



University of California, Berkeley
Richmond Field Station
Guide to Targeted Invasive Non-Native
Plants for Maintenance Staff

The purpose of this guide is to illustrate several targeted invasive non-native weeds that are found at the Richmond Field Station. The guide provides both pictures of target plants and management recommendations. It also provides techniques to prevent the spread of invasive plant materials during mowing and other maintenance activities.

Targeted Invasive Non-Native Species

Perennial pepperweed

Himalayan blackberry

Fennel

Poison hemlock

Harding grass

Pampas and jubata grass

Bull, Italian and artichoke thistles

Yellow star thistle

Salsify

Teasel

RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

PERENNIAL PEPPERWEED



Key factors:

- 1) Large, deep, and vigorous perennial root system.
- 2) Resprouts from small root fragments of less than an inch.
- 3) Produces thousands of tiny viable short-lived seeds.
- 4) Accumulates thick layer of debris.
- 5) Habitat: marsh ecotone, upland and grassland

Treatment:

For small populations, pull plants by hand and remove as much of the roots as possible. Mechanical removal is not recommended but will stop seed from spreading. For larger populations, either apply an appropriate herbicide while plant buds or mow or brush cut plants close to the ground when buds appear. After mowing, apply an appropriate herbicide to new growth using a wick-type application. Repeated mowing encourages root growth and is not recommended.

Follow-up:

Roots can lie dormant for multiple years so regular follow-up is essential for several years in early spring a late summer. Scrape litter from soil surface to allow growth of other species.

Disposal:

Root fragments will reroot! Bag and dispose of plants through hot compost with grinding or bag as garbage.

RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

HIMALAYAN BLACKBERRY



Key factors:

- 1) Abundant seed production & seeds viable for several years.
- 2) Fast-growing stems.
- 3) Resprouts from the crown and root fragments left in the soil.
- 4) Thrives in moist areas.
- 5) Habitat: Upland areas.

Treatment:

Mow repeatedly using a tri-blade brushcutter to cut the canes; use McCleods to clear the vegetation. The best time to do this is when flowers are in bloom but before the fruit sets. For small infestations, cut stems to about 1 foot above ground and paint immediately with approved herbicide after cutting. For individual plants, grub out root mass.

Follow-up:

Regardless of the method used, follow-up is essential. Inspect and apply foliar herbicides as needed. Possibly use hoe or rototiller to clear out any roots, then spray resprouts if any (only for small infestations).

Disposal:

Transfer stems and roots, chip and leave in piles to decompose onsite. Alternatively, chip and dispose of off-site.

RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

FENNEL

Key factors:

- 1) Seed production is very high, and seeds remain viable in the soil for several years.
- 2) Resprouts from the crown & root system typically 4-10 inches below soil surface.
- 3) Mowing can stimulate increased growth if done during the wrong season. Mowing should be early spring.
- 4) Habitat: upland and grassland.

Treatment:

Dig out individual plants with shovels, hand picks, and pulaskis, preferably when the soil is still wet and before seed set. Mowing can be effective if done repeatedly, with the first mowing in March to April. Wait for resprouts, then apply recommended herbicide. Applying too soon after mowing will be ineffective. Mowing *during* seed set encourages seed spread and should therefore be avoided. Apply herbicide before the plant bolts (around June). A repeat application may be needed for best results.

Follow-up:

Check for seedling growth twice a year, particularly in late winter/early spring.

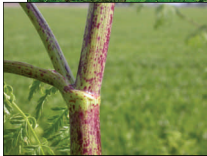
Disposal:

Fennel stalks can be piled and mulched on site to reduce costs.



RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

POISON HEMLOCK



Distinctive red blotches on stem

Key factors:

- 1) Poison hemlock can be toxic to humans if eaten. May cause dermatitis, nausea, and headaches if touched or inhaled for prolonged periods of time. Wearing gloves and a mask is advised.
- 2) Usually a biennial, therefore no need to remove entire root system.
- 3) Seeds may be viable for up to 5 years.
- 4) Grows best in rich soils in moist conditions.
- 5) Habitat: moist areas in grassland and upland.

Treatment:

For small infestations, pull plants by hand, preferably during the rainy season when moist soils allow you to get more of the root. Large clumps can be dug with a shovel, or cut using hand pick to hit below the root crown to remove upper portion. For large populations, mow to a height of 3-4 inches in early April. Repeat a month later to follow up and mulch with 6"-8" of seed free rice straw. Repeat for several years. Mowing won't eradicate, rather reduce size of infestations.

Follow-up:

Pull seedlings by hand or with hand tools.

Disposal:

Cut vegetation may be left on site to decompose.

RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

HARDING GRASS

Key factors:

- 1) Seed viable thought to be 1-3 years.
- 2) Removal is easier before large stands are established.
- 3) Re-sprouts from roots left in the soil.

Treatment:

For small infestations, cut around the base of the clump with a pulaski and dig out roots. Roots longer than 2 inches must be removed or they will reestablish. Follow with 6" layer of rice straw. For larger infestations, mow close to ground in late spring. Alternatively, mow at least 3 times, ensuring plants do not flower. This also suppresses shoot formation. After mowing close to the ground, apply approved herbicide using a wick-type applicator after plants have begun to grow back. [Note: see approved RFS mowing guidelines for Harding grass mow areas.]

