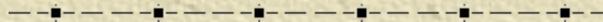




Roads and Exotic Plants

Joe DiTomaso

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The term invasive species is defined as “a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.”



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Impacts on human activities

- ◎ Lower livestock forage quality and quantity
- ◎ Physically interfere with grazing
- ◎ Compromise livestock, horse or human health
- ◎ Increase cost of managing and producing livestock
 - slow animal weight gain
 - reducing the quality of meat, milk, wool, and hides
- ◎ Impede recreation activities
- ◎ Reducing land value



Impacts on biotic aspects of natural ecosystems



- ✦ Reduce wildlife forage
- ✦ Alter wildlife habitat
- ✦ Lower plant and animal diversity
 - natives or endangered species



Naturalized species

Non-native species that overcomes survival and reproductive barriers within an environment and can survive without human intervention for an extended period (>25 years). Species known as waifs are similar but do not persist for an extended time.

Invasive species

Non-native naturalized species that spread into areas away from sites of introduction and have overcome environmental barriers within the new region. Most invasive species are not considered significant ecological threats.

Transformer species

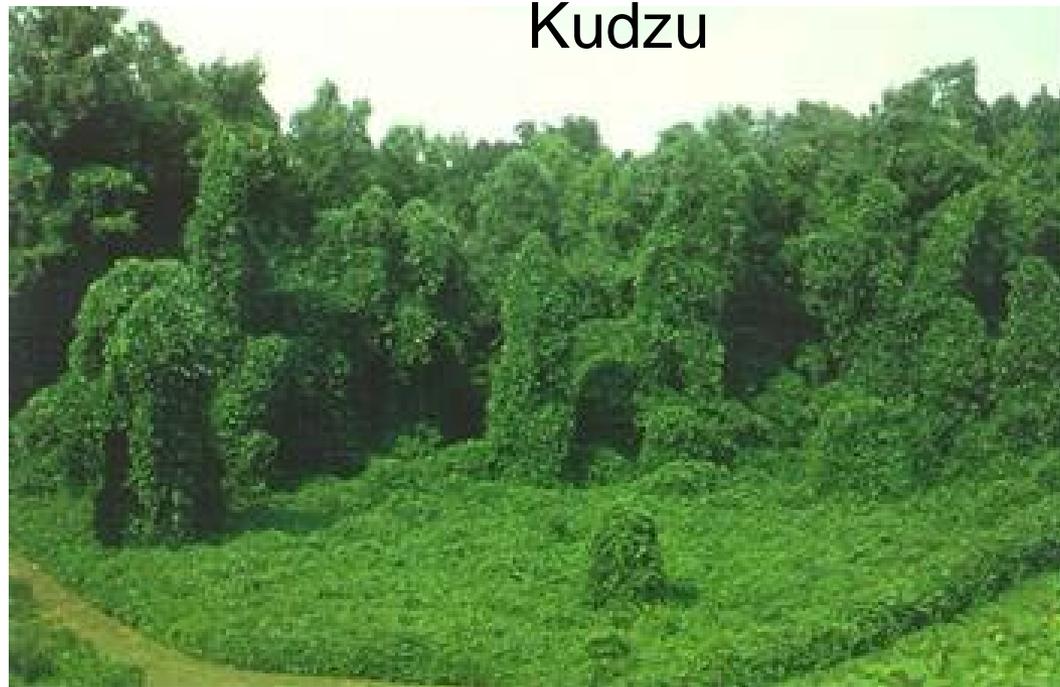
Invasive species that change the character, condition, form or nature of a natural ecosystem over a substantial area. These species are considered significant ecological threats.

