Part 3: Containment and prevention of spread

Introduction

This section presents advice for the containment of new and existing infestations and for the prevention of spread from infested areas. Quarantine and hygiene considerations, physical containment of infestations, and prevention of spread of fragments are all vitally important in reducing the spread of alligator weed in both core and non-core areas.

Quarantine and hygiene

Alligator weed can be accidentally spread through earthmoving equipment and activities, on mowers and slashers, on boats and trailers, and by grazing animals. In situations where physical removal techniques are used to control infestations, there is also a risk related to the movement and disposal of contaminated soil and plant material. Quarantine and hygiene measures are required to prevent such spread.

Quarantine

It is extremely important to prevent disturbances to alligator weed infestations, including slashing, mowing, earthmoving, cultivation or grazing. Infested areas should be signed and marked with highly visible markers and surrounding land users notified and asked to refrain from further use of the area.

Access may need to be physically restricted (i.e. use of electric fencing to prevent stock from grazing). In some circumstances it may be necessary to undertake formal quarantine procedures under State weed control legislation. Refer to the appropriate State or Territory weed control authority for details of relevant legislation.

Alligator weed is easily spread on earthmoving equipment. Photo: Graham Prichard

Slashing should not occur anywhere near an infestation. Photo: Graham Prichard

Mark infestations with highly visible markers and signage. Photo: Elissa van Oosterhout

Mowing close to an infested creek bank spread alligator weed throughout this property. Photo: Elissa van Oosterhout

Hygiene

If machinery is to be used for physical removal of alligator weed or if earthmoving is to be done in and around alligator-weed-infested areas, precautions must be taken to ensure that machinery and soil movement from infested areas to clean areas is limited and that proper washdown and disposal procedures are carried out.

In and near core areas, weed control authorities should have protocols in place relating to the accidental movement of alligator weed during earthworks and developments and on machinery. To minimise the risks of accidental spread, protocols (see box) should be formulated and followed by local government authorities, other government authorities (e.g. roads and transport, national parks), energy and communications suppliers, contractors and landholders carrying out work in the vicinity of alligator weed infested areas.

Hygiene protocols

The following are the types of protocols issued by the Lower Hunter Alligator Weed Taskforce:

- Before commencement, any agency responsible for implementing work must notify the local weeds officer.
- All operators and visitors to the site will be inducted as to their responsibilities in regards to alligator weed.
- The worksite will be signposted to alert visitors to the risks of alligator weed spread.
- Where possible, before commencement of work, the agency responsible will treat any alligator weed with a suitable herbicide.
- Only essential vehicles and machinery will be allowed to enter the site.
- Potentially contaminated spoil remaining at the site should be inspected and any emergent alligator weed treated at regular intervals.
- Potentially contaminated spoil removed from the site must be taken to a secure and approved disposal site [see *Disposal* for details].
- Any trucks transporting spoil must be covered and not overfilled, to ensure spoil is not scattered or spilled.
- All vehicles will be checked for fragments before leaving the site. If necessary they will be washed down (see below).
- The local weeds officer will be advised when the job is to be completed.
- At the completion of the work, all machinery will be washed down before it leaves the site.
- Any contaminated material at the washdown site will be removed to the designated secure disposal site.
- Local weed officers should monitor the work to ensure compliance.
- In the case of a breach of the requirements, weeds officers will issue a notice for work to cease until such time as the breach has been rectified.
- All of the above should be presented in a site weed management plan and approved by the local weeds officer before any work starts.

Accidental spread from earthworks

In a new subdivision in Maitland City Council local government area an excavator was used to place a sewerage line through a gully containing alligator weed. Weeks after the work was done alligator weed was found growing well away from the original infestation. Excavators had also been used to scrape up topsoil and stockpile it, and on closer inspection the 4000 m^3 of stockpiled topsoil was also contaminated with alligator weed from the gully. Maitland City Council now have strict protocols in place to ensure that this kind of accidental spread does not occur again, but it takes a large amount of time and commitment by weeds officers to ensure that the protocols are adhered to.

Washdown facilities

In the case of alligator weed it is best if washdown facilities can be set up at or near the site of the infestation. Where possible they should be on a hard, relatively flat but well drained surface, clearly signposted and screened to prevent fragments moving offsite. The washdown site must be recorded and easily identified for future monitoring for weed outbreaks. The landholder or trustee of the land should be notified of the location.

On-site washdown facilities generally use a water tanker or spray unit. Water can be pumped from dams or troughs if practicable. High pressure is required and

a gurney or pump can be used. High pressure – high volume water may be required for removing the large quantities of mud and plant material usually associated with alligator weed infestations.

