



Fauna Rehabilitation Plans Tunks Park Bushland

Middle Harbour Catchment Area

2003

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REHABILITATION PLAN

Tunks Park Bushland

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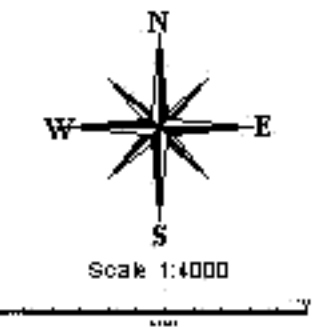
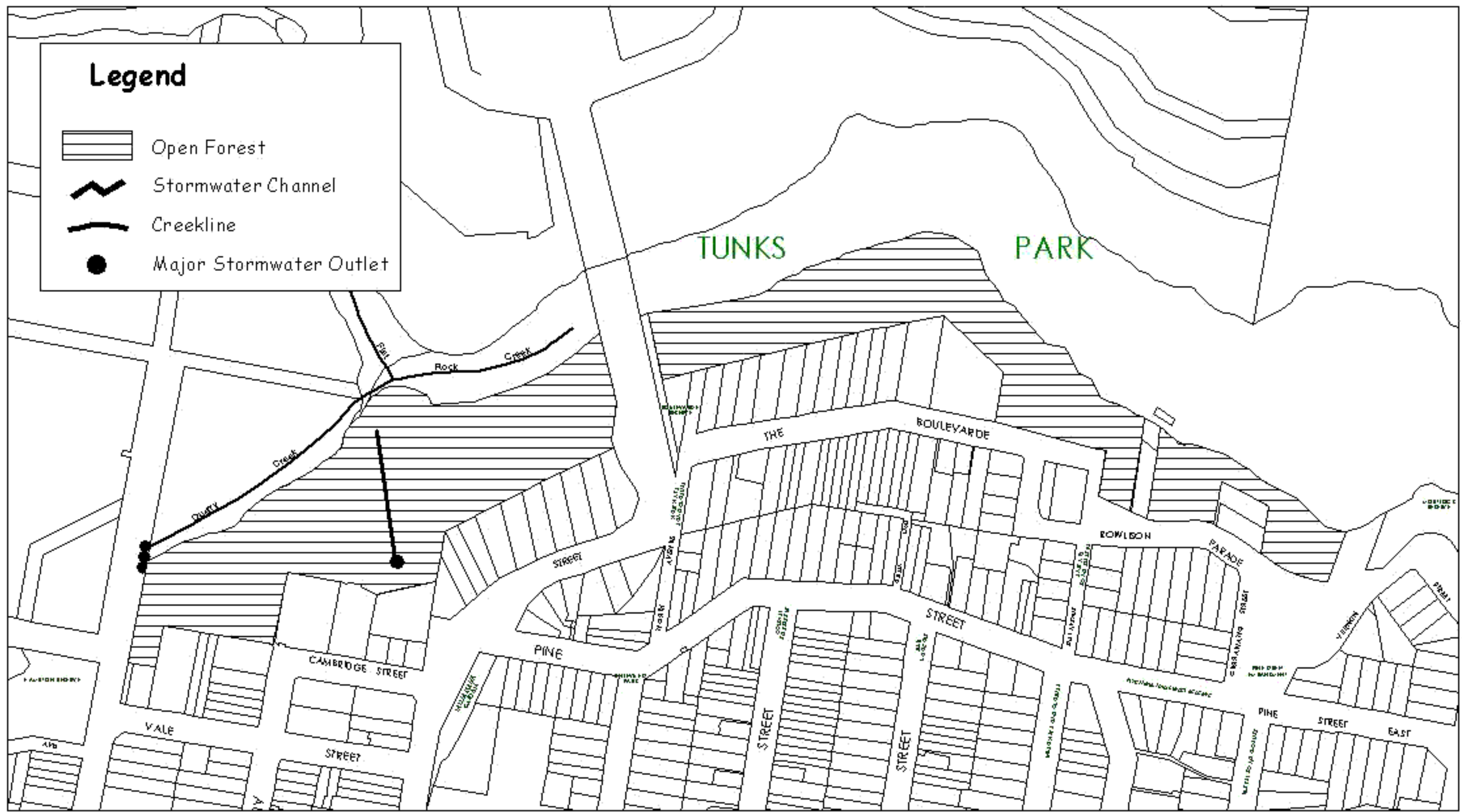
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Map 1 - Vegetation Zones

