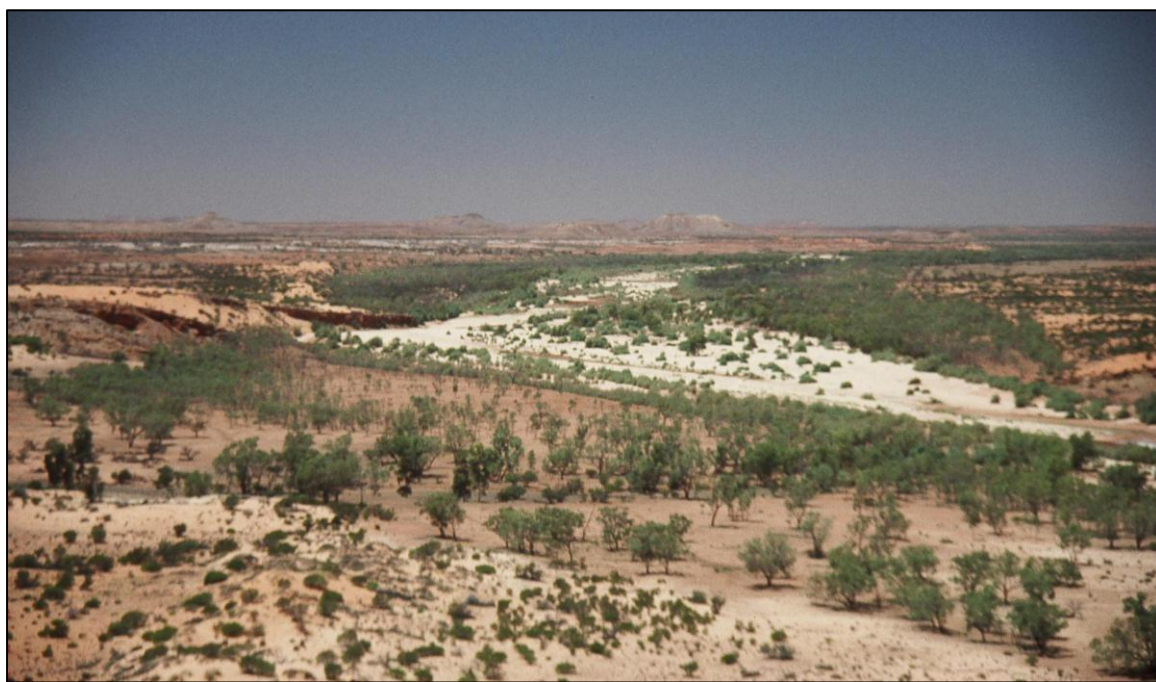


# Athel pine (*Tamarix aphylla*) NT Weed Risk Assessment Technical Report

January 2014



Athel pine  
*Tamarix aphylla*

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Cover photo (top): Cultivated athel pines growing near buildings.

Cover photo (bottom): Athel pine infestation along the Finke River, NT.

Final report compiled January 2014.

Edited by Louis Elliott, Department of Land Resource Management.

*NOTE: Online resources are available at <https://nt.gov.au/environment/weeds/list-of-declared-weeds-in-the-nt/athel-pine> which provide information about the NT Weed Risk Management System including an explanation of the scoring system, a fact sheet and user guide, a map of the NT weed management regions and FAQs.*

**Weed Management Branch contacts**

For more information or advice in relation to the identification, management or monitoring of weeds please contact the Weed Management Branch:

Phone: (08) 8999 4567

Email: [weedinfo@nt.gov.au](mailto:weedinfo@nt.gov.au)

Website: <http://www.nt.gov.au/weeds>

The NT Herbarium can also provide plant identification advice

Phone: (08) 8999 4516

**Rangelands Division**

Department of Land Resource Management

PO Box 496

Palmerston NT 0831

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## Weed risk and Feasibility of Control results

Table 1. Weed Risk and Feasibility of Control (FOC) results for athel pine (*Tamarix aphylla*). Weed Risk is calculated for the whole of the Northern Territory; FOC is calculated by Weed Management Region. Maximum score for Weed Risk and FOC is 1000. Each has three sections (A, B, C), with section scores expressed as a percentage.

Weed Risk (NT)				
Band	Very high			
Score	412			
A. Invasiveness (%)	83			
B. Impacts (%)	74			
C. Potential distribution (%)	67			
Note: For an explanation of how the Weed Risk and Feasibility of Control scores and bands are calculated, and for the Northern Territory Weed Management Regions, refer to <a href="http://www.nt.gov.au/weeds/risk">www.nt.gov.au/weeds/risk</a> .				
Feasibility of Control (by region)				
Weed Management Region	Darwin	Katherine	Tennant Creek	Alice Springs
Band	-	-	High	Medium
Score	-	-	251	125
A. # Control costs (%)	-	-	55	55
B. ## Current distribution (%)	-	-	100	50
C. Persistence (%)	-	-	46	46

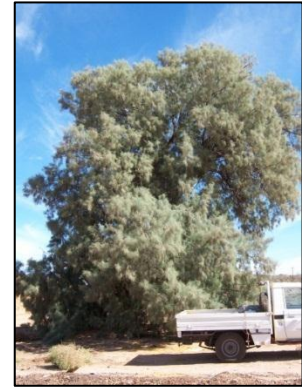
# A high score indicates low control costs and contributes to a high Feasibility of Control. ## A high score indicates a restricted distribution and contributes to a high Feasibility of Control.