Washdown procedures

All vehicles and machinery moving into, from or near an infested area should be washed down, including tractors, excavators, loaders, dump trucks, cars, trucks and 4WDs. Alligator weed is generally present in the mud stuck to the tyres, wheels, tracks, buckets, blades and undersides of machinery and vehicles. Some general principles of washdown procedures (adapted from Queensland Weed Seed Spread Project 2000) are presented below:

- Place the machine in a safe, stabile and immobile position.
- Stop the engine, apply the park brake, chock the wheels and lower all implements (eg. slasher) or secure/chock them if they require cleaning.
- Ensure the area is free of objects/obstructions that may cause injury (logs, powerlines, etc.)
- As necessary, remove guards/belly plates to gain access to areas for cleaning.
- Clean under guards and underneath machinery first, then do the upper body and implements.
- Toolboxes and storage compartment may also need cleaning.
- Replace guards and implements and move the machine off slowly, avoiding re-contamination and washing the remaining mud etc. off the tyres and tracks.
- Inspect the area and place all plant material in a sealable container for disposal.

Tip

If you are attempting mechanical removal of an infestation, always start with a clean machine that has been washed down by the operators before they start work. Hard, caked mud will be the most difficult to remove if it has been allowed to dry after previous work.

Water tankers can be used for onsite washdown. Photo: Brian Worboys

Alligator weed gets lodged in muddy excavator tracks. Photo: Brian Worboys

Thoroughly clean tyres and rims of wheeled tractors. Photo: Brian Worboys

The arm of the excavator may be used to lift each track off the ground. Photo: Brian Worboys

Tracks and track frames must be cleaned thoroughly. Photo: Brian Worboys

Note that different models and makes of machinery will require different parts and attachments to be cleaned. The condition of the machinery will also affect the level of cleaning required (e.g. rusting of parts may allow contaminants to enter sections that are usually sealed).

The following is a checklist of parts of tractors and excavators that should be inspected and washed down (adapted from Queensland Weed Seed Spread Project 2000):

Wheeled tractors

Clean and inspect the following areas:

- tyres and rims, including inner side of rim; between dual wheels; around wheel-mounted counter weights; in gashes or cuts in tyres
- chassis and body: inside chassis rail ledges and back axle-beam and undercarriage of this area; hollow sections in front of axle tubes; void spaces in rear brake assemblies; hollow sections in drawbars and in retractable/extendable three-point linkages; mud guards and wheel flares (if 4WD, check the front drive shaft guard for holes or poor attachment); power take-off area; power take-off shaft; universal joints; shaft covers and power take-off tubes
- attachments: all buckets, scoops, blades, carry-alls etc.; check all areas of blades for holes or double skins; remove and inspect cutting teeth, adaptors and wear plates on blades; inspect hydraulic arms and supports for hollows.

Track-type excavators

Tracks are the most difficult to wash down, and movement of tracked machinery over infested areas should be minimised whenever possible.

- Examine tracks and track frames carefully. The arm of the excavator may be used to lift each track off the ground to allow it to be rotated in order to remove all caught material.
- Remove inspection/cover plates to inspect and wash inside track areas.
- Check idler wheels (i.e. the wheels that support the tracks).
- Check hollow-section chassis channels.
- Check belly plate and rear plates.
- Check removable track-adjuster guards and lubrication points.
- Check blade/bucket. Ensure top and bottom edges of blade/bucket are not split, as soil can become very tightly packed in any holes. Ensure inside and outside of bucket are cleaned.
- Check cutter points and wear blades.
- Carefully check pivot points and adaptors and the rear of the front blade: soil can become compacted there and be difficult to dislodge.

Rope with floats contains fragments during physical removal. Photo: John Moorhouse

Alligator weed can grow over a boom. Photo: Rebecca Coventry

Physical containment

Physical containment of alligator weed with booms, screens and fences is important for the prevention of spread by fragments or floating mats. It is applicable in aquatic and semi-aquatic situations.

Booms

Floating booms have a number of roles in the management of aquatic alligator weed infestations. Their primary role is the collection of plant fragments, preventing downstream spread from an infestation.

Booms are particularly important where herbicides or biocontrol measures are being used, as both will cause plants to fragment. However, any aquatic infestation will fragment as it ages, and therefore booms are an important tool for containment and prevention of spread. If booms are substantial enough, they can also prevent the downstream movement of whole floating mats that break away from infestations. This use of booms is relatively long term – either for the length of an eradication strategy or for ongoing suppression – and therefore booms need to be relatively durable.

Floating booms should also be used to catch plant pieces that may break away whenever physical removal of bankside infestations is occurring. Small-scale booms made of rope with floats attached can be useful for this purpose.

The use of a floating boom to contain an actual aquatic infestation itself is not particularly effective, as the alligator weed can send stems out over the boom.

PVC and mesh boom commercially designed to contain alligator weed fragments. Photo: Graham Prichard

Commercial fence boom containing alligator weed fragments. Photo: Graham Prichard

Infestation at culvert in need of containment. Photo: Graham Prichard

Containment fence placed around infestation being treated with herbicides. Photo: Elissa van Oosterhout

Screen made from reinforcement mesh and shadecloth.

Shadecloth screen over culvert.