Follow-up:

Continue mowing to prevent expansion of infestation. Grub out small plants, and replant areas with native grasses.

Disposal:

For flowering plants, bag and dispose of debris, especially any seed heads, or pile for composting.



RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

PAMPAS AND JUBATA GRASS



Pampas grass

Key factors:

1) Resprouts will grow from roots left in the ground. 2) Thrives in moist areas. 3) Seed production is prolific. 4) Seeds remain viable approximately 9-12 months.

Treatment:

Pull seedlings by hand with the help of a pick, Pulaski, or shovel. For larger plants, cut back the blades and stems with a Pulaski (or chainsaw, depending on the size of the grass), and allow sprouts to regrow to 2-3 feet then apply an approved herbicide on any green growth when the plant is actively growing (between November and July). For small plants, dig out the root crown. Some land managers stress removing the root ball (the juicy, onion-like bulb) but report no resprouts from the stringy roots left in the ground. The root ball should, however, be turned upside down to dry out in the sun, away from the soil (to prevent resprouts). Cut the plumes when they are still pink or purple – July to early September prior to seed development. Apply approved herbicide on any green growth when the plant is actively growing.

Follow-up:

Check for resprouts twice a year.

Disposal:

Some practitioners advise taking the grasses off-site to prevent resprouting. Others suggest simply turn the uprooted mass upside down and leaving it in place. If disposing of offsite, dispose of the plumes before the seeds mature.

RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

BULL, ITALIAN AND ARTICHOKE SPECIES



Bull thistle



Artichoke thistle



Italian thistle

Key Features:

- 1) Spiny leaves and stem necessitate use of gloves.
- 2) High seed production with seed viable up to 10 years.
- 3) High germination success rate.
- 4) Resprouts from roots.

Treatment:

For small populations, pull individual plants by hand before flowers are produced. Dig large individuals out with a pick or shovel making sure to remove as much of the taproot as possible. Alternatively, cut plants just below the root crown with a hand pick or trowel. For large populations, brush cut or mow before flowers appear; repeat once plants reach 4-6 inches in height (approximately after 1 month). Alternatively, foliar spray with approved herbicide before plants go to seed, generally around mid-spring. For artichoke thistle use loppers to remove flowering stem and treat basal leaves with herbicide.

Follow-up:

Regardless of treatment used, return to the site twice a year for several years to monitor seedling growth and prevent further seed production.

Disposal:

Seeds must be bagged and disposed off site or burned. Stems and non-flowering plants may be composted on site.

RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

YELLOW STAR THISTLE



Key factors:

- 1) High speed reproduction.
- 2) Seed viability is at least 3 years.
- 3) Fast-growing and deep taproot.
- 4) Seedlings are somewhat shade-intolerant.
- 5) Plant chemicals absorbed through skin. Heavy leather gloves are a must!

Treatment:

For small populations, pull or dig individual plants by hand in May-August or as soon as possible after this time when plants are bolting. Rosettes often break off roots which resprout, so it is important to remove roots by grasping the plant at the base and pulling up steadily. Use spade or soil knife to help remove large plants. Remove at least a quarter- to half-inch of root below root crown. For large populations, mow after plants have bolted and some have started to bloom. Leave 1-2 inches above ground. May need to mow in 4-6 week intervals. Alternately, a foliar application of an approved herbicide applied at the bolting stage can be effective.

Follow-up:

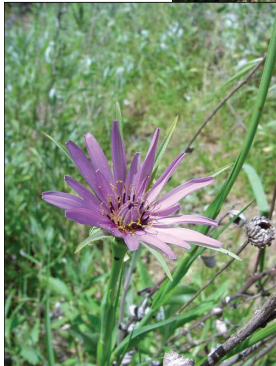
Repeat treatment program for at least 3 years. Continue as needed for the years following at a lower intensity as required by the number of resprouts. Monitor near-by areas for infestations.

Disposal:

Leave clippings on site if they do not contain seeds. Plants with only buds and young, pale yellow flowers can be left on the ground. Dark yellow flowers should be bagged and disposed off site as they may contain viable seeds.

RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

SALSIFY



Key factors:

- 1) Milky sap.
- 2) Biennial with thick taproot.
- 3) Blooms early spring, producing seeds by late spring.
- 4) Abundant wind dispersed seed.

Treatment:

For small populations, pull or dig individual plants by hand in March-July. Rosettes often break off roots which re-sprout. Use spade or soil knife to help remove large plants. Remove at least a quarter- to half-inch of root below root crown.

For larger populations, mow after plants have begun to bolt. Leave 1-2 inches above ground. May need to mow in 4-6 week intervals. Collect all seed heads, bag, and dispose off site. Alternatively, foliar spray of an approved herbicide applied during the rosette stage has been effective.

Follow-up:

Repeat treatment program for at least 3 years. Continue as needed.