Table 2. Broad management response recommended for athel pine (*Tamarix aphylla*) by Weed Management Region, according to Weed Risk and Feasibility of Control assessments.

		Feasibility of Control	
		Very high–High	Medium–Low
Weed Risk	Very high	Prevent movement; regional eradication; contain regional spread; protect priority sites	Targeted control (including biocontrol)/protect priority sites
	High	Prevent movement; contain regional spread; protect priority sites	Targeted control
	Medium	Targeted control; improve general weed management; monitor; protect priority sites	Improve general weed management
	Low	Monitor; assist interested parties	Assist interested parties
		<b>Tennant Creek Region</b>	<b>Alice Springs Region</b>

## Background information

<i>Taxon</i>	<i>Tamarix aphylla</i>
<i>Synonyms</i>	<i>Tamarix articulata</i> , <i>Thuja aphylla</i>
<i>Common name</i>	Athel pine
<i>Other names</i>	Tamarisk, saltcedar, athel tree
<i>Family</i>	Tamaricaceae (tamarisk family)
<i>Lifeform</i>	Tree
<i>Environment</i>	Terrestrial
<i>Origin</i>	Northern Africa, the Arabian Peninsular, Iran and India.



*Legislation* Declared in all other Australian states and territories.  
Declared Class A and Class B in different parts of the Northern Territory.  
The NT declaration zones for athel pine are available at:  
[www.nt.gov.au/weeds/find/athelpine](http://www.nt.gov.au/weeds/find/athelpine).

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### *Description*

Large, spreading tree up to 15 m tall. Athel pine is not a true conifer or pine, but its pendulous needles and branches give it the appearance of one. Salt secreting glands in the needles create a whitish coating giving the tree foliage a silvery grey appearance. Small, white and pink flowers occur in dense racemes. *Habitat*

Dominates sandy riparian habitats in the arid zone. In the Northern Territory, it forms monospecific stands along rivers and adjacent fringing woodlands in the arid zone. It is spread by wind and floodwaters, and is able to establish on sandy soils free of other vegetation.

### *Distribution*

There are large infestations present in South Australia, New South Wales, Queensland and Western Australia. In the Northern Territory athel pine is mainly found in the central region, where it was extensively planted in Aboriginal communities and at homesteads, bores and roadhouses as far north as the Barkly region. Extensive stands of athel pine are found on the Finke River system south of Alice Springs. *Other*

Athel pine is recognised as a Weed of National Significance.

Athel pine is also a significant invasive species in southern USA.

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### *Current situation in the NT*

In the Northern Territory (NT) athel pine is well established in the Finke River, this being the largest naturalised infestation in Australia. Infestations outside this core area, such as those found in Walker and Karinga Creeks, are smaller and of lower density, and as such have been prioritised for management. Historical and amenity plantings of athel pine are found throughout the southern region of the Territory. As these present potential for spread, their control and removal is also considered a management priority.

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## Summary of Weed Risk and Feasibility of Control

### *Weed Risk*

#### *A. Invasiveness:*

Intentionally introduced into Australia and widely planted for shade. Current infestations originate from trees planted around homesteads and communities. Seed viability is moderate (c. 22%), but a single tree is capable of producing enormous quantities of tiny seed (c. 500 000) which are principally spread by floodwaters. A major dispersal event occurred in the NT with the flood of 1974, with floods in later years aiding further establishment. It is also able to spread vegetatively—broken stem fragments can take root and are also spread by floods. People may continue to accidentally spread athel pine with heavy machinery such as graders.

#### *B. Impact:*

Forms monocultures which displace native vegetation, particularly the iconic river red gums (*Eucalyptus camuldulensis*) and coolibah (*Eucalyptus microtheca*) in central Australia. Athel pine extracts salt from the soil, causing salination affecting plant growth up to 50 m away. It lowers the water table, dry up waterholes, adds to sedimentation rates and can change the course of rivers. Only salt-tolerant herbs or grasses can grow under athel pine, so it reduces grazing area. Native birds, reptiles and insects are negatively impacted—athel pine flowers have no nectar, the trees do not provide hollows for nesting, and it is a poor source of food for invertebrates. A threatened species of brushtail possum is impacted.

*C. Potential distribution:*  
Wide native and introduced range throughout arid and semi-arid zone, surviving in areas with rainfall as low as 100 mm/year. The climate for optimum growth is probably 350–500 mm/year. Particularly suitable vegetation types in the NT are arid and semi-arid riparian and wetland areas, due to dispersal by floodwaters and the close proximity of groundwater.

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### *Feasibility of Control*

#### *A. Control costs*

Moderate. Athel pine is readily identifiable and infestations are generally accessible for treatment. However, the tree does not translocate chemical well. Chemical and labour costs are very high, especially for large infestations.

#### *B. Current distribution (NT)*

Large stands of athel pine exist on the Finke River system in the Alice Springs Region. In other parts of the arid and semi-arid NT, infestations tend to be isolated. In these areas, isolated trees planted for amenity purposes continue to exist.