Fine mesh containment fence. Above photos: Graham Prichard

▲ *Alligator weed is able to grow over or through a mesh fence.*

▼ *Ag-pipe and mesh boom designed to contain salvinia; this device would also contain alligator weed fragments.*

Photos: Elissa van Oosterhout

Fine mesh and star picket containment fence showing signs of wear and tear after 12 months' use. Photo: Elissa van Oosterhout

Alligator weed obstructing an irrigation drain. Photo: Brian Worboys

Types of booms

Floating booms range in size and capacity. Commercially available aquatic weed booms and oil-spill booms can be hired or purchased. Smaller scale booms can be made up in-house.

Fence booms. For alligator weed, a fence-type boom with a short hanging skirt is the most appropriate. Fence-type booms float upright at the water surface (40% above/60% below), and the same effect can be achieved using a mesh sleeve over plastic agricultural pipe (see *Ag-pipe and mesh booms* below). The gauge of the mesh must be fine enough to catch alligator weed plant fragments.

Ag-pipe and mesh booms. A floating boom that acts effectively as a fence boom can be made from unslotted agricultural pipe and effectively used over distances of 100 m, with regular checking and maintenance. Thread 5-mm-diameter wire cable through 100-mm-diameter unslotted black poly pipe, and attach the ends to star pickets. Seal the ends of the pipe with expanding foam. Treeguard mesh sleeves or similar plastic mesh tubing can be fastened around the pipe with plastic ties to form the curtain that sits above and below the water surface. Additional flotation may be required every 10 to 15 m.

Screens and containment fences

Screens and containment fences are used mainly to prevent spread of semi-aquatic infestations (e.g. alligator weed in stormwater drains, road culverts, irrigation drains, farm dam spillways).

If it is likely that water will flow in an area close to an alligator weed infestation, it is worth constructing a containment fence around the infestation or between it and the point of outflow.

Screens and fences can be constructed of fine-gauge mesh, shadecloth, or birdwire. Alligator weed fragments that get caught against a fence or screen may be able to take root; they are then easily capable of growing up and over, or through, the obstruction. Screens and fences must be checked regularly and cleared of fragments.

Maintenance

Booms and fences usually need to stay in place for the duration of the management effort (i.e. a number of years). They should be checked regularly and routinely after rain.

Preventing spread in irrigation systems

Alligator weed poses a major threat to both pressurised and flood-irrigated systems. Infestations present in water storages can contaminate crops and pastures when small plant pieces are dispersed through an irrigation system. Crops infested by alligator weed incur quarantine, loss of productivity, cost of control, and other restrictions associated with contamination by a noxious weed. Infestations also significantly reduce flows and efficiencies of irrigation systems.

Flood-irrigation systems

Control, containment and prevention of spread are major challenges in infested flood-irrigation systems owing to the open nature of supply channels and floodways and the ability of alligator weed to grow on land and in water.

Of greatest concern in flood-irrigation systems is that alligator weed can contaminate crops if supply channels are infested. Infestations have been found in crops at points where irrigation water enters the crop (See *Living and farming near alligator weed infested areas case study*). Other impacts include:

- obstruction of supply channels, causing collapse or channel bank breaching and flooding
- reduction of downstream supply flows. Infestations of between 2 and 10 m^2 can reduce flows by at least 50% (Julien 1995; Milvain 1995).

The Murrumbidgee Irrigation Area has been dealing with alligator weed since 1993 and has faced immense costs in control and management over this time. Flood-irrigation areas that are currently free of alligator weed need to have early detection programs in operation; a rapid response strategy in place in the case of finding an infestation; and an understanding of what is involved in containment, eradication and suppression.

Preventive measures

Hygiene and quarantine are important if stock, machinery or earth is moved from one area to another.

Irrigation bays should be checked for alligator weed before cultivation is done each season. (Near infested areas, irrigators should prevent grazing in bays and supply channels so that they can locate infestations.) Alligator weed can occur in dry channels that have not held water for years (Verbeek 2004).

Irrigators can place mesh screens in front of their water wheels or flow meters to catch any fragments that escape detection in channel screens. The use of any screens poses maintenance and cleaning issues, but screens should be used if alligator weed is known to be in the system.

Pressurised irrigation systems

Irrigators who pump directly from infested water sources such as creeks, dams or rivers face similar risks similar to those faced by flood irrigators in terms of contaminating crops and pastures and reducing efficiencies. In pressurised systems a build-up of alligator weed growth around the foot valves and strainers of pumps can significantly reduce flows and pressure at the discharge side of the system, reducing the efficiency of the pump and irrigation system (North Coast Irrigator Summer 2000).

Preventive measures

There are some preventative measures that will reduce these risks:

Installing footvalve filters. Commercially available mesh filters can be fitted to foot valves to filter debris and plant material from the water before it enters the intake pipe. In flowing water, an arrowhead-shaped screen pointing into the flow to divert water and plant fragments can be effective. In still water circular screens are effective, and there are automatic self-cleaning filters available that use a rotating spray bar to continually sweep algae, dirt and leaves from the filter screen.

Changing footvalve height. Alligator weed plant fragments tend to float on the water surface. By ensuring that the height of the foot valve is set well below the surface of the water, irrigators can reduce the chances of discharging plant fragments through the system.

Clearwater Self-Cleaning Suction Screen®
Image courtesy Clemons Sales Corporation