Landscape Transformers

- Excessive users of resources
 - light
 - water
 - CO₂ and O₂
- Donors of limited resources
 - nitrogen
- Fire promoters and suppressors
- Sand stabilizers
- Erosion promoters
- Colonizers of inter-tidal mudflats/sediment stabilizers
- Litter accumulators
- Salt or heavy metal accumulators

Invasive Transformers

- ✦ Excessive users of resources
 - Light





Scotch broom
(*Cytisus scoparius*)









Medusahead
(*Taeniatherum caput-medusae*)



Invasive Transformers

- ✦ Excessive users of resources
 - water
- ✦ Erosion promoter



Long distance seed dispersal

✦ Natural methods

– Animals

- ectozoochoric fruit or seed which attach to animals with awns, hooks, barbs, or sticky secretions
- endozoochoric fruit which provide a food source for animals

– Water

– Wind

Long distance seed dispersal

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Cocklebur
(*Xanthium strumarium*)



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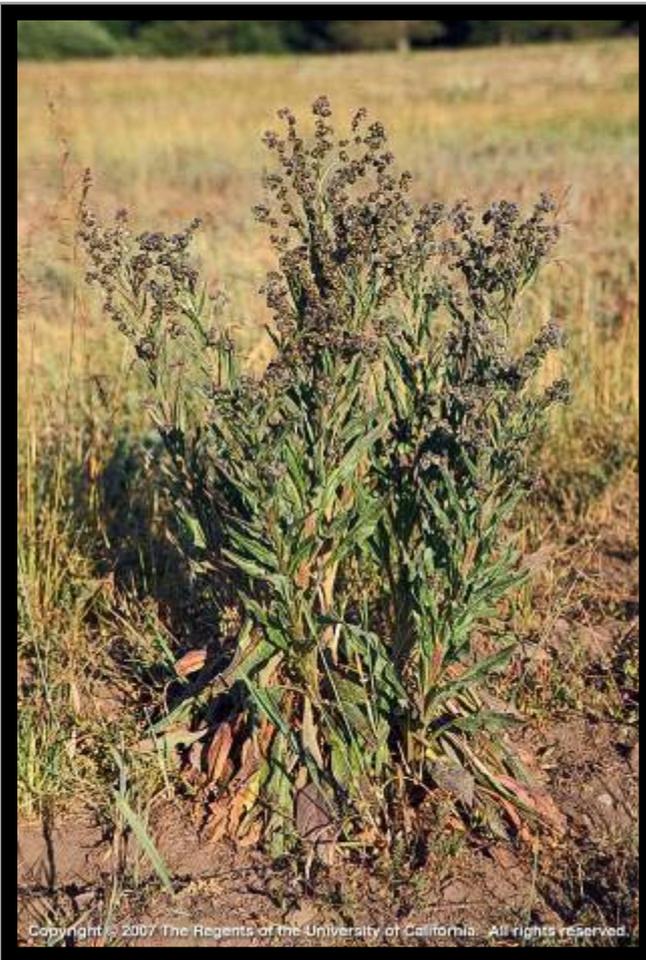


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Hedgeparsley
(*Torilis arvensis*)



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Houndstongue
(*Cynoglossum officinale*)



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Medusahead
(*Taeniatherum caput-medusae*)

Long distance seed dispersal

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Himalaya blackberry
(*Rubus armeniacus*)



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Cutleaf blackberry
(*Rubus laciniatus*)

