

Preventing weed spread is everybody's business



Weeds **restrict** fishing and recreation

◀ Salvinia at Four Mile Hole



Weeds **escalate** fire risk

◀ Gamba grass



Weeds **reduce** feed for livestock

◀ Cattle road train

Weeds don't recognise property or political boundaries. Everyone has a role to play in protecting all land.

Weed spread prevention is always the most successful and cost effective type of weed management. This document describes simple spread prevention techniques that are able to be applied by all Territorians, including land managers and business operators, with a view to protecting our valuable and diverse resources from the impacts of weeds.



Prickly acacia, Barkly Region

Reducing the threat of weed spread:

Weed Management Branch

Weeds pose a significant threat to the Northern Territory's economy, environment and people. The Northern Territory Government's Weed Management Branch recognises that successful prevention and management of weeds will require: effective partnerships, clear management goals, best practice weed management techniques, methods to monitor progress and targeted research.

The Weed Management Branch identifies and promotes ways to reduce the spread and impact of priority declared weeds across the Territory.

What we do:

Extension and training

- Support businesses tendering for construction and maintenance contracts, regarding weed management
- Support commercial weed managers to meet legislative and tender requirements
- Assist in developing industry specific weed hygiene procedures
- Develop and deliver tailored training focusing on regionally and industry specific weeds

Planning and coordination

- Provide standard tender specifications that align with broader weed management priorities
- Promote planning as a pivotal tool for weed management and assist land managers to develop customised plans
- Develop networks and assist cooperation across tenures and sectors to improve capacity and outcomes relevant to weed management
- Inform Development, Notice of Intent, Land Clearing, Extractive and Mineral Permit Applications
- Coordinate aerial and ground surveillance and control programs

Compliance and enforcement

- Administer list of declared species
- Provide training regarding how to comply with legislation
- Enforce the *Weeds Management Act* in a transparent and risk-based manner
- Issue fines (infringement notices) for minor offences
- Prosecute serious offences (fines over \$100 000 for an individual and over \$500 000 for a corporation)

On-ground weed management

- Carry out emergency response programs to eradicate new arrivals of high risk species
- Participate in inspections for weeds, particularly pre and post-construction on large projects

Research, monitoring and data

- Support field and digital data collection and monitoring to inform weed management planning
- Provide spatial and scientific data and map products on request
- Perform herbicide trials specifically for Territory conditions

Policy

- Use scientific risk-assessment tools and community consultation to inform legislation, policy and management decisions
- Contribute to the development and implementation of national emergency response plans and programs

Why weed spread prevention matters

Weeds cost the Australian economy over \$4 billion every year in control costs and lost production, as well as severely damaging natural ecosystems and habitats. In the Northern Territory (NT) at least \$15 million is spent every year on weed management. Unless weed spread is prevented this amount will increase dramatically as the Territory develops further.

Directly or indirectly, all Territorians are affected by weeds and their continuing spread. Weed management costs include equipment, herbicides, labour, planning, monitoring, reporting, extension and research. While land managers directly incur the costs of weed control and the impacts of unmanaged weeds, costs are usually passed on to the public through higher prices for goods and services.

Preventing weed spread is by far the cheapest and most effective form of weed management. Once a weed has spread and become established, eradication is often impossible because of the high costs. Studies have shown that the costs of managing established weeds are up to 100 times the costs of spread prevention. Once a weed becomes established, the costs of protecting assets including productivity, infrastructure or the environment are with us forever.

There is already strong recognition across a broad cross section of industry, that investment in weed management is not only a legislated responsibility, but also has a critical role in protecting future development opportunities.



Weed spread issues in the Northern Territory

The NT is vast, covering over 1.3 million km² with a population of fewer than 250,000 people. The population primarily resides in Darwin and the regional centres with few people living and working in the Territory's remote areas. There is a multitude of different land tenures in the Territory. The mix of pastoral, private, Aboriginal, conservation, defence, towns, mining, industrial and recreational land results in variable knowledge about weed risk and spread management.

A sparse network of corridors including road, rail, gas, electricity and water interconnects the Territory's remote areas. There are around 40,000 km of roads alone that provide the perfect opportunity for weeds to spread undetected into remote areas where few people pass by and where access can be limited for much of the year.

The rapidly increasing rate of development in the NT has the potential to spread weeds into previously clean areas on equipment, machinery, or construction materials. There is also an opportunity to avoid previous errors and use proper weed hygiene and spread prevention measures to mitigate weed impacts. This would bring lasting benefits and cost savings for years to come.

Spread prevention issues in the NT are well illustrated by gamba grass. This robust grass is a valuable fodder plant for the pastoral industry, that has unfortunately spread well away from paddocks. It is spread by wind, animals, hay, slashers, machinery, vehicles and by planting. Gamba grass produces a much higher fuel load than native grasses and it carries very intense and destructive wildfires. These fires present a serious risk to life and property in the rural areas around Darwin and Batchelor. The costs of fire management and firefighting have now escalated dramatically in these areas, additional to the costs of spraying gamba grass.

Other impacts of weed spread include significant effects to our unique 'Territory lifestyle'. Hunting, fishing, camping, off-roading and bushwalking can all be impacted by weeds. Aquatic weeds such as cabomba and salvinia have the capacity to impede boating and fishing, reduce fish stocks and lower water quality.

Weeds can also impact the lives of Indigenous Territorians by affecting the availability of traditional foods, disrupting spiritual and physical connections to country and changing fire regimes. Weeds such as mimosa have hindered access to wetlands, hunting areas and sacred sites.

