

Chapter 10. Invasive Plant Prevention

*Adapted from USDA Forest Service Guide to Noxious Weed Prevention Practices
Additional prevention guidelines provided by the Bureau of Land Management,
Federal Highway Administration, Union of Concerned Scientists,
and Montana State University Extension Service*

INTRODUCTION

The most effective, economical, and ecologically sound method of managing weeds is to prevent their invasion in the first place. Often landowners and land managers pour resources into fighting weed infestations after they are firmly established. By that stage, ongoing control is prohibitively expensive and eradication is probably not an option. Resources might be more efficiently used in proactive weed management activities. Proactive weed management relies on management of existing infestations but with a strong focus on prevention or early detection of new invasions.

Elements of a proactive weed prevention plan include limiting weed seeds into an area; early detection and eradication of small

patches of weeds; proper management of vegetation along roadside, trails, and waterways; land management practices that build and maintain healthy communities of native and desirable plants that compete well against weeds; careful monitoring of high-risk areas; and annual evaluations of the effectiveness of the prevention plan so appropriate adaptations can be implemented the following year.

This guide was developed with the firm conviction that “an ounce of prevention is worth a pound of cure.” We can protect our healthy ecosystems from invasive plants by following practical, proactive weed-prevention guidelines.

INVASIVE PLANT PREVENTION AND LANDS

Site-Disturbing Projects and Maintenance Programs

Incorporate weed prevention and control into project layout, design, and evaluation, as well as all project decisions. Consider how to build or maintain healthy plant communities that will effectively compete with weeds.

- Environmental analyses for projects and maintenance programs should assess weed risks, analyze high-risk sites for potential weed establishment and spread, and identify prevention practices. Determine weed prevention and management needs at the onset of project planning.
- Include site-specific vegetation monitoring objectives in project plans. Recognize desirable plants as well as weeds.

Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

- Before ground-disturbing activities begin, inventory and prioritize weed infestations for treatment in project operating areas and along access routes. Identify what weeds are on site or within the vicinity and do a risk assessment accordingly. Control weeds as necessary.

- Begin project operations in uninfested areas. Restrict movement of equipment or machinery from weed-contaminated areas to non-contaminated areas. This includes machinery used for or by construction, recreation, agriculture, forestry, oil and gas exploration and production, utility companies, mining, and tourism.
- Locate and use weed-free project staging areas. Avoid or minimize travel through weed-infested areas, or restrict travel to those periods when spread of seed or propagules are least likely.
- Identify sites where equipment can be cleaned. Remove mud, dirt, and plant parts from project equipment before moving it into a project area. Seeds and plant parts should be collected when practical and incinerated.
- Clean all equipment before leaving the project site if operating in areas infested with weeds.
- Inspect, remove, and properly dispose of weed seed and plant parts found on clothing and equipment. Proper disposal means bagging the seeds and plant parts and incinerating them.
- Coordinate project activities with nearby herbicide applications to maximize cost effectiveness of weed treatments.
- Evaluate options to regulate the flow of traffic on sites where desired vegetation needs to be established or maintained.

Prevent the introduction and spread of weeds caused by moving infested sand, gravel, and fill material. Work with the responsible transportation agencies to voluntarily adopt these practices.

- Inspect materials on site to ensure that they are weed-free before transport and use. If sources of sand, gravel, and fill are infested, eradicate the weeds, then strip and stockpile the contaminated material for several years, if possible, and check regularly for weed re-emergence.
- When material from a weed-infested but treated source is used in a project, inspect and document the project area annually for at least three years to ensure that any weeds transported to the site are promptly detected and controlled.
- Maintain stockpiled, uninfested material in a weed-free condition.

Avoid creating environmental conditions that promote weed germination and establishment.

- Minimize soil disturbance.
- When working in vegetation types with relatively closed canopies, retain shade to the extent possible to suppress weeds and prevent their establishment and growth.
- Retain native vegetation in and around project activity as much as possible.

