Science, Service, Stewardship

NOAA FISHERIES SERVICE

All mowing equipment should be inspected for plant material before and after use
(Photo credit: New York Department of Transportation).

All areas of watercraft should be carefully inspected for invasive plants and animals. Multiple persons performing inspections will reduce the opportunity for non-native species to be transported to new locations
(Photo Credit: NY Department of Environmental Conservation).

Preventing Invasive Species: Inspection of Vehicles, Equipment, and Personal Gear

Background

Human activities often result in the unintentional introduction of non-native species into new areas. Vehicles, earth-moving equipment, pumps, trailers, as well as clothing, shoes, and waders can become vectors that contribute to the spread of invasive species. Once introduced, invasive species can profoundly impact normal ecosystem functioning and native biodiversity; accordingly, habitat restoration projects may not be considered successful if non-indigenous populations become established within the project sites. Inspecting personal gear, equipment, and vehicles for non-indigenous species should be budgeted into the time and cost of restoration projects, as preventing the spread invasive species is much less expensive than controlling and managing costs after introduction.

Inspections should be carried out on a staging area dedicated to cleaning equipment and vehicles. Effective inspections require good lighting conditions, personnel trained to look for problem areas that are not apparent upon casual observation, and development of protocols and lists of priority invasive species. Effective inspections also require persons who have the task of inspecting vehicles, equipment, and personnel to be dedicated and accountable for their actions.

In general, inspection should follow these three steps:

1) If the equipment is used at a location known to be infested with an invasive species, the equipment should undergo a pre-inspection, followed by thorough cleaning and a post-inspection, before being moved off the worksite.
   - ✓ Look for seeds, plant material, soil, mud, insects, and other invertebrates, snails, mussels, algae, aquatic plant fragments, and other aquatic species.
   - ✓ For in-water gear, inspect carefully for zebra and quagga mussel infestations. Look for adult mussels and feel by hand for small veligers attached to anything that has made contact with raw water (see *Decontamination of Invasive Mussels* bulletin).
2) At the new location, the equipment should be inspected again, preferably by someone other than the original inspector before the equipment is placed into service.
3) If, on reinspection, contamination is found on the equipment, do not allow the equipment entry on the new worksite. Return the equipment to the location of last use for additional cleaning or arrange for cleaning at a location that is specifically designed for equipment cleaning.

Land Vehicles and Equipment

All vehicles and equipment should be inspected, examining and removing vegetation as well as soil and mud, which may contain plant cuttings or seeds. Particular attention must be given to places where foreign material could become accidentally trapped, such as cracks and crevices, undercarriages, and the treads of tracks or tires. All suspect areas should be properly cleaned (*see Cleaning of Land Vehicles, Equipment, and Personal Gear* bulletin).

Cleaning heavy accumulations of mud prior to inspect may reveal covered or trapped invasive species (Photo credit: Bureau of Reclamation)

The following is a list of areas that warrant special attention and as plant material could most easily become lodged:

Rubber Tired Land Vehicles

- Crevices in surface and panels
- Tires, rims, and fender wells
- Spare tire mounting area
- Bumpers
- Front and rear quarter panels
- Around and behind grills
- Bottom of radiator vent openings
- Brake mechanisms
- Transmission
- Stabilizer bar
- Shock absorbers
- Front and rear axles
- Beds
- Suspension units
- Exhaust systems
- Light casings and mirrors

Tracked Land Vehicles

- Crevices in surface and panels
- Top of axles and tensioners
- Support rollers
- Between rubber or gridded areas
- Beneath fenders
- Hatches
- Under casings
- Grills

Interiors of All Vehicles

- Beneath seats
- Beneath floor mats
- Upholstery
- Beneath foot pedals
- Inside folds of gear shift cover

Right: Inner view of track roller. Post-inspection on a previously cleaned vehicle, note the remaining mud accumulation. This photo illustrates the value of an equipment inspection following cleaning (Photo credit: Bureau of Reclamation).

Watercraft and Equipment

Working in aquatic environments presents different challenges than in terrestrial areas. Invasive aquatic plants often spread from fragments; therefore, special care must be taken to identify and address these issues before leaving a water body. Furthermore, many aquatic species, such as the zebra and quagga mussels, can spread relentlessly and require special inspection and cleaning methods (*see Cleaning of Watercraft and Equipment* and *Decontamination of Invasive Mussels* bulletins).