Environmental values such as biodiversity and ecological function can also be directly impacted. Weeds can compete with and replace native plant communities and indirectly change ecological function by altering fire regimes, light and water availability and soil nutrients.

***The Territory is a big place with few people.
To reduce weed spread, we need to cooperate.***

REDUCE WEED SPREAD

Understanding how weeds spread

Weeds can be spread in many ways and along multiple pathways. Understanding how weeds spread can help you to identify where spread is most likely to occur and also how to plan prevention efforts accordingly.

Many weed seeds have special dispersal adaptations, including wings or hairs that catch the wind; edible fruit and pods that are eaten by birds and animals who later defecate in new areas; and hooks, barbs and sticky surfaces that enable seeds to 'hitchhike' on anything passing through.

Wind, gravity, animals and birds are major mechanisms for long distance weed spread. Similarly, long distance spread can occur with irregular natural events such as floods, droughts, cyclones and fires. While preventing weed spread in these instances is almost impossible, it is important to acknowledge this form of weed spread and plan weed management accordingly.

In contrast, human spread pathways, and to a certain extent waterways, are more predictable. There are positive actions, or changes to procedures and practices which can be undertaken to reduce or prevent spread by human means. For this reason spread through human activity is the main focus of this booklet.

Weeds tend to be the first plants to grow and proliferate in any areas where the soil or vegetation is disturbed. From there weeds can spread into productive or natural areas. It is important to understand the implications of transporting weed seeds to disturbed areas. The risk can be reduced with good hygiene measures, minimising soil disturbance, constant surveillance and control.

The table on page 6 compares the risks of each of the main spread pathways in the NT. The remainder of the booklet provides strategies on how to reduce weed spread in those pathways identified as high risk. A number of case studies have been used to showcase industry level innovation and commitment in implementing best practice weed spread prevention.



What is a spread pathway?

The first step in minimising weed spread is to be aware of the multitude of pathways that facilitate weed spread. A pathway is any means that allows the entry or movement of a weed. A pathway can often be similar to an actual path: a linear feature such as a track or a drainage line. However, the term pathway in relation to weed spread also includes the mechanism or means of spread. This may refer to a particular type of vehicle, equipment or activity. Pathways of spread range from relatively local scales, such as many recreational activities, to large Territory wide pathways.

Not all pathways pose the same risk. Risk increases in those pathways that disperse many seeds long distances to sites where they are likely to survive and reproduce. Perhaps the most important pathways are those that bring declared weeds into otherwise clean areas.