Where project disturbance creates bare ground, re-establish vegetation to prevent conditions to establish weeds.

- Revegetate disturbed soil to optimize plant establishment for that specific site. Define for each project what constitutes disturbed soil and objectives for revegetation.

- Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching as necessary. Use native material where appropriate and feasible. Consider hiring a contractor to chip local brush or cut and bale local weed-free grass for mulch—an added benefit is that seeds in the grass or brush can help restore localized vegetation on the site. Use certified weed-free or weed-seed-free hay or straw where certified materials are required or available.
- Monitor sites where seed, hay, straw, or mulch has been applied. Eradicate weeds before they seed. In contracted projects, contract specifications can require that the contractor maintain the site weed-free for a specified time.
- Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas; for example, road embankments or landings.
- Use local seeding guidelines to determine procedures and appropriate seed mixes. A certified seed laboratory needs to test each lot according to Association of Seed Technologists and Analysts (AOSTA) standards (which include an all-state noxious weed list) and provide documentation of the seed inspection test. Check state and federal lists to see if any local weeds need to be added prior to testing. Non-certified seed should be tested before use.
- Inspect and document all ground-disturbing operations in noxious weed infested areas for at least three growing seasons following completion of the project. For ongoing projects, continue to monitor until reasonable certain that no weeds have appeared. Plan for follow-up treatments based on inspection results.

Improve effectiveness of prevention practices through weed awareness and education.

- Educate people in weed identification, biology, impacts, and effective prevention measures.
- Provide proficient weed management expertise at each administrative unit of a public land management agency. Expertise means that necessary skills are available and corporate knowledge is maintained.
- Develop incentive programs encouraging weed awareness, detection, reporting, and identifying new invaders.

Set the example; maintain weed-free administrative sites.

- Treat weeds at administrative sites and use weed prevention practices to maintain sites in a weed-free condition.

Timber Harvest

Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

- Treat weeds on timber-harvest projects—including landings, skid trails, and helibases—before activities commence.
- Maintain weed-free mill yards, equipment parking, and staging areas.

- To prevent weed germination and establishment, retain native vegetation in and around timber harvests and minimize soil disturbance. Logging practices that reduce soil disturbance include:
 - Over-snow logging
 - Skyline or helicopter logging
 - Reuse of landings, skid trails, and helibases when they are weed-free
- Minimize period from end of logging to site preparation, revegetation, and contract closure. Prompt reforestation and revegetation is required for long-term restoration and weed suppression.

Land Acquisition and Subdivisions

Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

- Conduct weed inventories of all lands considered for acquisition, sale, or exchange. Weed treatment may be written into a contract as a condition of land purchase or exchange.
- Public land managers may include a weed prevention and control provision in new permits, easements, or leases when authorized activities present a high risk for weed infestation or the location of the activity is vulnerable to weed introduction or spread. Consider amending existing authorizations when ground-disturbing activities are involved.

Incorporate weed prevention into project layout, design, evaluation, and decisions for mining, oil and gas exploration, and utility work.

- Include weed prevention measures, including project inspection and documentation, in operation and reclamation plans.
- To prevent conditions favoring weed establishment, minimize bare soil conditions and re-establish vegetation as soon as possible on disturbed or bare ground.

Incorporate weed management practices in land subdivision planning.

- Encourage the landowners' association to address weed issues through education and awareness.
- Develop weed management guidelines for the entire subdivision rather than individual lots.
- Include building contractors, utilities, and others in requirements to clean equipment and use weed-free materials.
- Communicate and coordinate with the local county weed district or weed management area.
- Develop standards for grazing, landscaping, and revegetation that promote healthy plant communities.

Recreation and Wilderness

To prevent new weed infestations and the spread of existing weeds, avoid or remove sources of weed seed and propagules.

- Inspect and clean motorized and mechanized trail vehicles of weeds and their seeds.

