Which Weed to Whack? The Cal-IPC Invasive Plant Inventory

Elizabeth Brusati and Doug Johnson, California Invasive Plant Council, 1442-A Walnut St. #462, Berkeley, CA 94709 (510) 843-3902 edbrusati@cal-ipc.org

The Problem

Invasive plants threaten the integrity of California's native ecosystems by displacing native plants, removing food sources for wildlife, increasing the frequency and duration of wildfires, and decreasing water availability. However, land managers and restoration workers are often overwhelmed by a multitude of invasive species and need to know where to focus their control efforts. Current state and federal rating systems focus mainly on weeds that infest crops or rangeland and do not consider invasions into native habitats. Cal-IPC, then called the California Exotic Pest Plant Council, published the previous version of "Exotic Pest Plants of Greatest Ecological Concern in California" (commonly referred to as "the Weed List") in 1999. We have now updated and expanded the list to include more than 200 plants, with improved descriptions and documentation.

The Previous Weed List

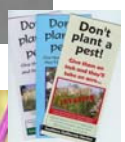
- Approximately 150 species ranked A-1, A-2, B, Considered But Not Listed, Red Alert, or Need More Information
- Based on a committee's consensus of impacts and records of habitats invaded

The Update

- Based on a categorical system using ecological impacts, invasiveness, and distribution contained within 13 criteria
- Provides a transparent rating system with rationale and documentation for each question
- Extends evaluation to approximately 240 species.

Applications

- Assist land managers in prioritizing control efforts
- Alert restoration workers to potential problem species
- Educate the public about impacts of invasive plants
- Aid comments on environmental documents
- Solicit information on species for which we need more information (and provide ideas for future research)
- Work with the horticultural industry to remove invasive plants from the market
  - "Don't Plant a Pest!: Alternatives to invasive garden plants" brochures for gardeners and landscapers



Yellow starthistle invades 12 million acres of California grasslands. Photo: Bob Case

The Plant Assessment Form (PAF): 13 Criteria, 4 Levels of Documentation

I. Impact (A – severe to D – none, U for unknown)
- 1.1. Impact on abiotic system processes
- 1.2. Impact on native plant community
- 1.3. Impact on higher trophic levels
- 1.4. Impact on native genetic integrity

II. Invasiveness (A – high potential to D – none)
- 2.1. Ability to invade areas without human-caused disturbance
- 2.2. Local rate of spread with no management
- 2.3. Recent trend in total area infested within state
- 2.4. Innate reproductive potential
- 2.5. Potential for human-caused dispersal
- 2.6. Potential for natural long-distance dispersal (>1km)
- 2.7. Other regions invaded

III. Distribution (A – wide to D – limited)
- 3.1. Ecological amplitude/Range of ecotypes invaded
  Based on 10 major and 39 minor ecological types
- 3.2. Distribution/peak frequency within habitats

IV Documentation Levels (4 - reviewed publication to 0 - none)
- Reviewed scientific publication
- Other published material
- Observational information confirmed by professional in the field
- Unconfirmed anecdotal information

Bull thistle displaces native forage plants used by deer and elk. Photo: Bob Case

Example: One section of the Plant Assessment Form for *Cynara cardunculus* (Artichoke thistle)

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes **B Other Pub. Mat'l**

Identify ecosystem processes impacted: Outcompetes native vegetation for light, water, and nutrients. No evidence of soil chemistry alteration because displaced species are able to recolonize following artichoke removal.

Rationale: Large arching leaves together with a large aggressive tap root system preemptively intercept resources necessary for the growth of other species.

Sources of information: Kelly, M. Cynara cardunculus. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;

Pepper A. and M Kelly. 1994. Portrait of an invader. The ecology and management of the wild artichoke Cynara cardunculus. Cal EPPC News Winter pg. 4-6.

Question 1.2 Impact on plant community composition, structure, and interactions **A Other Pub. Mat'l**

Identify type of impact or alteration: Artichoke thistle can create a monoculture leading to the the decline of, for example, broom baccharis (Baccharis sarothroides). Artichoke thistle is a threat to the endangered San Diego thornmint. Usually displaces annual exotic grasses, which may be facilitated by fire. Seriously threatens grassland ecosystems and may affect coastal sage scrub and riparian habitat in southern California. In San Diego's Los Penasquitos Canyon, artichoke thistle invades open forb covered canyon bottomlands. It can also invade riparian woodlands under willow (Salix spp.), mulefat (Baccharis glutinosa) and sycamore (Platanus racemosa).

Rationale: Artichoke thistle can reach stands of 22,000 plants per acre. Forms a basal rosette of leaves up to six feet in diameter. Reduces available habitat for grassland dependent species; displaces natives. There may be some alleopathic mechanism to neighbor plant suppression. When leaves die and fall to the ground they do not readily decompose, thus providing another barrier to competing species.

Sources of information: Kelly, M. Cynara cardunculus. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;

The Nature Conservancy Wildland weed Management and Research 1998-1999 Weed Survey by Trish Smith;

Pepper A. and M Kelly. 1994. Portrait of an invader. The ecology and management of the wild artichoke Cynara cardunculus. Cal EPPC News Winter pg. 4-6.