Weed seeds on tractor grill



Weeds can attach to clothing

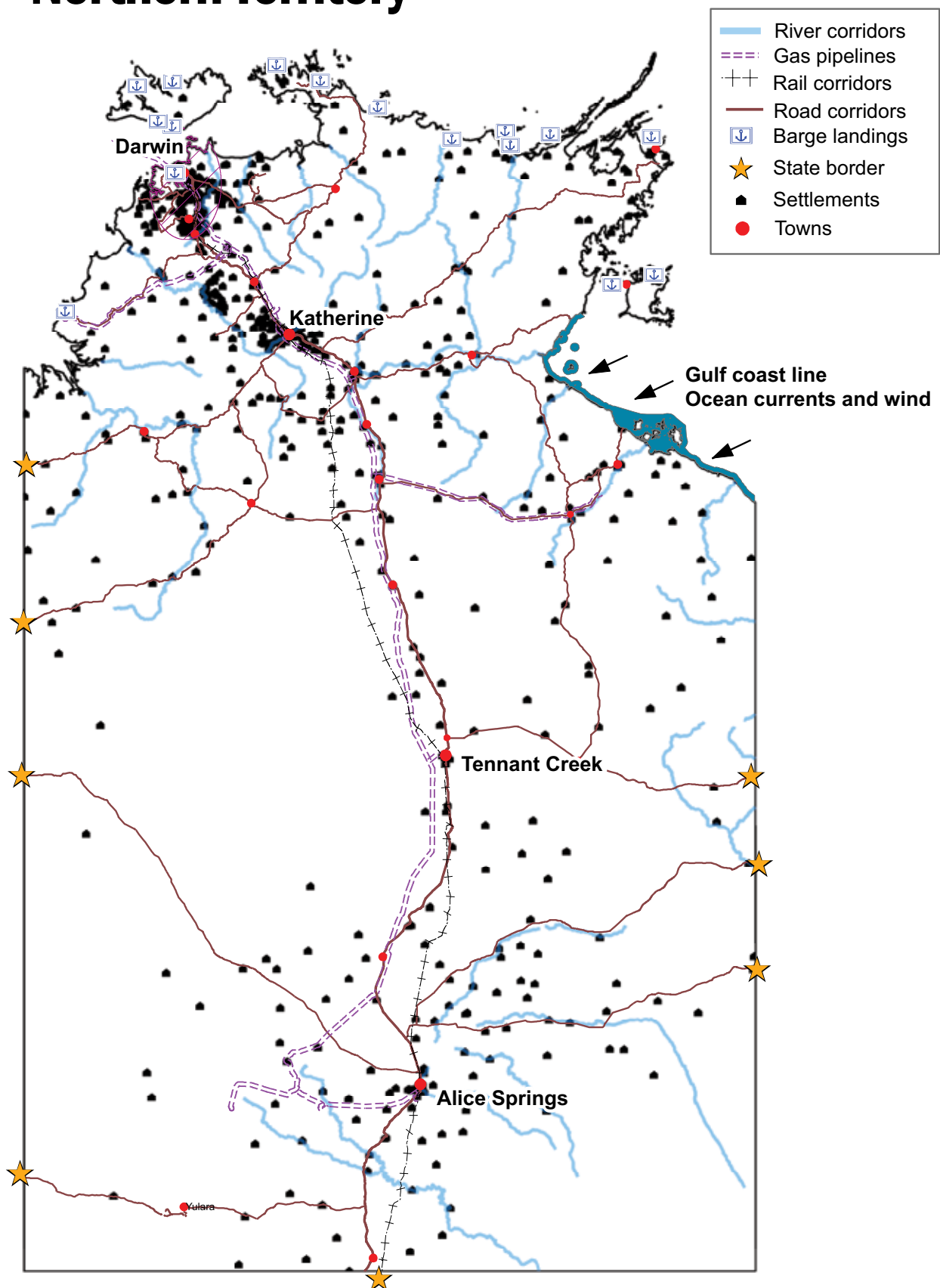


Cattle road train, East Arm Port

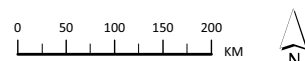
Risk of weed spread based on pathways

CAUSE	MECHANISM	PATHWAY	RISK
Land use and development, business and recreational activities. (Human assisted weed spread)	Unintentional movement (seed, plants, plant parts or soil containing seed, adhering to machines, cargo or people. Pathways that also disturb the soil increase probability of seed establishing)	Subdivision, development and construction projects	High
		Slashing machinery	High
		Earth working machinery	High
		Mining and exploration	High
		Corridor construction and maintenance (road, rail, gas, power, water)	High
		Recreational activities (hunting, quad/ motor biking, hiking, 4WD, camping)	High
		Fishing and boating (boats, trailers, fishing gear)	High
		Nursery and aquarium trade	High
		Transport	Medium
		Light vehicles	Medium
		Tourism	Low
		Shipping	Low
		Illegal dumping	Low
	Contaminated products (unintentional movement of seeds, plants, plant parts other than intended species)	Hay	High
		Extractive industries (sand, gravel, soil, fill)	High
		Agricultural seed	Medium
		Mulch	Medium
		Untreated manure sold from holding yards	High
	Movement by stock or domestic animals (seeds ingested or adhering to animals with hooks, barbs, adhesive or mud - distance can increase if animals are transported)	Livestock across property, stock routes, regional and interstate stock transport and cattle yards	High
Physical processes	Waterways (seeds that float or survive inundation)	Flood waters, rivers, creeks, drains	High
	Wind (wings or hairs on seed increase dispersal distance)	Strong and directional wind, fire updrafts	Medium
	Gravity	Falls from parent plant depending on height and slope of land	Low
Use by industry (Human assisted weed spread)	Introduction, trade and use (planting seed, plants, plant parts often with fertiliser and water to improve survival and selling fruit. These plants may then naturalise and move of their own accord)	Pastoralism	High
		Horticulture	Medium
		Nursery	Medium
		Erosion control	Medium
		Forestry	Medium
		Backyard plant traders	Low
Native or feral animals	Movement by native or feral animals (seeds ingested or adhering to animals with hook, barbs, adhesive or mud)	Local movement or seasonal migration, faeces, disturbances such as buffalo wallows and pig diggings	High

Pathways of weed spread in the Northern Territory



Broad pathways for weed spread as identified in the Northern Territory Regional Weed Management Plans.



Subdivision, development and construction

Urban and rural subdivisions and developments pose a high risk of weed spread. Development can create ground disturbance ideal for weed establishment or involve movement of soil which could be contaminated with weed seed. The use of unclean machinery that has previously been used in weed infested areas also poses a risk of spreading weeds.

Traffic along newly created parcel boundaries and fencelines can continually spread weeds along these corridors and further afield. Development is often in areas with mixed land tenures which can result in edge effects where weeds spread into adjacent bush and neighbouring land. They also provide an opportunity for future land uses and small holdings which can further exacerbate weed problems.

High fuel loads of grassy weeds spreading in urban and rural areas can increase the number and intensity of fires. The high density of people and dwellings in these areas make these fires especially dangerous.

Remote areas, however, are particularly at risk from the undetected introduction of new weeds via contaminated construction materials or on vehicles and equipment that have been sourced from populated areas where weeds are prevalent.



What you can do:

- Map locations and densities of declared weeds through dedicated survey and send to Weed Management Branch
- Use weed data to determine management requirements for inclusion in the Construction Environmental Management Plan
- Control weeds prior to the commencement of works
- Train operations staff to recognise declared weeds relevant to the site
- Clean and inspect equipment for weed seeds prior to commencement of works
- Avoid passing through weeds, particularly when clearing subdivision lines. Where weeds cannot be avoided, vehicles should be cleaned before moving to weed free areas
- Where seeding weeds must be cleared, stockpile and bund the plant material and contaminated top soil on site. Do not re-use contaminated topsoil
- Minimise disturbance to existing land surface and native vegetation
- Do not import or export contaminated materials including sand, gravel, rock and fill
- Where necessary manage weeds until change of land use or issue of land titles
- Seek advice from the Departments of Transport, Infrastructure or Lands Planning and the Environment regarding weed management requirements prior to construction



Control weeds prior to commencement of works



Use only clean fill

Case study: Initiatives to make development more sustainable

The Tomazos Group is one of the major players in the NT development industry providing quarry products, earthmoving and construction services.