- Wash boots before hiking into a new area. Inspect and clean packs, equipment, bike tires.
- Keep dogs and other pets free of weed seeds.
- Avoid picking unidentified "wildflowers" and discarding them along trails or roadways.
- Support the development and distribution of weed-free or weed-seed-free feed, hay, straw, and mulch.
- Maintain trailheads, boat launches, outfitter and public camps, picnic areas, airstrips, roads leading to trailheads, and other areas of concentrated public use in a weed-free condition. Consider high-use recreation areas as high priorities for weed eradication.
- In areas susceptible to weed infestation, limit vehicles to designated, maintained travel routes. Inspect and document travel corridors for weeds and treat as necessary.

Improve effectiveness of prevention practices through weed awareness and education.

- Post weed awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, information kiosks, and forest portals.
- Recreation permits and hunting and fishing licenses should include weed prevention guidelines and/or information on weeds that hunters and fishermen are likely to encounter.

Roads and Utilities

- Incorporate weed prevention into road and utility project layout, design, evaluation, and decisions.
- Develop Best Management Practices for road construction material sites, sand and gravel pits, mulch, and other material source sites.
- Remove mud, dirt, and plant parts from project equipment before moving it into a project area. Seeds and plant parts should be collected when practical and incinerated.
- Clean all equipment before leaving the project site if operating in areas infested with weeds. Seeds and plant parts should be collected when practical and incinerated.
- Communicate with the local weed district or weed management area about projects and best practices for prevention.
- To avoid weed infestation, build and maintain healthy plant communities whenever possible, including utility rights of way, roadsides, highway landscaping projects, rest area construction, scenic overlooks, and state entrances.

Minimize roadside sources of weed seed that could be transported to other areas.

- Periodically inspect roads and rights-of-way for noxious weeds. Train road maintenance staff and utility truck operators to recognize weeds and report locations to the local weed specialist. Inventory weed infestations and schedule them for treatment.

- Schedule and coordinate blading or pulling of noxious weed-infested roadsides or ditches in consultation with the local weed specialist. Do not blade or pull roadsides and ditches that are infested with noxious weeds unless doing so is required for public safety or protection of the roadway. If the ditch must be pulled, ensure the weeds remain on-site. Blade from least infested to most infested areas. When it is necessary to blade noxious weed-infested roadsides or ditches, schedule activity when seeds or propagules are least likely to be viable and to be spread.
- Avoid acquiring water for road dust abatement where access to the water is through weed-infested sites.
- Treat weeds in road decommissioning and reclamation projects before roads are made impassable. Reinspect and follow up based on initial inspection and documentation.

INVASIVE PLANT PREVENTION AND WATER

To prevent new weed infestations and the spread of existing weeds, avoid or remove sources of weed seed and propagules. Avoid moving weeds from one body of water to another.

- Inspect boats (including air boats), trailers, and other boating equipment and remove any visible plants, animals, or mud before leaving any waters or boat launching facilities. Drain water from motor, live well, bilge, and transom wells while on land before leaving the vicinity. Wash and dry boats, tackle, downriggers, anchors, nets, floors of boats, props, axles, trailers, and other boating equipment to kill weeds not visible at the boat launch.
- Before transporting to new waters, rinse boat and boating equipment with hot (40°C or 104°F) clean water, spray boat or trailer with high-pressure water, or dry boat and equipment for at least five days.
- Inspect seaplanes and remove weeds from floats, wires, cables, water rudders, and pump floats; wash with hot water or spray with high-pressure water, or dry for at least five days.
- Avoid taxiing seaplanes through heavy surface growths of weeds before takeoff; raise and lower water rudders several times to clear off plants. If weeds were picked up during landing, clean off the water rudders before take-off and leave the water rudders up during take-off. If water rudders were down during take-off, raise and lower water rudders several times to free weed plant fragments while over original body of water or over land. If weeds remain visible on floats or water rudders, the pilot may return to flight origin and remove plants if an extra landing and takeoff is not a safety concern.
- Maintain a 100-foot weed-free clearance around boat launches and docks.
- Promptly post sites if aquatic invasives are found. Confine infestation; where prevention is infeasible or ineffective, close facility until infestation is contained.