Long distance seed dispersal

✦ Natural methods

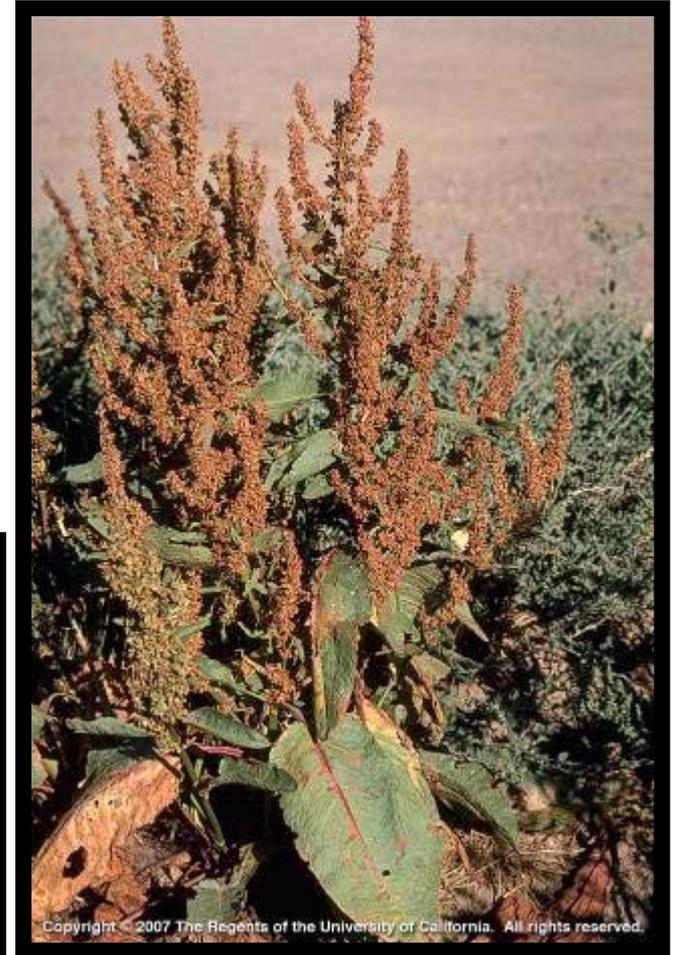
– Animals

- ectozoochoric fruit or seed which attach to animals with awns, hooks, barbs, or sticky secretions
- endozoochoric fruit which provide a food source for animals

– Water

– Wind

Dock
(*Rumex* sp.)



Giant reed
(*Arundo donax*)



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Long distance seed dispersal

✦ Natural methods

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Dyer's woad
(*Isatis tinctoria*)



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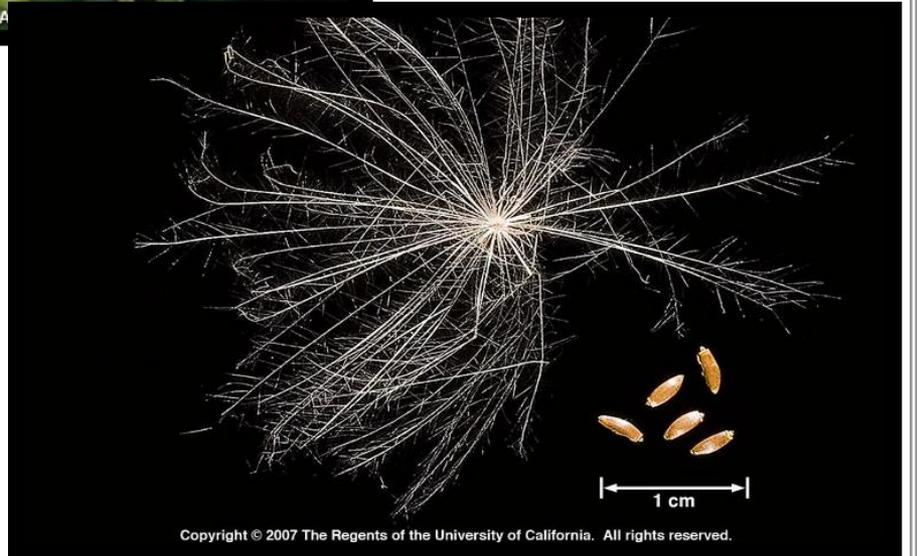


Blessed milkthistle
(*Silybum marianum*)