#### *C. Persistence*

Moderate. Seeds remain viable for only a few weeks. However vegetative propagules can propagate even when there is no seed. The tree can live for at least several decades.

---

## General Management Recommendations

Refer to the *Weed Management Plan for Athel Pine* (*Tamarix aphylla*). This can be found at [www.nt.gov.au/weeds/find/athelpine](http://www.nt.gov.au/weeds/find/athelpine).

## Weed Risk Assessment - Determinations

### A. INVASIVENESS

#### Determination

A1. What is the ability of the plant to establish amongst intact native environments?

Very high

A2. What is the reproductive ability of the plant?

- a) Time to seeding
- b) Annual production of viable seed per sq m or /plant
- c) Vegetative reproduction

2-3 years
High
Frequent

A3. Do propagules of the plant have properties that allow them to be dispersed long-distance by natural means?

- a) Flying animals (birds, bats)
- b) Other wild animals
- c) Water
- d) Wind

Don't know
Don't know
Yes
Yes

A4. How likely is long-distance dispersal by human means?

- a) Deliberate spread by people
- b) Accidentally by people and vehicles
- c) Contaminated produce
- d) Domestic/farm animals

Unlikely
Occasional
Unlikely
Occasional

### B. IMPACTS

B1. What is the plants competitive potential?

High

B2. What is the plant's potential to modify the existing fire behaviour and alter the fire regime?

Some potential

B3. What is the plant's potential to restrict the physical movement of people, animals, vehicles, machinery and/or water?

High

B4. What is the plant's potential to negatively affect the health of animals and/or people?

None

B5. Does the plant potentially have negative effects on natural and cultural values?

- a) reducing habitat quality for native animals
- b) threatened species or communities
- c) sites of natural significance

High
One
More than 1

B6. Is the plant presumed to have negative effects on environmental health?

- a) soil chemistry/stability
- b) water quality
- c) hydrology

Yes
Yes
Yes

### C. POTENTIAL DISTRIBUTION

C1. What is the CLIMATE suitability score (which indicates the proportion of the NT environment that is suitable for the plant)?

8.8

C2. How many broad habitat types in the NT will the plant potentially naturalise in (up to 5) ?

Two

C3. What is the potential of the plant to occur throughout its favoured habitat in the NT (from those identified in question 2)?

Some

## Feasibility Of Control - Determinations

### A. CONTROL COSTS

*Darwin Region*

*Katherine Region*

*Tennant Ck Region*

*Alice Springs Region*

A1. How detectable is the weed?

- a) Distinguishing features
- b) Active growth period
- c) Height at maturity

		Always distinct	Always distinct
		4-8 months	4-8 months
		> 2 m	> 2 m

A2. What is general accessibility of infestations at the optimum treatment time?

		Medium	Medium
--	--	--------	--------

A3. How expensive is control of the weed in the first year of targeted control, for an infestation that has reached maximum weed density?

- a) Chemical cost
- b) Labour costs
- c) Equipment costs

		Very High	Very High
		Very High	Very High
		Low	Low

A4. What is the general community perception of this weed within the region?

		High	High
--	--	------	------

### B. CURRENT DISTRIBUTION

B1. What is the current pattern of the weed's distribution across the weed's range in the NT?

		Restricted	Restricted
--	--	------------	------------

### C. PERSISTENCE

C1. How long will it take to reach the maintenance period? The maintenance period is reached when there is no further recruitment from the original infestation, although monitoring and follow up may still be required.

		Medium	Medium
--	--	--------	--------

C2. What is the minimum time period for reproduction of sexual or vegetative propagules?

		<1 year	<1 year
--	--	---------	---------

C3. What is the maximum longevity of sexual or vegetative propagules?

		>5 years	>5 years
--	--	----------	----------

C4. What is the threat of reinfestation from outside the region?