- Wash and dry fishing tackle, downriggers, float tubes, waders, and other equipment to remove or kill harmful species not visible at the boat launch.
- Avoid running personal watercraft through aquatic plants near boat access locations. Instead, push or winch watercraft onto the trailer without running the engine. After the watercraft is out of the water, start the engine for 5 to 10 seconds to blow out any excess water and vegetation. After engine has stopped, pull weeds out of the steering nozzle. Inspect trailer and any other sporting equipment for weed fragments and remove them before leaving the access area. Wash or dry watercraft before transporting to another body of water.
- Waterfowl hunters may use elliptical, bulb-shaped, or strap anchors on decoys because these types of anchors avoid collecting submersed and floating aquatic plants. Remove aquatic plants and rinse mud from waders and hip boots before leaving the water. Remove aquatic plants, animals, and mud attached to decoy lines and anchors.
- Divers should clean their equipment after each use. Be especially careful to wash the buoyancy control device and other items that retain water. All gear should be rinsed with water heated to at least 140 degrees and everything should be allowed to dry completely between dives.
- Construct new boat launches and ramps at deep-water sites. Restrict motorized boats in lakes near areas that are infested with weeds. Move sediment to upland or quarantine areas when cleaning around culverts, canals, or irrigation sites. Clean equipment before moving to new sites. Inspect and clean equipment before moving from one project area to another.
- Drain the water in bait buckets, live wells, and transom wells on land or back into the water from which it was taken.
- Avoid dumping aquarium water or aquatic plants into local waters. Many plants for water gardens and aquaria are highly invasive.

Watershed Management

Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

- Inspect and document riparian areas and wetlands for noxious weed establishment and spread. Eradicate new infestations before they become established.
- When possible, maintain conditions (for example, water levels) that sustain desired riparian plant systems that compete effectively with weeds.
- Address noxious weed risks in watershed restoration projects and water quality management plans.
- Pay particular attention to practices listed under "Site-disturbing Projects and Maintenance Programs."

INVASIVE PLANT PREVENTION AND ANIMALS

Grazing Management

Consider incorporating noxious weed prevention and control practices in the management of grazing allotments.

Consider prevention practices and cooperative management of weeds in grazing allotments. Prevention practices may include:

- Altering season of use
- Exclusion
- Activities to minimize potential ground disturbance
- Preventing weed seed transportation
- Maintaining healthy vegetation
- Weed control methods
- Revegetation
- Inspection
- Reporting
- Education

Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds. Minimize transport of weed seed into and within allotments.

- If livestock may contribute to seed spread in a weed-infested area, schedule livestock use for prior to seed-set or after seed has fallen.
- If livestock were transported from a weed-infested area, annually inspect and treat entry units for new weed infestations.
- Close infested pastures to livestock grazing when grazing will either continue to exacerbate the condition or contribute to weed seed spread. Designate those pastures as unsuitable range until weed infestations are controlled.
- Whenever possible, provide supplemental feeding in a designated area so new weed infestations can be detected and treated immediately. Pelletized feed is unlikely to contain viable weed seed.
- Noxious weeds can be introduced through seeds in livestock dung. Keep new livestock (especially livestock that may have been fed poor-quality hay) in a holding field for 24 to 48 hours before releasing onto open range.

Maintain healthy, desirable vegetation that resists weed establishment.

- Manage the timing, intensity (utilization), duration, and frequency of livestock activities to maintain the vigor of desirable plants and retain live plant cover and litter.
- Manage livestock grazing on restoration areas to ensure that desired vegetation is well established. This may involve exclusion for a period of time. Consider practices to minimize wildlife grazing on the areas, if necessary.
- Reduce ground disturbance. Consider changes in the timing, intensity, duration, or frequency of livestock use; location and

changes in salt grounds; restoration or protection of watering sites; and restoration of yarding/loafing areas, corrals, and other areas of concentrated livestock use.