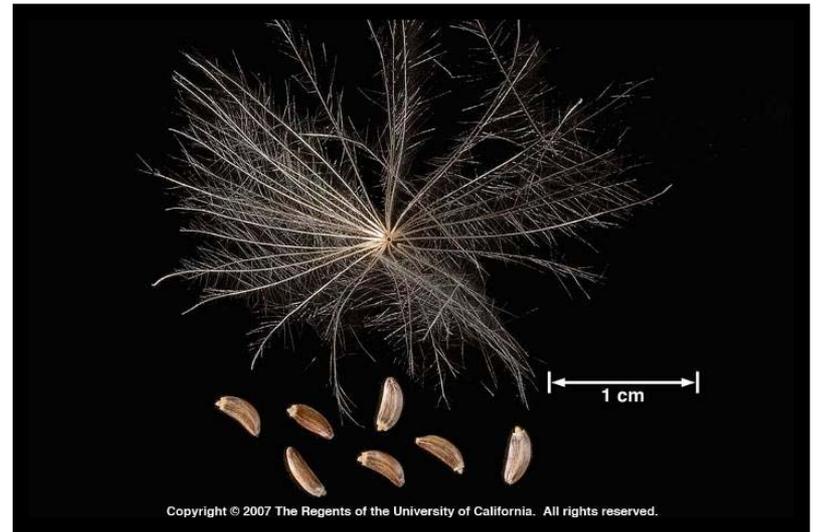
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Canada thistle (*Cirsium arvense*)



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Bull thistle
(*Cirsium vulgare*)





Rush skeletonweed
(*Chondrilla juncea*)



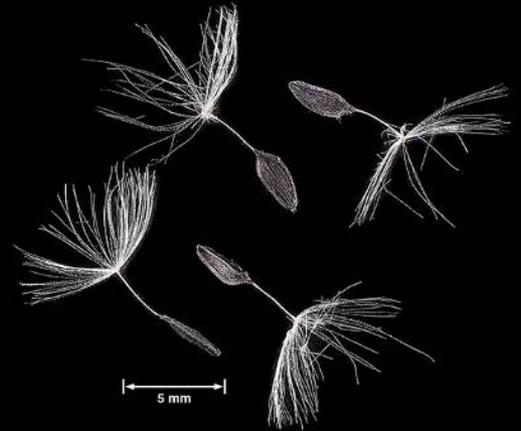
Salsify
(*Tragopogon* sp.)



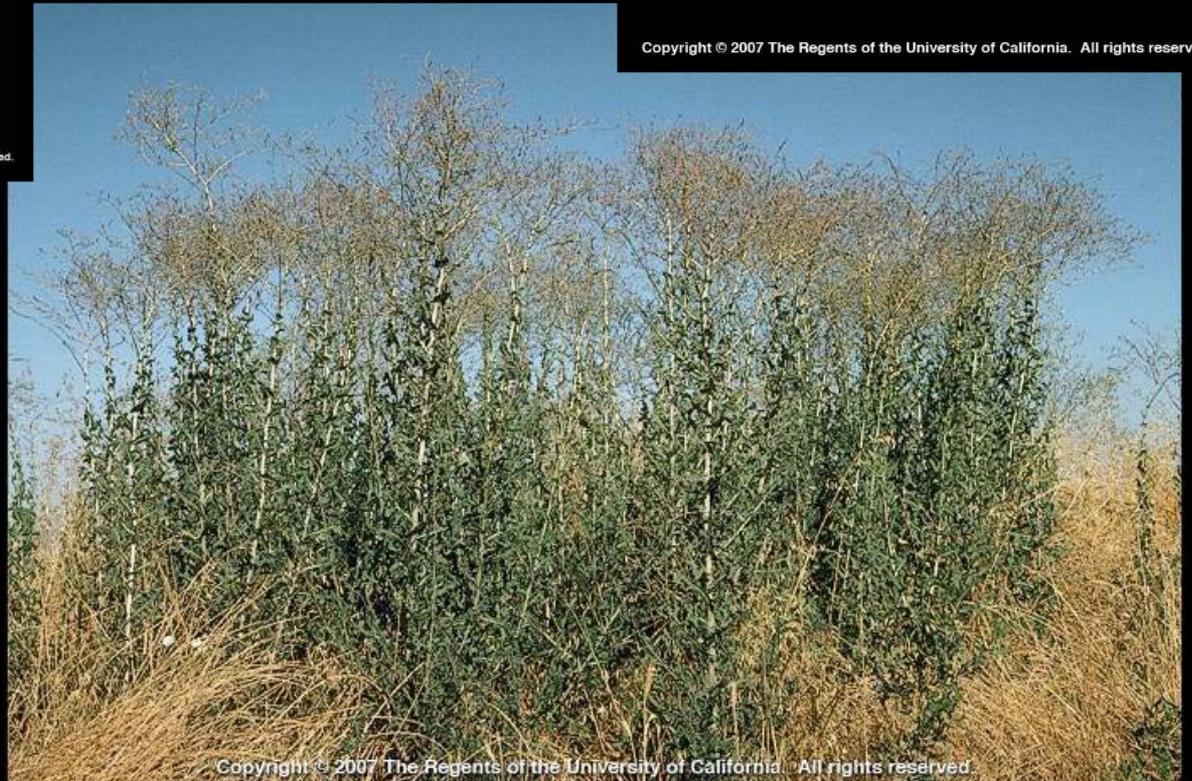
Prickly lettuce (*Lactuca serriola*)



