treatments constituted 55 percent of the overall net acres treated.

**Prevention:** Yosemite National Park is leading the way by instituting mineral inspection procedures to prevent contaminated sand and gravel materials from entering the park. Although not quite as tangible as field treatments, these programs have the capacity to greatly reduce the overall, rather daunting, invasive treatment needs of the parks over time.

**Early detection and rapid response:** The San Francisco Bay Area Inventory and Monitoring Network (I&M Network) and Lassen Volcanic National Park received EPMT

assistance for early detection and control activities. These programs focused on getting solid information to better plan future treatment strategies and stop new invaders before they get established.

The I&M Network surveyed road and trail corridors in Golden Gate National Recreation Area for two highly invasive plants, oxeye daisy and licorice plant. Surveys covered 239 acres of prioritized sites and managed to treat over 50 percent of what was mapped. The non-treated sites were too large for this volunteer cadre to treat, however mapping details about populations are added to a prioritized list of follow-up treatments.

Lassen Volcanic NP implemented an early detection survey protocol based on Utah State University (Dewey and Anderson). 2010 was a pilot year to refine the survey methodology and data management. With EPMT support the program went "live" in 2011 and surveyed 5000 acres in places judged to be the most likely to contain undetected weed populations (prior backcountry burn locations). The 2011 surveys showed that while most of the backcountry of Lassen remains uninfested, small colonies of cheatgrass, woolly mullein, and bull thistle do exist. This early detection approach is one way of working more intelligently in the weed science world.

After a decade of operation with flat budgets and shrinking value of the dollar, the EPMT considers an annual critique of our program fundamental to our success. The positive side of the financial stressor is that it has inspired creative partnerships and sharing of resources; thereby expanding what we can do with limited resources. With the strides and networking established in 2011, we are looking forward to a creative and productive 2012.



Pinnacles National Monument, NPS Fire Crew Treating Yellow Starthistle (*Centaurea solstitialis*) (NPS File Photo)

# Invasive Weed Control on DFG Lands

In 2001 DFG began annual surveys to document the presence of invasive, exotic weeds on its lands. Each year a sample of DFG-managed lands is surveyed via a statewide questionnaire. These surveys have revealed several important trends. Primary among these trends is the reality that invasive, exotic weed infestations are widespread on DFG lands.

For the 2010 survey, 98 DFG-managed facilities responded with information on the current status of invasive, exotic weed infestations. The number of facilities that responded to the survey represented more than 13 percent of the total number of properties managed by DFG. The survey asked respondents to provide information on infestation sizes, control methods employed, and herbicide usage.



**Bull thistle (*Cirsium vulgare*), an invasive weed found on many of DFG's lands, commonly invades disturbed areas. Photo by C. Christie**

The survey found that there are 890 invasive, exotic weed infestations on DFG-managed lands. All of the surveyed facilities reported at least one invasive exotic weed infestation. The average number of infestations per facility was 9.8 and approximately 7.5 percent of the infestations were larger than 100 acres. The 890 infestations were reported to contain a total of 57 different invasive, exotic weed species. The number of infestations per species was evenly distributed with no single species comprising more than 5 percent of the total infestations statewide.

When reviewing previous surveys it is clear that the number of reported infestations has steadily increased over time. In

2001, the number of infestations per facility was 2.4. By 2008, this number had increased to 8.6 and then up to 9.8 in 2010. Not only has the number of reported infestations increased, but now many of these infestations have become large and well-established. Since 2001 there has been a 340 percent increase in the number of infestations that are larger than 100 acres. However, these statistics dramatically under represent the seriousness of the problem. In spite of increased awareness regarding invasive, exotic weeds, new infestations continue to develop on wildlife areas, ecological reserves, and other DFG lands.

DFG facilities are using both chemical and non-chemical methods to control invasive, exotic weeds. In 2008, 70 percent of the surveyed facilities reported using herbicides. More than half of the surveyed facilities (59 percent) also reported using non-chemical methods such as disking, mowing, or grazing. Since chemical and non-chemical methods are often highly compatible, many of the surveyed facilities are likely using these methods as part of an overall integrated pest management (IPM) strategy.

DFG land managers are also discovering the value of working cooperatively with other land managers to combat the spread of invasive, exotic weeds. In the 2010 survey, 63 percent of respondents indicated that they share a property boundary with another public agency. Further, a large percentage (47 percent) of respondents indicated that they have worked cooperatively with other public entities or private landowners on invasive, exotic weed control projects in the past.

For more information regarding the annual surveys of invasive, exotic weeds on DFG-managed lands please contact Joel Trumbo ([jtrumbo@dfg.ca.gov](mailto:jtrumbo@dfg.ca.gov)) with DFG's Wildlife Branch Lands Program.