INTRODUCTION

Tunks Park Bushland consists of a narrow north-facing strip bordered by residential properties, sports fields, the waters of Flat Rock Creek and associated tributaries. Stormwater enters the main tributary at the junction of Marks St and Hamilton Lane, Crows Nest. The area is approx. 55 130m². The dominant vegetation association is an *Angophora costata* (Sydney Red Gum) and *Eucalyptus resinifera* (Red Mahogany) Open Forest with *Eucalyptus pilularis* (Blackbutt) Open Forest dominating to the west. Weed species are dominant along property boundaries, creekline edges and the numerous stormwater drains located at various points throughout the bushland area.

Bush regeneration activities are carried out by the Tunks Park Bushcare Group, Tunks Park West Bushcare Group, Council's Bushland Management Team and bush regeneration contractors. The bushland at Tunks Park forms an important link to Mortlock Reserve to the east and the bushland of Flat Rock Gully located in the Willoughby Council area.

The bushland is mainly utilised by passive recreationists. The absence of a formal track system through the bushland has limited certain issues that lead to bushland degradation eg. creation of informal tracks, trampling of vegetation, the presence of dogs and their faeces, litter and vandalism. The creation of informal tracks can lead to soil erosion due to the loss of vegetation, soil compaction and the invasion of weed species.

Native fauna throughout the North Sydney Local Government Area is not very diverse or abundant. However, the fauna of Tunks Park is relatively diverse and abundant due to the relative large size of the reserve and diversity of habitat provided. Many bird species persist, and it has the highest recorded bird species, equalled with Primrose Park, in North Sydney (Ekert, 2002). Several reptiles, plus frog, owl, bat and possum species also inhabit Tunks Park Bushland.

1.0 FLORA

Refer to **Map 1 -Vegetation Communities** for location details.

Tunks Park consists of two remnant vegetation communities that are part of the Sydney Sandstone Complex – Sydney Sandstone Gully Forest (10ag) as indicated by Benson and Howell, 1994. The vegetation is symbolic of the North Shore and consists of:

1. *Angophora costata* (Sydney Red Gum) and *Eucalyptus resinifera* (Red Mahogany) Open Forest dominated by a midstorey of *Allocasuarina littoralis* (Black She-oak), *Hakea dactyloides* (Broad-leaved Hakea), *Grevillea linearifolia* (White Spider Flower), *Elaeocarpus reticulatus* (Blueberry Ash), *Glochidion ferdinandi* (Cheese Tree) and an understorey of *Lomandra longifolia* (Mat Rush), *Dianella caerulea* (Blue Flax Lily) and native grasses (including *Entolasia* sp.).
2. *Eucalyptus pilularis* (Blackbutt) Open Forest with a dominant midstorey of *Dodonaea triquetra* (Native Hop Bush), *Pittosporum undulatum* (Sweet Pittosporum), *Glochidion ferdinandi* (Cheese Tree) and *Entolasia stricta* in the understorey.

For further information see:

Appendix E – Indigenous Flora of North Sydney Database

1.1 Creekline Vegetation

The creekline receives stormwater from the greater residential catchment of Cammeray. The piped stormwater enters the creekline below the junction of Hamilton Lane and Marks Street, Cows Nest. This tributary continues through the bushland and joins the main creek (Flat Rock Creek) that originates in the Willoughby bushland area in the upper catchment. Flat Rock Creek flows beneath the sports fields of Tunks Park via several underground concrete channels and drains to Long Bay.

Remnant creekline vegetation includes *Callicoma serratifolia* (Black Wattle), *Acmena smithii* (Lily Pily), *Ceratopetalum apetalum* (Coachwood), *Elaeocarpus reticulatus* (Blueberry Ash), *Glochidion ferdinandi* (Cheese Tree), *Polyscias sambucifolia* (Elderberry Panax) and *Clerodendrum tomentosum* (Hairy Clerodendrum). Weed species are also found throughout the bushland edges of the creekline. These are discussed below.