The Tomazos Group realised that expectations of the industry's environmental stewardship are changing and they have been working with both Government and non-government organisations on a number of initiatives to pre-empt these changes. These initiatives include installing GPS trackers to minimise fuel usage and reduce carbon footprint of transport fleet by dropping speed, conducting trials on how to best rehabilitate leases and quarries for industry best practices and improving weed management to reduce weed spread.

It is hoped that this process of continual improvement will increase business profitability, heighten environmental awareness and bring forth changes within the industry.

REDUCE WEED SPREAD

Corridor construction and mining exploration

The construction of roads, tracks, power lines, railways, gas pipelines and other infrastructure corridors are all essential for keeping Territorians connected. Similarly, finding new mining and gas deposits through exploration are vital for our growing economy. Weed spread can be an unintended consequence of these activities and ongoing weed management costs could run into millions of dollars. The key to future cost savings for management is to prevent spread during the construction phase.

Infrastructure corridors are ideal pathways of weed spread. Vegetation clearance and soil disturbance create ideal conditions for weed germination and establishment. Vehicles, plant, and construction materials such as gravel, sand, rock and fill all provide a means of weed seed introduction. Once introduced, infestations that are not controlled tend to spread very quickly along corridors and into neighbouring properties.

Most exploration requires access through other people's land. Mineral exploration is often very remote so has the potential to spread weeds to clean areas where they may not be found for some time, allowing infestations to establish and become widespread prior to a requirement for management being identified.



What you can do:

- Use NR Maps to determine relevant declared weeds
- Map locations and densities of declared weeds through dedicated survey and send to Weed Management Branch
- Contact land managers about the most up to date weed information before commencing work
- Operations staff should be able to identify declared weeds relevant to the region
- Equipment, particularly when coming from interstate, should be cleaned and inspected for weed seeds prior to commencement of works
- Avoid passing through weeds
- Where weeds cannot be avoided, vehicles should be cleaned before moving to weed free areas
- Clean machinery, vehicles and equipment before moving between sites or across property lines
- Clean down into an accessible, flat area that does not run into a waterway. Record the location of clean down area
- Inspect corridors, tracks and clean down areas after the first rains post disturbance. Control weeds before they establish
- Minimise disturbance to existing land surface and native vegetation
- Do not import or export contaminated materials including sand, gravel, rock and fill
- Work in collaboration with relevant government agencies and land holders, particularly those who have adjoining, overlapping or adjacent corridors



Clean vehicles before moving to new site



Liaise with landholders



Minimise disturbance

Case study: Practicing weed hygiene should be one part of a plan

Weeds are a problem on most land tenures; therefore two-way cooperation between stakeholders is essential for effective weed management across tenures.

In Queensland, recent press has focussed on the need for vehicle inspections and wash down procedures to prevent weed spread by the Coal Seam Gas (CSG) industry. However, these are only two components of a broader planning process to prevent weed spread.

Landholders are encouraged to develop a property biosecurity plan and CSG companies are asked to consider these plans when developing their access agreements. Sharing of information about location of priority weed species and when they are seeding is essential to minimise weed spread.

The Government's role is to facilitate the industry's implementation of best practice procedures, through active engagement with all parties and by conducting proactive compliance audits on the CSG companies and their contractors to ensure they are meeting legislated obligations.



Corridor maintenance

Throughout the NT there are over 50,000 km of road, power, rail (eg. roadside), gas pipeline and telecommunication corridors. Depending on the type of infrastructure, regular maintenance is required for user safety and asset protection. Where weed management is not the main aim of maintenance, inadvertent weed spread is likely.

Maintenance vehicles and machinery used in these corridors, as well as use by the public, can inadvertently introduce and spread weeds by seeds and parts adhering to machines directly or in soil and mud stuck to the undercarriage or tyres. Maintenance material such as gravel and rock can also be contaminated with weed seeds. Disturbance and bare ground encourages subsequent weed growth and spread.

Currently over \$2 million a year is spent across the NT managing weeds in corridors. Corridors are long, thin, have multiple neighbours and are often in the public eye. While successful weed management can often go unnoticed, unmanaged areas often attract criticism and can potentially damage reputations of land owners or managers. Active weed management is critical to protect adjoining properties.



What you can do:

- Map locations and densities of declared weeds through dedicated survey and send to Weed Management Branch
- Use mapping data to develop an annual Weed Management Plan
- All contractors and staff should be able to identify declared weeds relevant to the region
- All Class A species must be prioritised for eradication and reported to the Weed Management Branch
- Adhere to relevant Statutory Weed Management Plans e.g. isolated plants and infestations of gamba grass and bellyache bush must be eradicated
- Coordinate slashing, spraying and burning programs. Drive slashers from clean areas towards infested areas to prevent spread. Do not slash after seed-set or before herbicide has taken effect
- Prioritise weed control in areas with clean adjoining lands. Spray weeds while actively growing, but before seeding
- Plan control for areas susceptible to water logging
- High fuel load grasses close to infrastructure should be controlled early in the season to prevent fire damage
- Ensure that weed hygiene is written into maintenance contracts
- Do not drive through seeding weeds. Where weeds cannot be avoided, vehicles should be cleaned before moving to weed free areas
- Ensure temporary detours do not pass through weeds
- Clean down into accessible, flat areas that do not run into drains or waterways. Record the location of clean down areas. Check clean down areas after rain and treat emerging weeds if necessary
- Minimise disturbance to existing land surface and native or non-invasive grasses
- Do not import or export contaminated materials including sand, gravel, rock and fill
- Establish a monitoring program so control and weed spread can be evaluated
- Work in collaboration with relevant government agencies and land holders, particularly those who have adjoining, overlapping or adjacent corridors.