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Long distance seed dispersal

- ✦ Dispersal mechanisms associated with roads
 - Soil contamination
 - Contamination of tools, vehicles and equipment
 - Clothing contamination
- ✦ Intentional human introduction
 - Ornamental
 - Erosion control
 - Forage

Long distance seed dispersal

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Italian thistle
(*Carduus pycnocephalus*)



Yellow starthistle
(*Centaurea solstitialis*)





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Perennial pepperweed
(*Lepidium latifolium*)

Disturbance is often a prerequisite for invasion of an ecosystem

- ✦ While invasions can occur without disturbance, it is more common that disturbance events that damage resident vegetation lead to invasion.
- ✦ When disturbance frequency is maintained at a low rate, native species often tolerate stressful conditions and continue to dominate.
- ✦ Invasion of non-native species is most common in agricultural or urban sites, where human disturbance is regular, but less common in most natural areas with low rates of disturbance.



Types of disturbance

- ✦ Several types of natural and human-related disturbances that can affect vegetation.
 - grazing, fire, flood, and drought
- ✦ Disturbance with human activities are often more frequent and intense.
 - high intensity disturbance favor invasive species

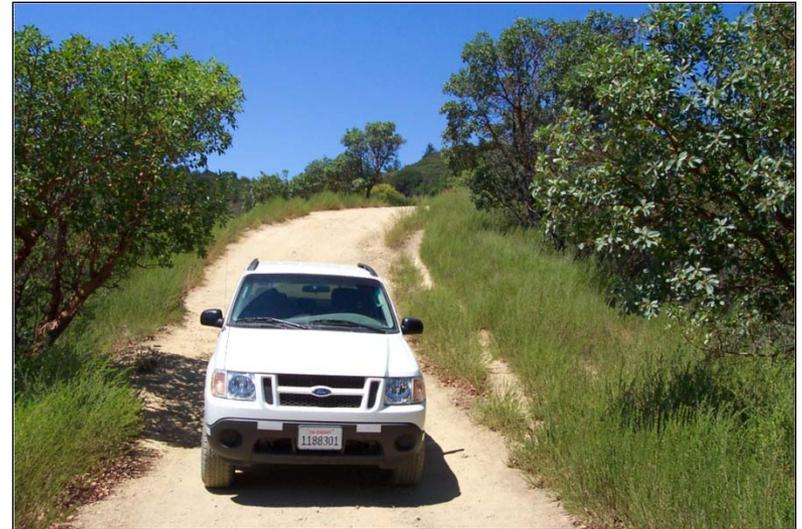


How disturbance favors invasives

- ✦ Disturbance increases resource availability because of damage to resident vegetation and reduces competition among species
 - Increased light availability leads to rapid response by invaders
 - Nutrient enrichment shifts species composition to fewer relatively fast growing species
 - Increase water availability also favors rapidly growing invasives