The original estuarine plant community at the mouth of the creekline adjacent to Long Bay was lost during the construction of the sports fields in the 1950's. This area would have contained mangrove thickets, mudflats and habitat for a wide variety of estuarine flora and fauna. Remnant vegetation of the lost estuarine environment can still be witnessed on the lower edges of the bushland. Native species include *Casuarina glauca* (Swamp She-oak), *Gahnia aspera* (Sword Grass) and *Juncus usitatus* (Common Rush).

1.2 Weed Assessment

Weed species are present in the reserve due to many factors.

The creekline is a source of weed seed and increased nutrient pollution from the upper catchment. This has resulted in the spread of weed species along the banks of the creekline below. Large Leaf Privets (*Ligustrum lucidum*) and pockets of Lantana (*Lantana camara*) line the banks of the creek in some areas. Exotic vines are also present in the area eg. Morning Glory (*Ipomea indica*) and Balloon Vine (*Cardiospermum grandiflorum*). Other prominent weed species found along the creekline are Cassia (*Senna pendula*), Madeira Vine (*Anredera cordifolia*) and Camphor Laurel (*Cinamomum camphora*).

Weed species found adjacent to the rear of residential properties are present due to many factors which contribute increased moisture and nutrients to the bushland edge. These include:

- 'Hard surface' runoff from impervious surfaces eg. driveways, concrete paths, roofs;
- Garden watering systems and pools;
- Imported fill soil and major disturbance to the original soil structure;
- Use of fertiliser; and
- Dumping of garden clippings into bushland that has enabled many ornamental species to spread throughout the reserve.

Native species that are usually found along rainforest margins eg. *Pittosporum undulatum* (Sweet Pittosporum), *Elaeocarpus reticulatus* (Blueberry Ash) and *Glochidion ferdinandi* (Cheese Tree) are successfully colonising areas of Open Forest. These native species flourish in elevated soil moisture and nutrient conditions and in areas where fire has been excluded for long periods.

The original soil profile has been disturbed in some locations and the native seed bank (found in the topsoil) has been buried or lost. The native seed bank takes many years to develop and mature. Major soil disturbance makes unassisted native plant regeneration almost impossible. To assist regeneration, sections of the bushland may have to be planted with local indigenous species. The placement of these plants will reflect their natural occurrence in the existing bushland ecosystem.

Weed species also invade along the edge of the bushland. The perimeter of bushland along the edge of the sport fields is highly impacted by 'edge effects' where the bushland is bordered by lawn grass species and wind borne seeds are most likely to be deposited along these edges as the bushland slows down wind velocities.

2.0 FIRE

2.1 Fire History

During 1996 a broad area burn was undertaken in bushland on the western side of the Suspension Bridge. Preparation for the burn included tree injection of large woody weeds such as Large Leaf Privet (*Ligustrum lucidum*), Camphor Laurel (*Cinamomum camphora*) and control of Ochna (*Ochna serrulata*) throughout the understorey. Fire trails were cut through the bushland to protect local residences and the adjoining bushland that was not part of the planned burn area. The burn was assisted by two local Fire Brigades and Council's Bushland Management Team.

The fire was successful in increasing the diversity of native species. Weed species to emerge after the burn included Ink Weed (*Phytolacca octandra*), Blackberry Nightshade (*Solanum nigrum*) and Lantana (*Lantana camara*).

Due to the success of the native plant regeneration following the broad area burn, future burns will be planned for this area.

Fire is an ecological tool required to sustain the plant communities of Tunks Park. There are several areas throughout Tunks Park that require burning for the purposes of maintaining diversity and stimulating the germination of native seeds which lay dormant in the soil. Some species can be eliminated from a bushland area due to the absence of fire.

As addressed in the Bushland Fire Management Policy, 1997: Section 4 – 'several areas that contain high fuel levels require burning not only for ecological purposes but also to manage the fuel levels on some sites'.