- a) Long-distance dispersal by natural means

		Frequent	Frequent
--	--	----------	----------

- b) Long-distance dispersal by human means

		Occasional	Occasional
--	--	------------	------------

Athel pine  
*Tamarix aphylla*

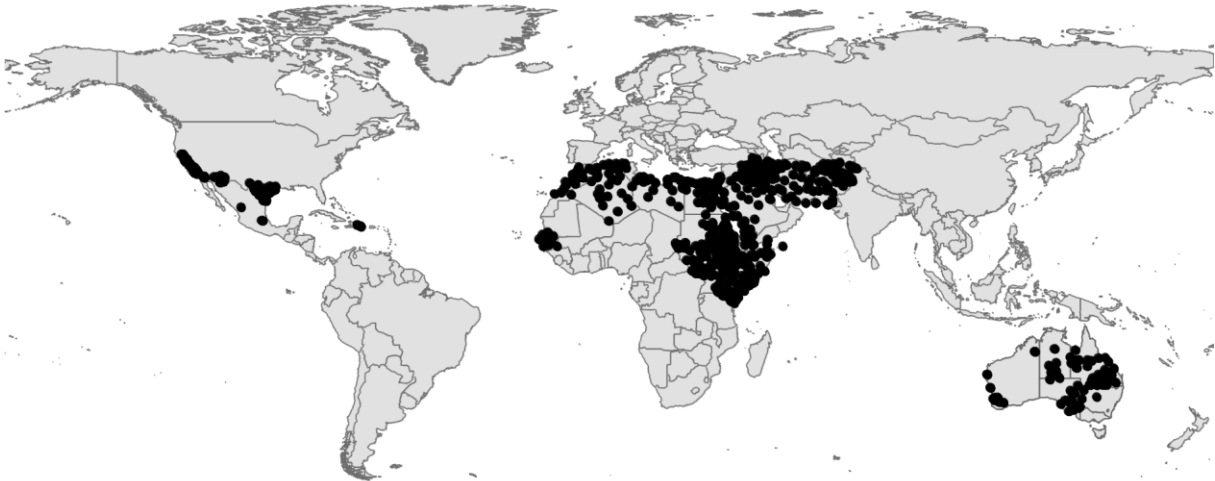


Figure 1. Global records of athel pine (*Tamarix aphylla*). Source: Global Biodiversity Information Facility and Australian Virtual Herbarium (2007).

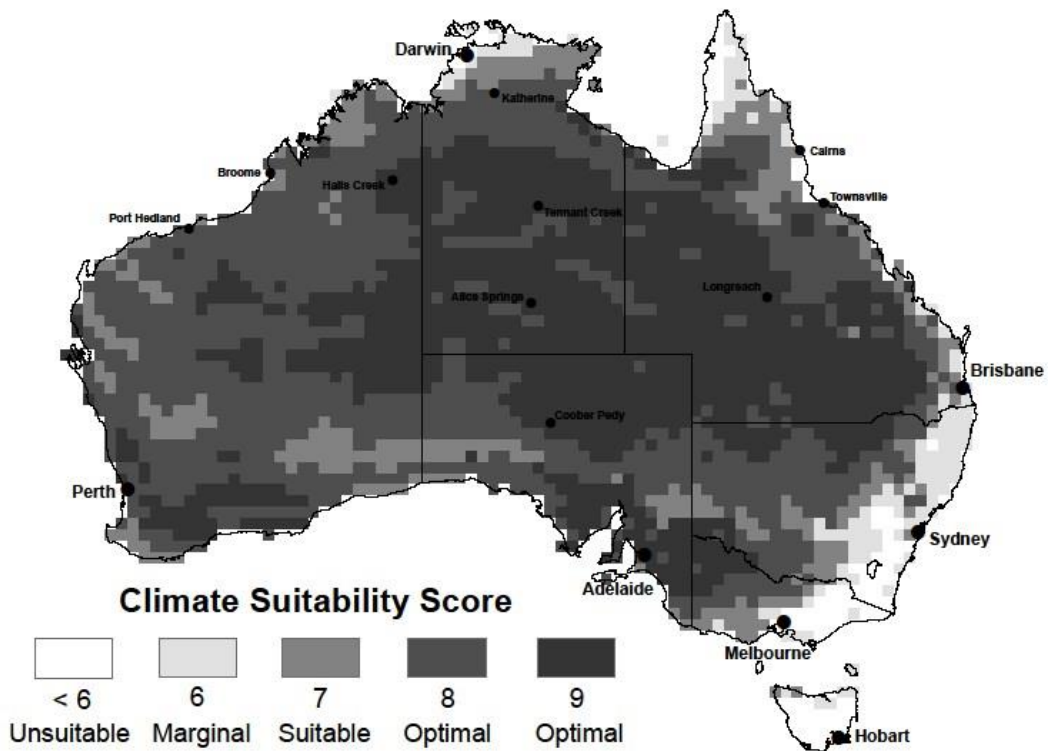


Figure 2. Potential distribution of athel pine (*Tamarix aphylla*) in Australia using CLIMATCH. Areas of suitable climate are indicated by a climatic suitability score of 7 or above out of 10. Source: NT Weed Management Branch 2010.



## Weed Risk Assessment - Evidence Used

### A INVASIVENESS

---

#### A1 What is the ability of the plant to establish amongst intact native environments?

---

The established trees [on the Finke River] now tend to form dense, almost monospecific stands, which appear to displace the native river gum ( <i>Eucalyptus camaldulensis</i> ) from parts of the river.	Griffin et al. (1989)
Dominates sandy riparian habitats in arid areas such as Finke River and excludes all other vegetation. In places, river red gums ( <i>Eucalyptus camuldulensis</i> ) an icon of central Australia, have been replaced by Athel Pine.	Csurhes (2008)
In the Finke River, the infestation of Athel pine ..extends into the dense fringing Coolabah woodlands. The infestation has now reached the Finke Floodout forest; an area of very dense Coolabah ( <i>Eucalyptus coolabah</i> subsp. arida) and Cooba ( <i>Acacia salicina</i> ) woodland/forest.	Duguid et al. (2002)
Along the Finke River it has formed many monospecific stands at the expense of the river red gum, <i>Eucalyptus camaldulensis</i> Dehnh., and the coolibah, <i>Eucalyptus microtheca</i> F. Muell., considerably reducing the available grazing area.	Parsons & Cuthbertson (1992)
Over the past 18 years Athel pine has become established along several hundred kilometres of the Finke River in the NT.	Fuller (1993b)
Seedlings seem only to establish on sandy soils that are free of vegetation.	Csurhes (2008)
In the Lake Mead recreational area (Nevada, USA) <i>Tamarix aphylla</i> has spread from 4 large trees in 1982 to over >5000 individuals in the same area of the park in 2006.	Walker et al. (2006)