Map priority weeds



Prioritise control of isolated plants



Slash corridors before weeds set seed

Case study: Strategic control on railway can help prevent weed spread

Genesee & Wyoming Australia and their contractors manage weeds along the 1700 km rail corridor spanning the length the NT.

With diverse management goals including safety, infrastructure maintenance, erosion control, environmental protection and the management of multiple weed species, prioritisation of weed control is essential as resources are finite.

For safety reasons, all vegetation including weeds must be removed from the area immediately adjacent to the track. Within 20 km of slow points such as towns, where weed seeds could attach to trains, an additional four metre buffer is treated either side of the track. For the remainder of the corridor, precedence is given to priority weed species, and keeping the maintenance roads and neighbouring fence lines clean.

As the rail corridor shares its boundary with many other land tenures, adopting a coordinated management approach with neighbours improves outcomes.

Mining and extractive industries

Mining and extractive industries generally result in a high level of disturbance within a relatively small area. This high level of disturbance promotes weed establishment from weed infestations both on and off site. During the construction and operation phases, there are many opportunities for long distance movement of weed seeds by machines, materials and people.

As mines are often located in remote areas there is a high risk that a mine will be a focal point from which weeds disperse into surrounding clean areas. This problem may be expanded if associated access and haul roads are not managed appropriately.

Furthermore, soil stockpiles can become infested with weeds and be either moved off site or used locally (e.g. for rehabilitation) further exacerbating the problem. In the past, inappropriate and invasive species have been used for rehabilitation and stockpile stabilisation.

In some cases there is a high risk of weed spread in contaminated extractive products such as sand and gravel. Extractive sites and stockpiles are often infested with weeds such as mission grass or gamba grass. Sometimes extraction results in water retention or pond formation suitable for serious wetland weeds such as mimosa. In Central Australia, extraction sites are often in river beds which are susceptible to weed proliferation.



What you can do:

- Map locations and densities of declared weeds through dedicated survey and send to Weed Management Branch
- Use weed data to determine management requirements for inclusion in the Mine Management Plan
- Operations staff and contractors should be able to identify declared weeds relevant to site
- Control weeds prior to the commencement of works
- All Class A species must be eradicated and reported to the Weed Management Branch
- Adhere to relevant Statutory Weed Management Plans e.g. isolated plants and infestations of mimosa and prickly acacia must be eradicated
- Where seeding weeds must be cleared, stockpile and bund the plant material and contaminated top soil on site. Do not re-use topsoil
- Regularly inspect and treat weeds on stockpiles, access tracks and haul roads
- Equipment, particularly when coming from interstate, should be cleaned and inspected for weed seeds prior leaving last work site
- Clean machinery, vehicles and equipment before moving between sites
- Establish a clean down area in an accessible, flat area that does not run into a waterway. Check clean down area after rain and treat any emerging weeds
- Minimise disturbance to existing land surface and native vegetation
- Do not import or export contaminated materials including sand, gravel, rock and fill
- Plan for rehabilitation that will minimise opportunities for weed establishment following closure/relinquishment



Minimise mine footprint



Ensure contractors clean down



Establish a dedicated clean down area

Case study: Continual improvements in weed control methods and team culture gives great result

The Ranger Mine has high standards when it comes to weed management because it is surrounded by the iconic Kakadu National Park.

Since 2012, a number of incremental measures have been implemented which has resulted in an increased weed control effort and a large reduction in the density of their worst weed; mission grass.

These measures have included: developing a culture of having pride in your work; a planning cycle owned by operational staff which is focussed on increasing efficiency; the inclusion of residual herbicides to manage the soil seed bank; having a champion for equipment maintenance; custom made equipment; more appropriate PPE; starting work earlier to avoid the afternoon rain; and strict equipment and vehicle inspection procedures to stop new weeds coming from outside or spreading within site.

Pastoralism

The pastoral industry has a 150 year history in the NT currently generating \$370 million per year (580,000 cattle) and employing over 1600 people. Operations include corporate and family run businesses. Nearly half of the land area of the NT (620,000 km²) is dedicated to cattle production and more than 300,000 animals are shipped through the port of Darwin to Asia for live export.

Pastoralism in the Territory generally involves large tracts of semi-arid land with little clearing of the native vegetation. While productivity has sometimes been improved by introducing grasses and legumes, some of these pasture plants have become weedy. Other means of weed spread to pastoral properties can be via the local and interstate transport of stock, particularly through weed seeds ingested and then defecated. The industry is heavily dependent on long distance transportation of animals to fatten and turn off. There is also potential to import and transport weed seed in hay and fodder or attached to machinery.