Site-Disturbing Projects

- Building construction
- Road construction and improvements



Roads and disturbance

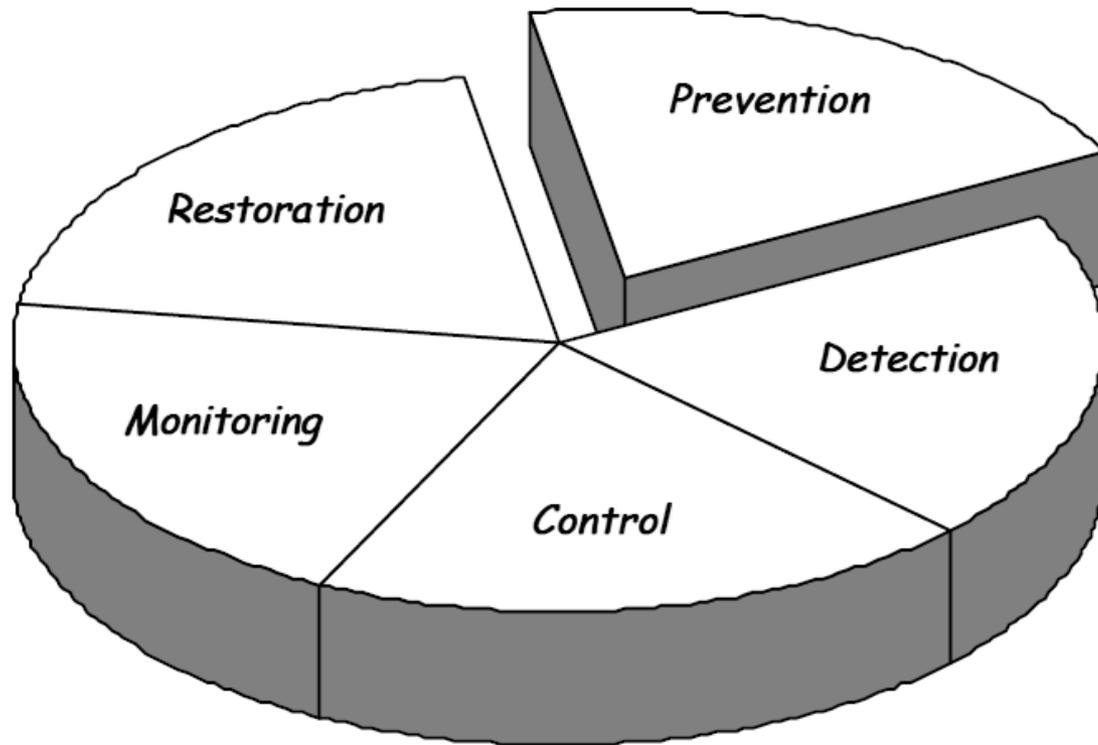
- ✦ Margins with disturbed soil
 - Road construction/re-construction
 - Periodic grading
 - Vegetation management within right-of-way
- ✦ Higher water availability due to accumulation of runoff
- ✦ Soils often imported from other regions
 - Higher nutrients
 - Contaminated with weed seeds
- ✦ Vectors for movement of weed seed and propagules
 - Contaminated straw
 - Exotic erosion control species

Managing disturbance

- ✦ Reducing the intensity and even timing of disturbance can be used to suppress or reduce establishment of invasive species.
 - In general, small scale, less frequent, and low intensity disturbances favor establishment and growth of desirable species
 - Large scale, more frequent and higher intensity disturbances favor invasion by ruderal or weedy species.