- Inspect areas of concentrated livestock use for weed invasion. Inventory and manage new infestations.

Improve effectiveness of weed prevention practices through awareness programs and education. Promote weed awareness and prevention efforts among range users.

- Use education programs or annual operating instructions to increase weed awareness and prevent weed spread associated with livestock management practices.

Wildlife

Avoid creating soil conditions that promote weed germination and establishment.

- Periodically inspect and document areas where wildlife concentrate in the winter and spring that might result in overuse or soil scarification.
- Use weed-free materials at big game baiting stations.

Outfitting/Recreation

Avoid moving weed seeds or propagules into the backcountry.

- Noxious weeds can be introduced in livestock dung. Feed pack and saddle stock only weed-free feed for several days before traveling into the backcountry.
- Inspect, brush, and clean animals (especially hooves and legs) before entering public land. Inspect and clean tack and equipment.
- Regularly inspect trailheads and other staging areas for backcountry travel. Bedding in trailers and hay fed to pack and saddle animals may contain weed seed or propagules.
- Tie or hold stock in ways that minimize soil disturbance and avoid loss of desirable native vegetation.
- Use weed-free feed in the backcountry.

INVASIVE PLANT PREVENTION AND FIRE

Fire Planning

Improve effectiveness of prevention practices through weed awareness and education.

- Increase weed awareness and weed prevention in all fire training. Provide weed identification aids.
- For prescribed burns, inventory the project area and evaluate potential weed spread with regard to the fire prescription.
- Ensure that a weed specialist is included in a Fire Incident Management Team when wildfire or control operations occur in or near a weed-infested area.

Avoid or remove sources of weed seed and propagules to prevent spreading weeds.

- Use operational practices to reduce weed spread (for example, avoid weed infestations when locating fire lines).
- Locate and treat weeds in practice jump areas.
- Maintain a network of airports, helibases, camps, and staging areas in a noxious weed-free condition.

Firefighting

Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

- Ensure that rental equipment is free of weed seed and propagules.
- Inspect and treat weeds that establish at equipment cleaning sites after fires.

Avoid creating soil conditions that promote weed germination and establishment.

- Use fire suppression tactics that reduce disturbances to soil and vegetation.
- Avoid moving water buckets from aquatic-weed-infested lakes to lakes that are not infested. There is no hazard in using water infested with aquatic weeds on terrestrial sites.
- Avoid ignition and burning in areas at high risk for weed establishment or spread. Treat weeds that establish or spread.

Fire Rehabilitation

To prevent conditions favoring weed establishment, re-establish vegetation on disturbed ground as soon as possible.

- To prevent weed spread, treat weeds in burned areas. The first preference is prevention, such as planting desired species to compete with unwanted plants. Use a certified weed-free seed mix.
- Determine soon after a fire whether revegetation is needed to speed recovery of a competitive plant community, or whether desirable plants in the burned area will recover naturally. Consider the severity of the burn and the proportion of weeds to desirable

plants on the land before it burned. In general, more severe burns and higher pre-burn weed populations increase the necessity of revegetation. Consider revegetating an area if the desired plant cover is only 20 to 30%.

- Inspect and document weed establishment at fire access roads, cleaning sites, all disturbed staging areas, and within burned areas. Control infestations to prevent spread within burned areas.
- Seed and straw mulch to be used for burn rehabilitation (for wattles, straw bales, dams, etc.) should be inspected and certified that they are free of weed seed and propagules.
- Regulate human, pack animal, and livestock entry into burned areas until desirable vegetation has recovered sufficiently to resist weed invasion.
- Develop a burned-area integrated weed management plan, including a monitoring component to detect and eradicate new weeds early.