What you can do:

- Map locations and densities of declared weeds through dedicated survey and send to Weed Management Branch
- Use mapping data to develop an annual Property Weed Management Plan
- Staff should be able to identify declared weeds relevant to the region
- Do not deliberately sow or plant any declared weeds for improved pasture, it is illegal
- Prioritise all class A weed species for eradication and report locations to Weed Management Branch
- Prioritise weed control along waterways
- Adhere to relevant statutory weed management plans e.g. isolated plants and infestations of gamba grass and prickly acacia must be eradicated
- Apply integrated approach to management including stock exclusion through fencing
- Isolate incoming stock in quarantine paddocks for at least eight days, particularly those coming from Queensland and Western Australia
- Isolate stock mustered from infested paddocks into quarantine paddocks for at least seven days prior to transporting off station
- Monitor quarantine paddocks to detect any newly establishing weeds early. Any weeds found should be controlled immediately
- Keep roads, tracks, laneways, stock routes and holding yards clean of weeds
- Clean machinery and vehicles before moving between weed infested and clean paddocks
- Check clean down area after rain and treat any emerging weeds
- Don't buy, sell or move contaminated hay, fodder or manure
- Trucks should be cleaned after delivering stock
- Seek advice from the Department of Primary Industry and Fisheries before introducing new pasture species



Treat dung as a potential weed source



Clean down in an appropriate area



Weeds impact pasture production

Case study: Interstate stock movement can spread weeds

In Queensland prickly acacia infests over 22 million hectares of pastoral land reducing production and making mustering difficult. Prickly acacia poses a huge threat to semi-arid NT particularly in the Barkly district.

Chris Towne on Helen Springs Station is careful not to introduce or move prickly acacia on his property. He finds out where the new cattle are from and whether they have had access to prickly acacia. Prickly acacia seeds are very hardy and can pass through cattle intact.

To prevent prickly acacia spread, the new cattle are quarantined in holding paddocks for eight days before being moved into clean areas. These holding paddocks are then monitored after rain and any seedlings controlled.

REDUCE WEED SPREAD

Hay

The hay industry in the NT has expanded steadily over the last twenty years in line with the growing live export market. It currently generates over \$20 million per year and directly employs around 160 people. Hay is one of the few viable rain grown crops in the Top End of the NT. There is also some irrigated hay produced in the arid zone. The 70,000 tonnes of hay produced on 15,000 hectares does not currently meet market demand.

The majority of hay enters the live export chain either via processors to make high protein cubes, or directly to pre-export yards. Opportunity for weed spread can eventuate during baling and transport of contaminated hay.

Where hay is used in local cattle production (e.g. for weaners) or for horse feed, it can promote weed spread if contaminated.

Weed seeds can be spread long distances within the NT as a contaminant of hay, or locally attached to machines involved in baling and transport.

There is also a small market (less than 2000 tonnes) for mulch hay, which is mostly made up of native flood plain grasses with some pasture grasses.



What you can do:

- Map locations and densities of declared weeds through dedicated survey and send to Weed Management Branch
- Use mapping data to develop an annual Property Weed Management Plan
- Train operations staff to recognise declared weeds relevant to the region
- Do not bale declared weeds
- Do not deliberately cut or mow an infested area for hay production or sale, or transport contaminated hay
- Integrate available tools to manage weeds (e.g. herbicide, cropping) prior to harvesting
- Clean down machines when moving between weed infested and clean paddocks
- Keep access tracks free from weeds
- Cover loads when transporting hay
- Buy only weed free hay
- Feed hay in holding paddocks that can be easily accessed throughout the year to monitor and control weeds
- Be suspicious of any unfamiliar plants that germinate in the areas where hay has been introduced and seek advice with identification
- Develop a clean hay certification process. Involve industry bodies in the process
- Install buffers to infested/clean areas to prevent weed spread
- Seek advice from the Department of Primary Industry and Fisheries before introducing new hay or fodder species



Selectively control outbreaks early



Buyers should insist on hay being weed free

Case study: Minimising weed spread from hay production

Ceres Downs is one of the biggest hay producers in the Northern Territory with 2,000 ha of grass and legume crops.

As well as there being a legal requirement, they also feel that there is a moral obligation to minimise weed spread.

Their main weeds are gamba grass, grader grass, sicklepod, hyptis and sida.

To combat spread, a strategic combination of control and prevention measures are used. These include different herbicides depending on target weeds, rotation between grass and legumes and minimum tillage to reduce weed germination.

When cutting hay, seeding weeds are avoided and then seeds are manually removed. Machinery is blown down with compressed air when moving between paddocks. A two metre buffer is sprayed along the main vehicle access to prevent off-farm spread from seeds attaching to vehicles and machinery.

Waterways

Waterways and associated flood plains are economically, culturally and ecologically important to many Territorians. The alluvial plains adjacent to many inland waterways are the most productive country for raising cattle and coastal floodplains support large commercial and recreational fisheries. Indigenous Territorians have a strong cultural connection with waterways for both food and spiritual purposes.

Waterways are a common pathway for long distance spread because: periodic floods can carry seeds long distances; the disturbance resulting from flood events is ideal for germination; and waterways provide favourable conditions for plant growth and seed production. Seasonally isolated billabongs are highly susceptible to the impacts of riparian and aquatic weed species such as cabomba. Arid river systems such as the Finke are also susceptible to weed invasion and spread.

The Territory also has a number of nationally significant weeds which already effect ecological and hydrological processes which require management prioritisation.

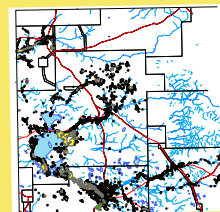


What you can do:

- Map locations and densities of declared weeds through an initial survey and repeat after flood events and post wet season. Send data to Weed Management Branch
- Use mapping data and information from neighbours up and downstream to develop a Weed Management Plan
- Operations staff and contractors should be able to identify declared weeds spread along waterways
- Prioritise species for control based on weed risk and feasibility of control
- Where feasible, control weeds in the upper catchment first to reduce downstream spread
- Plan to undertake control and monitoring works when weeds are actively growing
- Do follow up control after rain or flood events up to high water mark
- Apply integrated approaches to management including stock exclusion through fencing
- Only use herbicides in accordance with label to avoid off-target damage to waterways
- Work in collaboration with relevant government agencies and land holders, to develop a catchment wide approach to management



Control the upper catchment first



Parkinsonia spreads down waterways

Case study: Controlling neem in the Victoria River catchment

Heytesbury Cattle Company recognised the economic and environmental threat that neem posed to the Victoria River District when they noticed it spreading rapidly along the Wickham River.