**A2a Reproductive ability: Time to seeding?**

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The first flowers appear in about the third year, and annually thereafter, in summer.	Parsons & Cuthbertson (1992)
---	------------------------------

#### A2b Reproductive ability: Annual production of viable seed per square meter or per plant?

---

Athel pine flowers and produces many seeds, but most of the seeds are sterile.	Tesky (1992)
Seed viability is moderate (ca. 22% under best conditions) and seed production period [in America] is fairly restricted, but because millions of seeds can be produced, under the right conditions the potential for invasion is theoretically very high	Dudley (2004)
<i>T. aphylla</i> produces a large number of seeds, i.e. about 500,000 seeds/year from a single tree. The seeds are minute, about 1000 per gram. 500,000 seeds per year from a single tree X 22% viability = 11,0000 viable seeds per year from a single tree.	CAB International (2000)

#### A2c Reproductive ability: Vegetative reproduction?

---

In their native habitat, propagation is assumed to be mostly vegetative, although establishment from seeds after summer rains has been reported.	Griffin et al. (1989)
Its main method of propagation is vegetative. It sprouts from the root crown or forms adventitious roots from submerged, broken or buried stems.	Tesky (1992)
Athel pine reproduces from broken stem fragments as well as from seeds. Vegetative reproduction is particularly successful when branches are broken up by floodwaters and carried downstream.	Csurhes (2008)

## Weed Risk Assessment - Evidence Used

### A3a Propagule dispersal: Flying animals (birds, bats)

---

Seeds are spread . . . by birds.

Parsons & Cuthbertson  
(1992)

### A3b Propagule dispersal: Other wild animals

---

Seeds are spread . . . by animals.

Parsons & Cuthbertson  
(1992)

### A3c Propagule dispersal: Water

---

Major flows in the Finke River in 1974 dispersed seed along its entire length, and the wet conditions that followed were ideal for seed establishment. Further floods in 1983 and 1984 enabled more Athel pine to establish, from seed and vegetable matter, probably from those trees established in the 1974 floods.

Fuller (1993b)

Seeds are spread principally by floodwaters . . .

Parsons & Cuthbertson  
(1992)

It can colonise disturbed areas by broken limbs carried by water.

Tesky (1992)

### A3d Propagule dispersal: Wind

---

The minute seeds [of *Tamarix aphylla*] are furnished with a pappus, making them fit for long distance dissemination.

Waisel (1960)

Seeds are small enough to be carried over short distances by the wind.

Csurhes (2008)

Seeds have a pappus, making them suitable for wind transportation, but they are viable for only a few weeks.

Griffin et al. (1989)

Fruit is small, sessile, capsule like and ripens in the cold season. The capsules contain minute seeds. Ripe capsules turn brown and open up gradually to allow the minute seeds to be dispersed by the wind.

CAB International (2000)

### A4a Human dispersal: Deliberate spread by people

---

Athel pine was introduced into Australia to provide shelter against wind and sun and for use as an ornamental in the arid and semi-arid zone. It was planted extensively around Broken Hill and Whyalla in the 1930's and 40's and soon after in other states, particularly around homesteads, stock yards, bores and other hot, exposed sites on grazing properties and towns.

Csurhes (2008)

All infestations originated from trees planted around homesteads and communities for shade.

Fuller (1993b)

### A4b Human dispersal: Accidentally by people and vehicles

---

There is evidence to suggest that Athel Pine is spread accidentally by people, particularly via vegetative material adhering to heavy machinery such as earth moving equipment, road graders etc.

C. Brown [NT Weed Management Branch, Alice Springs] 2007, pers. comm.

### A4c Human dispersal: Contaminated produce

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It would not be spread by contaminated produce.

C. Brown [NT Weed Management Branch, Alice Springs] 2007, pers. comm.

## Weed Risk Assessment - Evidence Used

### A4d Human dispersal: Domestic/farm animals

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le that it could be spread by domestic and feral herbivores.

C. Brown [NT Weed Management Branch, Alice Springs] 2007, pers. comm.

### B IMPACTS

---

#### B1 What is the plant's competitive potential?

---

Dominates sandy riparian habitats in arid areas such as Finke River and excludes all other vegetation.

Csurhes (2008)

Along the Finke River it has formed many monospecific stands at the expense of the river red gum (*Eucalyptus camaldulensis* Dehnh.), and the coolibah (*Eucalyptus microtheca* F. Muell), considerably reducing the available grazing area.

Parsons & Cuthbertson (1992)

Few native herbs persist under the dense infestations.

Fuller (1993b)

#### B2 What is the plant's potential to modify the existing fire behaviour and alter the fire regime?

---

Because they are drought tolerant and fire resistant, athel pines decrease the frequency of fires and alter vegetation structure.

Commonwealth Department of Environment and Heritage (2003)

Athel pines do not allow fire to pass through an area and as a consequence natural fire regimes are altered. This can affect the regeneration of many native plant species.