Question 1.3 Impact on higher trophic levels **B Other Pub. Mat'l**

Identify type of impact or alteration: Artichoke thistle is a moderate threat to the Threatened California gnatcatcher and Coastal cactus wren. By displacing natives and annual grasses, it reduces the forage value for both livestock and wildlife. It is not used by birds for nesting or predative activities.

Rationale: Alters breeding success for threatened species by displacing native plants. The heavily armoured thistle flowerhead hinders herbivory; however, the seedlings may be subject to rabbit herbivory and the seeds may provide a food source for birds.

Definition of Plant Scores

High
- Severe ecological impacts on ecosystems, plant and animal communities, and vegetation structure.
- Reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment.
- Usually widely distributed ecologically, both among and within ecosystems.

Moderate
- Substantial and apparent - but generally not severe - ecological impacts on ecosystems, plant and animal communities, and vegetation structure.
- Reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance.
- Ecological amplitude and distribution may range from limited to widespread.

Low
- These species are invasive, but have relatively minor ecological impacts.
- Reproductive biology and other invasiveness attributes result in low to moderate rates of invasion.
- Ecological amplitude and distribution are generally limited (these species may be locally persistent and problematic).

Alert
- An additional designation for some species in either the High or Moderate category whose current ecological amplitude and distribution are limited.
- Alerts managers to species that are capable of rapidly invading unexploited ecosystems, based on initial, localized observations, and on observed ecological behavior in similar ecosystems elsewhere.

Evaluated But Not Listed
- Generally designates species for which information is currently inadequate to respond with certainty to the minimum number of criteria questions (i.e. too many "U" responses), or for which the sum effects of ecological impacts, invasiveness, and ecological amplitude and distribution fall below the threshold for listing (i.e. the overall rank falls below Low).
- Many such species are widespread but are not known to have substantial ecological impacts (though such evidence may appear in the future).
- All species receiving a "D" score for ecological impact (Section 1), regardless of what other section scores they receive, are by default placed into this category.

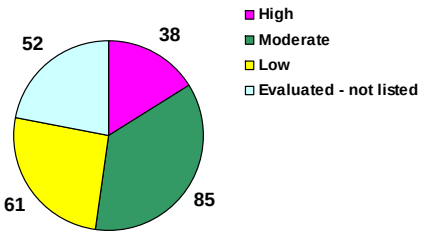
Cape ivy invades riparian areas in the East Bay hills. Photo: Bob Case

Documentation

- Scientific articles and other published research compiled using BIOSIS and AGRICOLA.
- Additional information from government reports and other "gray" literature
- Observational information contributed by persons familiar with the plants
  - Additional observations can be submitted to info@cal-ipc.org.

Arundo invades riparian areas throughout California. Photo: Bob Case

2005 Invasive Plant Inventory



Nine plants in the High category and 23 in the Moderate category were designated as "Alert", indicating that they have strong impacts and invasive potential, but currently occupy a limited range in California.

An additional 14 species were nominated for the inventory, but not reviewed due to lack of information or because they do not invade wildlands. Four species that are native to parts of California but invasive in other areas of the state were placed in their own category. These included *Lupinus arboreus* (yellow bush lupine), *Cupressus monocarpa* (Monterey cypress), *Pinus radiata* cultivars (Monterey pine), and *Phragmites australis* (common reed). The complete inventory and assessment forms for each species can be viewed at www.cal-ipc.org.

Certain questions proved difficult to answer for many species, due to lack of information from populations in California. In some cases we do not know how well data from other states or countries apply to California. These data gaps point out the need for additional research, specifically:

- Impacts to vertebrate and invertebrate wildlife
- Genetic impacts and hybridization with closely-related native species
- Range expansions within California
- Extent of invasion within specific habitat types throughout California

Pampas and jubata grasses (Cortaderia spp.) invade many habitats along the California coast. Photo: Bob Case

Some Cautions

- Ratings do not include economic impacts or difficulty of control
- There are a range of impacts and invasiveness within each category
- This list represents statewide impacts, but invasiveness of many species varies geographically.
  - Even "Low" species are problematic in specific regions or habitats
- Scores may change if populations expand

Future Plans (2006-07)

- Improve distribution information by surveying knowledgeable people around the state on invasive plants in their area
- Prepare report on research gaps and research priorities for invasive plants in California
- Develop interactive portal where weed workers can submit observations and update distributional information via Cal-IPC website
- Refine the inventory to reflect regional differences in species' invasiveness
  Publish management guide with control methods for High and Moderate species

Medusahead's high silica content makes it unpalatable for wildlife. Photo: Bob Case

The California Invasive Plant Council (Cal-IPC) was incorporated as a non-profit organization in 1992 in order to address the ecological and economic problems caused by invasive plants in California's wildlands. We promote research, restoration, and education in pursuit of this goal. Cal-IPC is a member-supported group that works with land managers, researchers, private landowners, concerned citizens, and others to facilitate information and resource sharing in our common fight against invasive plants.

www.cal-ipc.org