The declaration of neem as a Class B weed in July 2014 provided the impetus for Heytesbury to increase their investment in its control.

After mapping the infestation, three control methods were strategically used: stem injection and basal bark application of herbicide in sensitive riparian areas; foliar spraying and hand application of granules away from the river; and helicopter application of granules for outlying plants.

The Bradshaw Indigenous Rangers and Heytesbury staff collaborated to do the on-ground work. Monitoring and control of regrowth will involve substantial on-going commitment.

REDUCE WEED SPREAD

Recreation

Territorians love four wheel driving, quadbiking, hiking, camping, hunting and a host of other outdoor activities. Few of us would knowingly damage the outdoors we enjoy so much, but recreational activities contribute to the spread of weeds.

Recreational activities take people into remote and difficult to reach areas. Seeds occasionally can attach to vehicles, horses, clothes, hair and swags.

Not only do human activities help spread weed seeds, they may also create disturbances that help weeds get established. If an area is heavily trampled and native vegetation disturbed overly competitive weeds may colonise the disturbance.

Eventually, the impact of weeds on the natural environment could hurt the Territory's tourist industry. The invasion of national parks and rangelands by high fuel-load invasive grasses such as gamba grass is the first stage of Africanisation of the savannas, this is the process by which an area changes from forest and woodland to a grassland dominated by exotic species, largely unsuitable as habitat for many of our native birds and land animals. Weeds, such as mimosa, can also provide thorny refuge to feral animals and restrict hunting.

What you can do:

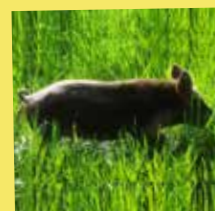
- Keep a NT Weed ID Deck in your glove box to identify the Territory's declared weeds
- If you find developing weed infestations, report to the Weed Management Branch
- Avoid passing through seeding weeds
- Horses should be fed weed-free hay to avoid weed spread in dung
- Clean 4WD, quads, bike, clothes and animals before moving to new areas
- If you find weed seeds or burrs, leave them in the weed infested area or burn them in your campfire



Avoid weeds when driving



Wash down vehicles after travelling through weeds



Weeds restrict pig hunting



REDUCE WEED SPREAD

Motocross in abandoned quarry, Holtz

Fishing and boating

Waterways are highly susceptible to weed invasion and billabongs and rivers in the Top End are no exception. Serious weeds such as mimosa and salvinia have spread to many river systems, while others, such as cabomba and water mimosa are currently restricted to one or two locations. Many aquatic plants can spread by seed as well as tiny vegetative fragments. Salvinia, however, can only spread by fragments, which means that all spread between catchments was probably done inadvertently by people.

Boating or fishing in weed infested waterways can contribute to the spread of water weeds from one site to another. Propellers and anchors can cut plants into fragments. Fragments can spread from an infested water body to a weed free water body by attaching to watercraft, trailers and fishing equipment. Some weeds can survive considerable time out of water and a single plant fragment can start a new infestation.

What you can do:

- Keep a NT Weed ID Deck in your tackle box to identify the Territory's declared weeds
- If you find new weeds, report to the Weed Management Branch
- Avoid infested water bodies or weed outbreaks
- Clean any plant fragments from boats, trailers and all equipment before leaving a site or launching at a new site
- Do not collect water to move live bait between waterways. This is an offence under the *Fisheries Act*
- Be aware of mimosa, which lines the banks of many waterways. They are prolific seeders and can rain seeds into the boat
- Do not enter quarantine zones e.g. Darwin River. Heavy penalties apply



Personal safety



Tackle can bring weeds into the boat



Check boats and trailers for weeds



Nursery and aquarium trading

In past years many weeds have been introduced as garden, aquarium or pond plants. These were introduced through mostly legal trade, with good intentions, but subsequently escaped to become invasive. In recent years most members of these industries have become highly aware of biosecurity issues, including weeds, and have introduced effective self-regulation procedures. Industry bodies including Nursery and Garden Industry Northern Territory (NGINT) have been active in promoting responsible trade and planting practices.

Sale of non-declared terrestrial plants is not regulated by legislation, however industry initiatives such as the 'Grow me instead' campaign discourage the use of potentially invasive plants that might escape from gardens. Trade in aquatic plants is regulated under the Fisheries legislation which prohibits trade in all species unless done in accordance with a Fisheries Licence.

Nevertheless, declared weeds still appear for sale from time to time, usually at local markets, and also occasionally in larger outlets.