Csurhes (2008)

*T. aphylla* is fire-hardy and is a useful species to plant as a firebreak. The salt drip from branches becomes moist due to its hygroscopic nature and suppresses other inflammable vegetation. Moreover, the leaf litter is too saline to burn. It can be grown in 30 m wide strips to check the spread of wildfires common in dry regions.

CAB International (2000)

*T. aphylla* is not known to increase fire risks.

Dudley (2004)

The high ash (30-40%) and salt content of its foliage make it hard to burn even when dry.

Tesky (1992)

#### B3 What is the plant's potential to restrict the physical movement of people, animals, vehicles, machinery and/or water?

---

Presence of the trees may alter the course of rivers.

Fuller (1993b)

Athel pine increases soil sedimentation in arid rivers systems.

Humphries et al. (1991)

Increases in the density of tamarisks may well alter the river's course and increase sedimentation rates by trapping and stabilising sediments during floods.

Griffin et al. (1989)

Extensive, old stands lower the water table and cause water holes to dry up.

Csurhes (2008)

#### B4 What is the plant's potential to negatively affect the health of animals and/or people?

---

*Tamarix* spp. are relatively unpalatable to most classes of livestock and

Athel tamarisk foliage contains phenolic acids which may prevent herbivory.

Tesky (1992) wildlife.

## Weed Risk Assessment - Evidence Used

### B5a Natural & cultural values: Reducing habitat quality for native animals

---

- Dominates sandy riparian habitats in arid areas such as Finke River and excludes all other vegetation. In places, river red gums (*Eucalyptus camuldulensis*) an icon of central Australia, have been replaced by Athel Pine. Unlike eucalypts, athel pines do not provide nesting hollows or food for native wildlife. Csurhes (2008)
- The displacement of eucalypts by tamarisks has resulted in dominance of the ground vegetation by a relatively few species or introduced or salt-tolerant plants. Griffin et al. (1989)
- Fewer birds occurred in the area invaded by tamarisks. Birds could find tamarisks unsuitable as they provide only tiny flowers which presumably attract few insects and no nectarivorous birds; their foliage is devoid of herbivorous species; and, tamarisks probably suppress ground-dwelling insects because of depauperate litter fauna. Fewer herbs and forbs grow through the litter to provide substrate for invertebrates. In addition, hole-nesting birds probably decline in abundance near tamarisk infestations during breeding periods, due to the absence of tree-hollows in tamarisk stands. Griffin et al. (1989)
- Fewer reptiles occurred in the area invaded by tamarisks. Reptiles could find tamarisks less suitable as: the litter beneath tamarisks appeared to contain sparse populations of litter invertebrates; and tamarisk deposited few logs or dead branches on the ground, and those on the ground did not have the same thick persistent bark of the eucalypts that encourages colonization by reptiles. Griffin et al. (1989)

### B5b Natural & cultural values: Threatened species of communities

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- One threatened species affected, common brush tail possum. J. Woinarski [NT Biodiversity Conservation] 2007, pers. comm.
- Athel Pine does have a significant impact on the natural values of inland waterways such as the Finke River as it can dominate large sections of the river channel excluding native river red gums and coolabahs. These inland riverine areas form significant breeding and refuge areas for native wildlife. C. Brown [NT Weed Management Branch, Alice Springs] 2007, pers. comm.
- In central Australia, the common brushtail possum now occupies riverine habitat that is close to rocky outcrops and moist gullies within the ranges or rocky slopes (Kerle *et al.* 1992). This habitat occurs on various geological substrates but is characterized by a diverse association of fire-sensitive plant species. Its former habitat in central Australia included river systems supporting large eucalypts, coolibah claypans and spinifex grasslands with a shrubby overstorey (Burbidge *et al.* 1988). Burbidge et al. (1988)  
Kerle et al. (1992)  
Pavey (2006)

### B5c Natural & cultural values: Sites of natural and cultural significance

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- The Finke and several other water courses are listed as nationally significant wetlands and river red gums are characteristic of these sites. Duguid et al. (2002)  
J. Woinarski [NT Biodiversity Conservation] 2007, pers. comm.

### B6a Environmental health: Soil chemistry/stability

---

- Their extensive roots also extract all soluble salts from the soil; these are excreted through the glands in the leaves onto the top of the soil in the form of litter or 'tears', thus causing salinisation of top soil even in non-saline areas, reducing the growth of nearby plants up to a distance of 50 m. CAB International (2006)
- Athel pine tolerates saline water and exudes large quantities of salt through its leaves, leading to increasing levels of salinity in surrounding soil. Csurhes (2008)