Prevention

Our first line of defense



Prevention Guidelines

- Learn which plants are invasive in the area
- Identify and eradicate weeds prior to project start



Prevention Guidelines

- Minimize conditions that promote weed germination:
 - ✓ minimize unnecessary soil disturbance
 - ✓ Reduce traffic on road
 - ✓ retain shade
 - ✓ retain vegetation
 - ✓ Use loaders and dump trucks instead of grader to leave more vegetation
 - ✓ retain original topsoil



Prevention Guidelines

- Locate and use weed-free equipment staging areas
- Start in non-infested area and then move to infested areas





Prevention Guidelines

- Require all equipment, tools and clothing to be cleaned **BEFORE** entering or leaving the site; remove all mud, dirt and plant parts
- Quarantine contaminated materials





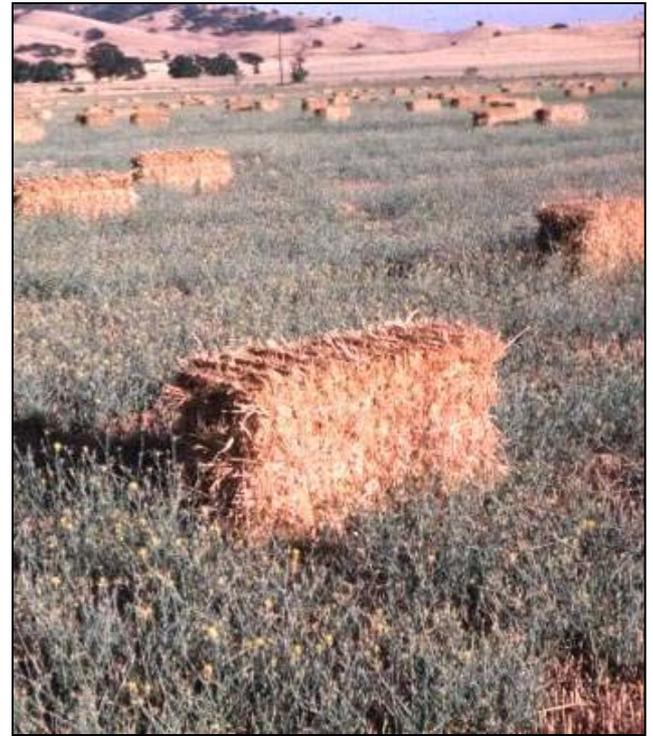






Prevention Guidelines

- Use weed-free materials
 - fill, fiber rolls, gravel, sand, mulch, straw, hay, etc.
- Treat gravel pits and soil before use
- Consider chipping local brush for mulch – seed may help restore vegetation



Yellow starthistle infested bales

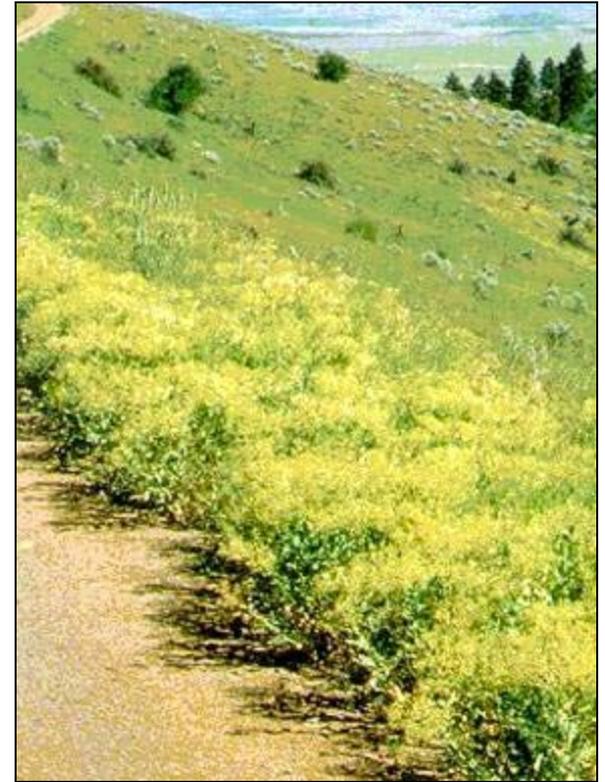
Prevention Guidelines

- Re-establish vegetation with high purity local weed-free seed that can reduce weed establishment
- Mulch to “shade out” invasive weeds and prevent seed germination
- Inspect the site for at least three growing seasons after completion of the work



Prevention Guidelines

New weed
infestations should
be controlled
immediately!