All equipment that comes into contact with water should be carefully inspected and cleaned. (Photo credit: Lower lakes Aquatic Projects)

Watercraft and trailers are major contributors to the spread of invasive aquatic plants and animals. Detailed inspections and complete removal of all potential invaders must be performed before watercraft, trailers, or equipment come in contact with water or is moved from one waterbody to another. The following is a list of areas that warrant special attention and where potential invaders may be found:

Water Vehicles

- Bilge compartments
- Water holding tanks
- Wet and live wells
- Propellers
- Trailers
- Anchors
- Chains
- Ropes
- Ties
- Tread mats
- Traction grids

Inboard Engine

- Propeller
- Trim Tab
- Input cap
- Crevices
- Water intake ports
- Rudder

Inboard/Outboard Engine

- Propeller
- Under trim tabs
- Steering components
- Cooling water intake ports

Outboard Engine

- Propeller
- Motor mounts
- Bottom drain holes
- Cooling water intake ports

Right: Motor props and field equipment should always be carefully inspected as they provide locations for invasive plants and animals (Photo credit: NY Department of Environmental Conservation).

Personal Gear and Clothing

Clothing and personal gear is capable of transporting invasive species (or fragments, seeds, or propagules) in ways similar to vehicles and equipment. To prevent the spread of non-native species all personal gear and clothing should be inspected before entering and exiting the worksite. Any suspect material should be removed and properly disposed of (*see Cleaning Of Land Vehicles, Equipment and Personal Gear* bulletin).

The following is a list of special areas of concern and where foreign material could become accidentally trapped:

Closures:

- Zippers
- Belts
- Laces or ties
- Buckles
- Straps,
- Velcro grips
- Rivets
- Buttons and fasteners

Loose Particle Fabric

- Canvas
- Nylon
- Cotton
- Poly blend
- Wool
- Fleece
- Netting
- Suede

Other

- Flaps
- Pockets
- Seams
- Cuffs and folds
- Socks and ankle grips
- Treads of footwear
- Collars and hoods
- Ventilation openings

To reduce movement of invasive species, all clothing, including shoes, should be carefully inspected and cleaned prior to leaving the project site (Photo credit: Robert Clement, APHIS-PPQ).

Any invasive species or material removed during inspection should be properly disposed of to prevent re-introduction. (Photos by Jean Held)

Suggested Resources:

Guide of Noxious Weed Prevention Practices
U.S. Department of Agriculture, Forest Service. July 2001. 25 pp. Available online at: http://www.fs.fed.us/rangelands/ftp/invasives/documents/GuidetoNoxWeedPrevPractices_07052001.pdf
This document provides a comprehensive directory of weed prevention practices for use in Forest Service planning and wildland resource management activities and operations.

Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species
U.S. Department of the Interior Bureau of Reclamation. 2009. Technical Memorandum No. 86-68220-07-05. 203 pp.
Available online at: http://www.usbr.gov/pps/EquipmentInspectionandCleaningManual_Sept09.pdf
This manual provides recommendations for inspection and cleaning of vehicles and equipment as a prevention tool to limit the spread of invasive species.

Invasive Plant Prevention
U.S. Department of Agriculture, Forest Service. 2002. Invasive Plant Management: CIPM Online Textbook. Chapter 10 Invasive Plant Prevention; Adapted from USDA Forest Service Guide to Noxious Weed Prevention Practices. Available online at: http://www.weedcenter.org/textbook/10_prevention.html
This guide provides practical, proactive weed-prevention guidelines.

Invasive Plant Prevention Guidelines
Center for Invasive Plant Management. September 2003. Compiled by J. Clark, Bozemon, MT. 15 pp.
Available online at: http://www.weedcenter.org/store/docs/CIPM_prevention.pdf
This document provides guidelines for prevention and for developing weed management areas.

Protect Your Waters
Aquatic Nuisance Species Task Force. Available online at: http://protectyourwaters.org
This site provides recommendations for recreational users who want to help prevent the spread aquatic nuisance species

Transfer of Invasive Species Associated with the Movement of Military Equipment and Personnel.
Cofrancesco, Jr. AF., Reaves DR. Averett DE. July 2007. Army Corp of Engineers, Engineer Research and Development Center. ERDC/EL TR-07-8. Washington D.C., 126 pp.
Available online at: http://el.erdc.usace.army.mil/elpubs/pdf/trel07-8.pdf
This document provides an overview of the current process that exists to clean, inspect, and regulate the movement of invasive species through ports of embarkation and debarkation.