## Weed Risk Assessment - Evidence Used

Tamarisk tolerates saline water and exudes large quantities of salt through its leaves; the salt concentration on the foliage may be up to 50 times that in the root water supply.	Berry (1970)																
Leaf litter from <i>T. aphylla</i> can significantly increase soluble salts in the soil surface, with the mean values under the canopy about twice or three times as high as out in the open.	Litwak (1957)																
Fig. 1 Mean of total soluble salts (in parts per million) in soil under the canopy of <i>Tamarix aphylla</i> and in the open (from Litwak, 1957).																	
<table border="1"> <thead> <tr> <th>Depth</th> <th>Under canopy</th> <th>In open</th> <th>Difference</th> </tr> </thead> <tbody> <tr> <td>0 cm</td> <td>1201 ± 345</td> <td>480 ± 120</td> <td>721*± 299</td> </tr> <tr> <td>40 cm</td> <td>1198 ± 216</td> <td>512 ± 102</td> <td>678**± 250</td> </tr> <tr> <td>80 cm</td> <td>859 ± 187</td> <td>490 ± 78</td> <td>368**± 57</td> </tr> </tbody> </table>	Depth	Under canopy	In open	Difference	0 cm	1201 ± 345	480 ± 120	721*± 299	40 cm	1198 ± 216	512 ± 102	678**± 250	80 cm	859 ± 187	490 ± 78	368**± 57	
Depth	Under canopy	In open	Difference														
0 cm	1201 ± 345	480 ± 120	721*± 299														
40 cm	1198 ± 216	512 ± 102	678**± 250														
80 cm	859 ± 187	490 ± 78	368**± 57														
* Significant at 0.05, ** Significant at 0.01																	
The change in soil composition was also affected by the age of the trees, with total soluble salts highest under large mature trees.																	
<b>B6b Environmental health: Water quality</b>																	
Presence of the trees may increase sedimentation rates.																	
	Fuller (1993b)																
Exotic tamarisk trees have become established along several hundred kilometres of the Finke River, the largest river system in arid central Australia. Establishment appears to have deposited large quantities of sediment on the levees.																	
	Griffin et al. (1989)																
Athel pine increases soil sedimentation in arid rivers systems.																	
	Humphries et al. (1991)																
<b>B6c Environmental health: Hydrology</b>																	
Athel pine is a hydrophyte, which means it has specialised roots that draw water from deep underground. It uses large quantities of water and dense stands can have significant impacts on underground water tables.																	
	Csurhes (2008)																
<i>Tamarix aphylla</i> is known to lower ground water tables.																	
	Csurhes & Edwards (1998)																
Extensive, old stands lower the water table and cause water holes to dry up.																	
	Csurhes (2008)																
<b>C POTENTIAL DISTRIBUTION</b>																	
<b>C1 What is the CLIMATE suitability score (which indicates the proportion of the NT environment that is suitable for the plant)?</b>																	
The native range of <i>T. aphylla</i> extends over the Middle East, North, East and Central Africa, and parts of West and South Asia. The species is thought to have originated in the Central Sahara, from where it spread to Pakistan, India, Afghanistan, the Middle East, Egypt and North Africa, as well as to Eritrea, Somalia, Kenya and Ethiopia.																	
	CAB International (2000)																
Tamarix aphylla has a very wide range of distribution in North Africa and in Western Asia...It is assumed to be indigenous in Morocco, Algeria, Tunisia, Central Sahara, Lybia, Egypt, Sudan, Israel, Trans-jordan, Syria, Iraq, Arabia, Yeman, Iran, Baluchistan, Sind and Punjab.																	
	Waisel (1960)																
It is an aggressive, fast growing species which survives in areas where annual rainfall is as low as 100 mm (optimum growth is probably 350-500 mm per annum).																	
	National Academy of Sciences (1980)																
The CLIMATE model used by the NT Weed Management Branch predicts that 88% of the NT is climatically suitable for athel pine (see Figure 1).																	
	NT Weed Management Branch (2007)																



## Weed Risk Assessment - Evidence Used

**C2**      **How many broad vegetation types in the NT will the plant potentially naturalise in (up to 5) ?**

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The broad vegetation types that *Tamarix aphylla* will potentially naturalise in are:

- Arid and semi-arid wetlands
- Arid riparian

The favoured vegetation type is arid riparian.

NT Weed Risk Management Committee (2007)  
Rossiter-Rachor (2012)

Vegetation types: deserts; dry forests; dunes

**C3**      **What is the potential of the plant to occur throughout its favoured habitat in the NT (identified in question 2)?**

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*Tamarix aphylla* has the potential to occur through some of its favoured habitat.

CAB International (2000)  
NT Weed Risk Management Committee (2007)

## Feasibility of Control - Evidence Used

### A CONTROL COSTS

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#### A1a Distinguishing features

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*Tamarix aphylla* (Athel pine) is a spreading tree reaching 10 m in height. The leaves are blue green and are similar in appearance to pine needles. Flowers are pinkish white and are arranged in racemes at the end of the branches.

Csurhes & Edwards (1998)

Always distinct.

P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

#### A1b Active growth period

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Active growth period 4-8 months (spring/summer).

P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

#### A1c Height at maturity

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The height at maturity is >2m.

P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

*Tamarix aphylla* (Athel pine) is a spreading tree reaching 10 m in height.

Csurhes & Edwards (1998)

### A2 Is general accessibility of infestations at the optimum treatment time?

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The general accessibility of infestations is Medium.

P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

Medium (all work done with 4WD quadbikes).

C. Brown [NT Weed Management Branch, Alice Springs] 2007, pers. comm.

#### A3a Chemical cost

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Chemical Costs: Medium Category (\$250-\$500/Ha).