Disposal:

Rosettes may be composted on site. Bag and dispose of plants with seeds heads.

RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

TEASEL

Key factors:

- 1) Abundant seed spreads quickly and stay viable for several years.
- 2) Long taproot develops during rosette stage.

Treatment:

For small populations, begin pulling individual plants by hand in April-May through August. Rosettes often break off roots which re-sprout. Use spade or soil knife to help remove large plants. Remove at least a quarter- to half-inch of root below root crown. For large populations, mow after plants have begun to bolt. Leave 1-2 inches above ground. May need to mow in 4-6 week intervals. Collect all seed heads, bag, and dispose off site. Alternatively, a foliar application of an approved herbicide can be applied during the rosette stage.

Follow-up:

Repeat treatment program for at least 3 years. Continue as needed.

Disposal:

Rosettes may be composted on site. Bag and dispose of plants with seeds heads. Even immature seed head may produce viable seeds!



Flowers produced
in 2nd year on
stalks



1st year basal
rosette

RICHMOND FIELD STATION—INVASIVE NON-NATIVE PLANT SPECIES

Tips to Prevent the Spread of Invasive Plants While you Work

Cleaning your tools and vehicles before you leave a weed-infested area is crucial to prevent the spread of these plants into other areas. Some weeds (particularly Harding grass and perennial pepperweed) can sprout from a root pieces, and other plants (such as thistles and pampas/jubata grass) have hundreds of seeds per flower head. Preventing the spread of these species is more efficient and effective than treating emerging populations in new areas.

Cleaning your equipment and vehicles is easy. Before leaving a weedy site, simply take a broom or other tool and brush off any visible pieces of vegetation. Be sure to check in wheel wells and any moving parts (mower blades) where plant pieces can easily stick. “Plant pieces” includes flowers, leaves, stems, and roots. You should clean your equipment and vehicles each time **AFTER** working in an area infested with a particular weed species.

At the **end of the day** and **BEFORE working in a highly sensitive area**, clean equipment at a washing station. Using a power-washer or pressurized hose, dislodge any visible plant pieces. Collect these plant pieces and dispose of them properly.

RICHMOND FIELD STATION—MOWING GUIDELINES

Figure 1. Harding Grass Management - No Mow Areas



SENSITIVE GRASSLAND PROTECTION AREAS

The Richmond Field Station (RFS) has a number of sensitive habitat protection areas. The grassland habitat on the western side of the RFS, illustrated in Figure 1 is very sensitive as it contains both wetlands and rare grassland plant species. No mowing, maintenance or research actions should be undertaken in the orange-shaded areas without prior notification of the Office of Environment, Health and Safety.

RICHMOND FIELD STATION—MOWING GUIDELINES

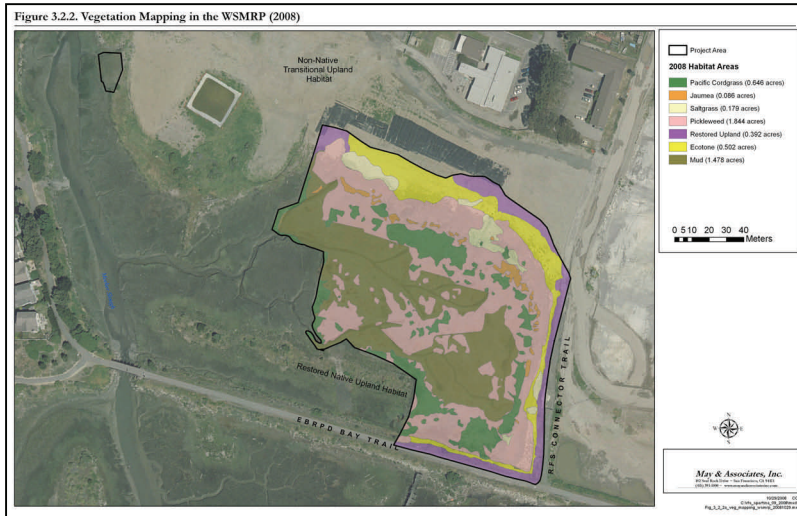


MOWING AREAS WITHIN WESTERN GRASSLAND HABITATS

Figure 2 illustrates the areas where mowing for weed suppression and maintenance can be performed within the western grassland areas. All mowing activities however, must be performed in accordance with the *Guidelines for Mowing Harding Grass in Coastal Terrace Prairie Habitat*. These Guidelines apply to mowing the RFS coastal terrace prairie with lawn mowers, brush cutters, and other hand held equipment (as a follow-up to mowing along edges or in areas with small patches of weeds that cannot be reached by mowers).

RICHMOND FIELD STATION—MARSH RESTORATION AREA

NO MOWING, MAINTENANCE OR RESEARCH ACTIVITIES ARE AUTHORIZED WITHIN THE RESTORED AND EXISTING MARSH HABITATS



The adjacent figure illustrates the restored marsh habitat within the RFS. Existing marsh habitat is located west and northwest of this area. No mowing or maintenance activities should occur within the marsh system without prior authorization from the Office of Environment, Health and Safety at 510-643-9574.