What you can do:

- Sales staff should be able to identify declared weeds and suggest suitable alternate species to customers
- Do not deliberately plant, transport or sell declared weeds as garden plants, for example: neem, lantana and fountain grass
- Remove garden and aquatic plants that are declared weeds
- Destroy all vegetative plant matter and seeds on site, to avoid spread
- Never dump declared weeds or garden clippings in the bush or over the back fence
- Keep potted sales stock weed free, especially when sending orders to remote locations
- Closely monitor plants grown from seeds to check any contaminants are not declared species
- Do not import aquatic plants into the NT, is not permitted unless done under a Fisheries Permit
- Check the list of aquatic plants that have been assessed as being suitable for importation into the NT as these species can be brought in under a Fisheries Permit
- Prevent any plant movement from outdoor ponds during heavy rains
- Never tip pond or aquarium plants in a waterway or drain
- Promote non-weedy garden plants described on the 'Grow me instead' website from NGINT



Remove all declared weeds from gardens



Never keep declared weeds in ponds, pots or aquaria



Never discard aquaria contents into waterways

Do the right thing

Enforcement is generally a last resort, Weed Officers will preferentially use education and extension to provide opportunities for discussion of legislated requirements. However, all stakeholders should be aware of their obligations under the law and the offences relating to weed spread prevention.

The *Weeds Management Act* (the Act) recognises the central role of weed spread prevention in best practice management of declared weeds.

The fundamental purpose of the Act is to prevent the spread of weeds into, out of and within the Northern Territory. It does this by setting out the responsibilities and obligations of land owners and occupiers, and members of the public, together with offences and penalties that apply to the spread of weeds under the Act.



Cabomba quarantine zone, Darwin River

Declared species

There are three classes of declared species each needing different actions. Required management actions depend on the current distributions in the Territory. Some species can have geographically split classifications according to the level of establishment of the weed e.g. A/B

- Class A (limited distribution) eradicate
- Class B (widespread) prevent the growth and spread
- Class C (not yet present) prevent the introduction into the Territory

Management requirements

For all declared species the land manager must take all reasonable measures to prevent the land being infested and prevent spread to other land.

Weed Management Plans

Weed Management Plans are statutory documents that set out the legal obligations of land owners and occupiers to manage the highest risk declared species. There are currently eight plans in force for bellyache bush, cabomba, chinee apple, gamba grass, mesquite, mimosa, neem and prickly acacia. At the time of writing, a draft plan for grader grass was in development.

Movement of weeds or their seeds

The Act places clear responsibility on developers and users of land to implement hygiene standards that will prevent weed spread. It is illegal to deliberately, or inadvertently, transport or carry declared weeds, including their flowers, fruit, seeds, cuttings, roots or rhizomes. It is also illegal to hire equipment that contains or carries a declared weed.

Declared weeds and hay

A person must not cut or mow an area for the purpose of producing fodder or mulch if the area is infested or contaminated with a declared weed. This condition is excepted when the intent is to manage a declared weed in accordance with a Weed Management Plan.

Prohibition of sale and use

Businesses or land managers must not sell, purchase, offer to sell or purchase, propagate, grow or scatter a declared weed including those which have production, aesthetic or medical benefit.

Quarantine zones

Quarantine zones may be declared to prevent the spread of high priority weeds from a restricted area. Currently, there is a quarantine zone on Darwin River for the aquatic weed cabomba.

Powers of Officers

Weed Officers have wide powers to enter land and search, inspect, take samples and order treatment of the land to control weeds. Officers may also order a contaminated animal, vehicle or other things, to be cleaned. It is an offence to obstruct or hinder an Officer or fail to comply with an order.

Permits

A person may apply to the Minister for a permit to use a declared weed.

The information given here is only a summary of the main provisions relating to weed spread prevention. Further details on obligations and offences are set out in the Act.



Education and technical materials



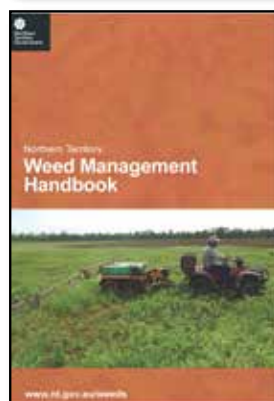
Weed Identification Tables

Contains photos and written descriptions to assist with identification.



Weed Notes

Provides information on identification, impacts, habitat, distribution and management.



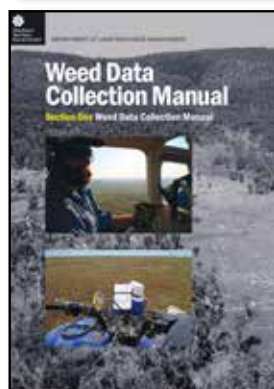
NT Weed Management Handbook

Provides information on strategic and planned approaches to weed management, including integrated weed control methods. Specific information is provided on herbicides registered for use in the NT. The 46 'Weed control option tables' include a colour photo of the weed in question, list which herbicides are registered for use and indicate optimum treatment times and which method/s can be employed for maximum effectiveness.



NT Weed ID Deck

Glove box-sized and rugged, this product has been developed to be used out on the land. Pictures and simple descriptions make weed identification easy. It also details which weeds that need to be reported or acted upon immediately.



Weed Data Collection Manual

The Northern Territory Weed Data Collection Manual provides standards and guidelines to assist data managers, researchers and land management agencies to utilise weed data held by the Northern Territory Government and to allow them to contribute weed data in the most effective way. **Section one** provides an overview of weed data collection and management and **section two** provides technical data description for the NT weeds dataset and contains metadata, a data dictionary, and a comprehensive list of NT weed species and their status.

REDUCE WEED SPREAD





REDUCE WEED SPREAD

Contact us

The Northern Territory Government Weed Management Branch can help with information or training on all aspects of weed management including spread prevention.

Phone	Darwin	8999 4567
	Katherine	8973 3857
	Tennant Creek	8962 4314
	Alice Springs	8951 9210

E-mail weedinfo@nt.gov.au

Web www.nt.gov.au/weeds

REDUCE WEED SPREAD