Athel pine does not translocate chemical well

In the maximum density infestation of Athel pine (like has been on the Finke) there would be large broken bark stems plants, as well as seedlings coming up.

Would need to use:

- 4-5 L of access of Garlon/ha @ \$70/L = 280-350
- 1000L of diesel /ha @ \$1.80/L

Therefore would cost \$2080 - \$2150 per hectare.

[Note: This would place Athel pine control in the **Very High** (>\$500 /ha) chemical costs category]

C. Brown [NT Weed Management Branch, Alice Springs] 2007, pers. comm.

P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

#### A3b Labour costs

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The labour costs for controlling a maximum density Athel pine infestation would include people to do basal bark control, as well as spraying seedlings, and someone operating the earthmoving equipment. [Note: This would place Athel pine control in the Very high (>\$500 /ha) labour costs category]

P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

Labour Costs: High (\$200-\$500).

C. Brown [NT Weed Management Branch, Alice Springs] 2007, pers. comm.

## Feasibility of Control - Evidence Used

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### A3c Equipment costs

Equipment Costs: High (for dense stands of mature trees as requires bulldozer).

C. Brown [NT Weed Management Branch, Alice Springs] 2007, pers. comm. P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

### A4 What is the general community perception of this weed within the region?

The general community perception of Athel pine is High. Well known weed in the Alice Springs region.

P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

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## B CURRENT DISTRIBUTION

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### B1 What is the current pattern of the weed's distribution across the weed's range?

Athel pine's distribution in the Alice Springs region is Scattered.

P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

In the Northern Territory athel pine is mainly found in the central region of the Northern Territory, where it has been extensively planted on Aboriginal communities and at homesteads, bores and roadhouses as far north as the Barkly region. Athel pine is well established in the Finke River.

Department of Land Resource Management (2014)

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## C PERSISTENCE

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### C1 How long will it take to reach the maintenance period?

Medium. It is likely to take 2-5 years to reach the maintenance period.

P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

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### C2 What is the minimum time period for reproduction of sexual or vegetative propagules?

The minimum time for reproduction is within 1 year.

P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

The first flowers appear in about the third year, and annually thereafter, in summer.

Parsons & Cuthbertson (1992)

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### C3 What is the maximum longevity of sexual or vegetative propagules?

## Feasibility of Control - Evidence Used

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Seed viability is moderate (ca. 22% under best conditions) and seed production period [in America] is fairly restricted, but because millions of seeds can be produced, under the right conditions the potential for invasion is theoretically very high.	Dudley (2004)
Although a single tree can produce 500 000 seeds. The seed is short lived, lasting only a few weeks.	Griffin et al. (1989)
About 60% of stem tissues produce new shoot/roots under greenhouse conditions, while root cutting was less successful, producing only about 19% new shoot growth. [Note that this paper only refers to <i>Tamarix</i> spp.]	Brock (1994)
<i>T. aphylla</i> cuttings lose their vitality after losing one-third of their water content.	Waisel (1960)
<i>Tamarix aphylla</i> can reproduce by seed, but most spread is via broken living plants that are transported in floodwaters.	Csurhes & Edwards (1998)
The maximum longevity of <i>vegetative</i> propagules is greater than five years.	P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

### C4a Long-distance dispersal by natural means

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Major flows in the Finke River in 1974 dispersed seed along its entire length, and the wet conditions that followed were ideal for seed establishment. Further floods in 1983 and 1984 enabled more Athel pine to establish, from seed and vegetable matter, probably from those trees established in the 1974 floods.	Fuller (1993b)
Seeds are small enough to be carried over short distances by the wind.	Csurhes (2008)
It can colonise disturbed areas by broken limbs carried by water.	Tesky (1992)
Seeds are spread principally moved by floodwaters.	Parsons & Cuthbertson (1992)
Seeds are spread . . . by animals	Parsons & Cuthbertson (1992)
Long-distance dispersal of Athel pine by natural means is likely to be rare.	P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.
<i>T. aphylla</i> can reproduce by seed, but most spread is via broken living plants that are transported in floodwaters.	Csurhes & Edwards (1998)

### C4b Long-distance dispersal by human means

It would not be spread by contaminated produce but there is the possibility that it could be spread by domestic and feral herbivores.	C. Brown [NT Weed Management Branch, Alice Springs] 2007, pers. comm.
Long-distance dispersal of Athel pine by human means is likely to be rare	P. Jeffery, M. Fuller & G. McSkimming [weed control contractors] 2007, pers. Comm.

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Athel pine  
*Tamarix aphylla*

Athel pine was introduced into Australia to provide shelter against wind and sun and for use as an ornamental in the arid and semi-arid zone. It was planted extensively around Broken Hill and Whyalla in the 1930's and 40's and soon after in other states, particularly around homesteads, stock yards, bores and other hot, exposed sites on grazing properties and towns.

Csurhes (2008)

All infestations originated from trees planted around homesteads and communities for shade.

Fuller (1993b)

There is evidence to suggest that Athel Pine is spread accidentally by people, particularly via vegetative material adhering to heavy machinery such as earth moving equipment, road graders etc.

C. Brown [NT Weed Management Branch, Alice Springs] 2007, pers. comm.



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