*Hoary cress moving into
wildlands from a road*

Control options in rangelands

✦ Mechanical

- Hand pulling, hoeing and hand tools, weed whips, chainsaw, loppers, Weed Wrench
- Tillage
- Mowing

✦ Cultural

- Grazing
- Prescribed burning
- Flaming

✦ Biological

- Pathogens
- Insects

✦ Chemical

- Foliar
- Wick
- Woody plants; basal bark, cut stump, stem injection

Consideration of primary long-term land-use objective

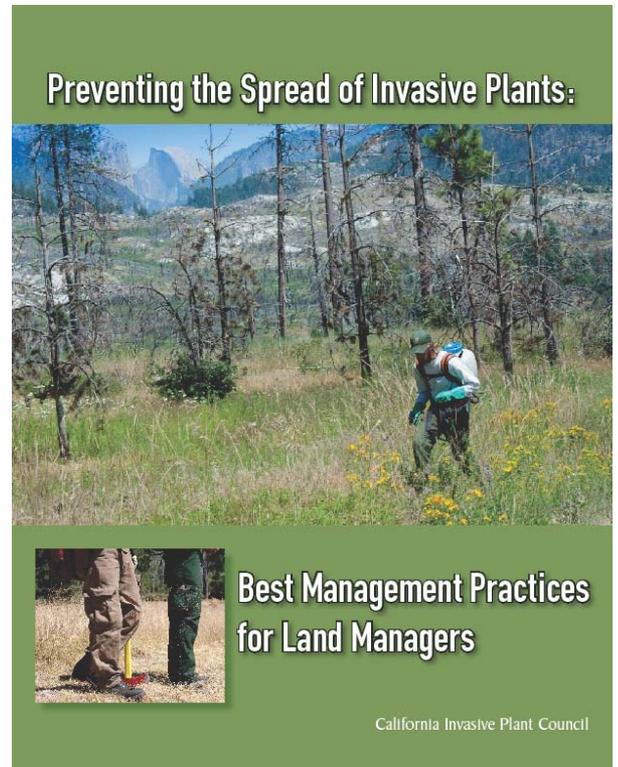
- ✦ Forage production for livestock
- ✦ Timber production
- ✦ Preservation of native or endangered plant species
- ✦ Wildlife habitat development
- ✦ Water management
- ✦ Recreational land maintenance

Prevention BMPs

Goal: To prevent accidental introduction and spread of invasive plants

Two Prevention BMP Manuals:

1. for Land Managers
2. for Transportation and Utility Corridors



31 pages

Prevention BMPs

Manual Chapters: Pathways of Invasion

1. Planning & Inventory
2. Project Materials
3. Travel
4. Tool, Equipment & Vehicle Cleaning
5. Clothing, Gear & Boots Cleaning
6. Waste Disposal

Land Manager Prevention BMPs

Available at:
www.cal-ipc.org

Preventing the Spread of Invasive Plants:



**Best Management Practices
for Land Managers**

California Invasive Plant Council

Large Equipment and Vehicles:

| Check for soil, seeds, and plant material | Inspected | Cleaned |
|---|-----------|---------|
| 1. Truck bed | | |
| 2. Vents | | |
| 3. Front of the grill and tray under radiator | | |
| 4. Wheel well/quarter panels | | |
| 5. Ledges under bumper (front and rear) | | |
| 6. Tire rims and treads | | |
| 7. Spare tire | | |
| 8. Under the floor mat (inside cab) | | |
| 9. Under the seat (inside cab) | | |



Thank you for your attention!
Questions?