**Himalayan blackberry (*Rubus armeniacus*) was found throughout DFG managed lands. Photo by Zoya Akulova**

# Research Spotlight: Weed Control Handbook for Natural Areas

Joseph DiTomaso, University of California, Davis

While there are several publications that provide information on the management of weeds in agricultural systems, there is currently no comprehensive book that provides control options for invasive and weedy species in natural areas. However, in the summer of 2012, the first such book will be published by the Weed Research and Information Center at the University of California. The book, entitled “Weed Control Handbook for Natural Areas in the Western United States,” will cover approximately 350 species of weeds that invade or cause problems in natural areas, including grasslands, pastures, riparian, and aquatic areas, within the 13 western states of Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. The book is principally dedicated to providing control options, however it also includes safety and environmental considerations, herbicide characteristics, rainfall periods and grazing and haying restrictions for terrestrial herbicides, a list of species with biological control agents either available or under development, and helpful conversion tables.

The species the book focuses on were chosen using the states’ noxious weed lists, but also include other non-crop weeds that are frequently problematic in natural areas of the western United States. Although the vast majority of species included in the book are non-native, some native species are included, as they occasionally create problems in certain natural areas, both terrestrial and aquatic. The book contains control options, both chemical and non-chemical, with full descriptions provided for nearly 240 species. Chemical and non-chemical treatment options are also provided for an additional 100 species in a susceptibility table without full descriptions. For chemical control options, the book includes information regarding recommended application rates, timing of application, and helpful remarks and cautions. For situations where data was lacking for control options on particular species, the authors defaulted to established recommended options for closely related species.

The authors of the book consist of many individuals within California and other western states that conduct research on the control of invasive plants and other non-crop weeds. The project team was led by Dr. Joe DiTomaso at UC Davis and included Dr. Lars Anderson and Dr. Tim Prather

from the University of Idaho, Tim Miller from Washington State University, and several UC Cooperative Extension experts, including Guy Kyser, Scott Oneto, Steve Orloff, John Roncoroni, Rob Wilson, Steve Wright, Katie Wilson, and Jeremiah Mann. The information in the book is derived from a number of sources, including the authors’ personal experience, peer-reviewed and nonpeer-reviewed literature, and reviews in books. In addition, the authors conducted extensive internet searches for credible websites that contained information on weed and invasive plant control and management. All forms of control found were included in the book. With this information, the authors summarized what they considered to be the most relevant and practical control options for each weed.

The authors’ intent was to provide as many control options for weeds as possible, with the hope that at least a few of the options could be used to achieve desired control objectives and be implemented without restrictions. The choice of any control option should always be weighed against its desirable and undesirable impact on the ecosystem and the desired function of that system. Due to the dynamic nature of weeds, new species appearing each year, and the development of new control techniques by researchers and field practitioners throughout the west, the authors’ propose to update and reprint the book once every three years to ensure the content is accurate and up to date.



**The yellow starthistle (*Centaurea solstitialis*) is an invasive weed listed on the California Department of Food and Agriculture’s Noxious Weed List. Photo by George W. Hartwell**

## DO YOU KNOW THIS IS INVASIVE? Fountain Grass – *Pennisetum setaceum*

Its airy stems and bunchgrass characteristics make fountain grass a desirable landscape plant. Fountain grass is perennial, drought tolerant, adapted to many growing conditions, relatively pest-free, and easy to find in nurseries or online as seed. It is just these characteristics that make fountain grass a highly invasive weed that has become established locally as well as globally. It is reported to occur within 15 counties in California, with the highest number of occurrences in southern California. Fountain grass is also found in Arizona, Colorado, Florida, Louisiana, Tennessee, and Hawaii. It is also considered a weed in several countries, including Australia, New Zealand, Micronesia, Bermuda, Puerto Rico, Spain, and outside of its natural range in Africa and the Middle East.

Genetic studies have shown that fountain grass collected in South Africa, Namibia, Egypt, Hawaii, Arizona, and California are the same species with no variation among populations worldwide. Some researchers call it a “super weed” because it responds quickly to new environments rather than having to evolve to adapt to them. Fountain grass has several other traits that make it a successful weed, including seeds that can live at least six years in the soil that are dispersed by wind, animals, humans, vehicles, and water, it is aggressive in natural communities and displaces native plants and animals, it accumulates large quantities of dead biomass and burns with high fire intensity and plants quickly resprout after a fire, and it is extremely difficult to control and eradicate. Pre-emergent and post-emergent herbicides show the most promise.

You can help prevent the spread of fountain grass by selecting alternative native plants for landscaping, such as deer grass, tufted hair grass, and species of wild rye. You can also work with local nurseries and encourage them not to offer this invasive weed for sale, and remove volunteer plants if they appear in your garden.



Photo by Lynn Sweet, PhD

### 2012 Cal-IPC Wildland Weed Field Courses Registration Now Open

The California Invasive Plant Council (Cal-IPC) is offering field courses on wildland weed management. Courses will be offered in Santa Cruz County on April 24, 25, & 26 and in Riverside County on June 5, 6 & 7. Topics include strategic approaches, biology and identification, mapping and control methods. Visit the [Cal-IPC website](#) for more information and to register.

### A Sneak Peek into the next issue of Eye On Invasives: Marine Invasives

### Subscribe

If you would like to receive the “Eye On Invasives” quarterly newsletter, please email [INVASIVES@dfg.ca.gov](mailto:INVASIVES@dfg.ca.gov) with the word ‘subscribe’ in the subject line to be added to the distribution list.

Help Rare Plants at Tax Time  
**Donate on Line 403**  
It's Deductible!