3.0 FAUNA

Information used in this section has been compiled from the Fauna Survey conducted by Dr Arthur White and the Biosphere Environmental Consultants in March 2002. Fauna sightings recorded on the Fauna of North Sydney Database 2003 and the North Sydney Bushland Continuing Bird Survey Interim Report by Peter Ekert and the Ekerlogic Consulting Services in December 2002 has also been considered. However, these two surveys are not specific for each reserve, rather the broader area of Middle Harbour Catchment.

For further information see:

Section 1.7 – Method

Appendix B – Fauna Survey Middle Harbour Bushland Reserves 2002

Appendix D – Fauna of North Sydney Database 2003

Appendix M - North Sydney Bushland Continuing Bird Survey Interim Report 2002

3.1 Terrestrial Vertebrates Overview

There is a relatively wide diversity of fauna species within the bushland areas of Tunks Park. Ringtail Possums (*Pseudocheirus peregrinus*), Brushtail Possums (*Trichosurus vulpecular*) and the Grey-headed Flying-fox (*Pteropus poliocephalus*) frequent the area on nightly foraging trips.

Eastern Water Dragons (*Physignathus lesueurii*) have been sighted along the creeklines and stormwater runoff areas. Usually both adults and juveniles can be witnessed. This suggests that there is a healthy population present in the area. The Blue-tongue Lizards (*Tiliqua scincoides*) and Eastern Water Skinks (*Sphenomorphus quoyii*) are commonly found in the area. The Green Tree Snake (*Dendrelaphis punctulata*), the Golden-crowned Snake (*Cacophis squamulosus*) and the Red-bellied Black Snake (*Pseudechis porphyriacus*) are rarely seen.

Common bird species can be found in the bushland of Tunks Park. These include the Noisy Miner (*Manorina melanocephala*), the Australian Magpie (*Gymnorhina tibicen*), the Pied Currawong (*Strepera graculina*) and Rainbow Lorikeets (*Trichoglossus haematodus*). Other common species that have been sighted in the bushland include the Grey Butcherbird (*Cracticus torquatus*), the Red Wattlebird (*Anthochaera carunculata*), and the Black-faced Cuckoo-shrike (*Coracina novaehollandiae*).

The Southern Boobook Owl (*Ninox novaeseelandiae*) occasionally visits the bushland area. This species has also been witnessed hunting Ringtail Possums in Cremorne Point bushland and also in the bushland of Gore Cove, in Wollstonecraft. Tawny Frogmouth Owls (*Podargus strigoides*) are found in the bushland of Tunks Park

The Common Koel (*Eudynamis scolopacea*) and the Channel-billed Cuckoo (*Scythrops novaehollandiae*) are both migratory species visiting in Spring and Summer each year from the Asia Pacific Region.

Less common species include the White-headed pigeon (*Columba leucomela*), the Eastern Whip-bird (*Psophodes olivaceus*), the White-browed Scrub-wren (*Sericornis frontalis*), Azure Kingfisher (*Alcedo azurea*) and the Spotted Pardalote (*Pardalotus punctatus*).

The Australian Kookaburra (*Dacelo novaeguineae*), Magpie Lark (*Grallina cyanoleuca*), the Welcome Swallow (*Hirundo neoxena*) and the Willy Wagtail (*Rhipidura leucophrys*) are occasionally witnessed along the bushland edges. A pair of Masked Lapwings (*Vanellus miles*) are commonly seen on the sports fields adjacent to the bushland area.

The Crimson Rosella (*Platycercus elegans*) and periodically, the Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*), and the Sulphur-crested Cockatoo (*Cacatua galerita*) have been seen in Tunks Park Bushland perhaps seeking out any available nesting hollows.

There is a lack of nesting hollows in Tunks Park due to the absence of mature native trees that tend to bear such hollows. Native birds, arboreal mammals and bat species suffer from the lack of

safe nesting and roosting sites. These creatures play an important role in the ecology of the vegetation communities of Tunks Park. They act as pollinators, natural seed dispersal units, and aid in the germination of some native plant species

For further information see:

Appendix D – Fauna of North Sydney Database 2003

3.2 Other Native Fauna Groups

- Terrestrial Invertebrates
- Aquatic Vertebrates, and
- Aquatic Invertebrates.

A formal survey of the diversity and abundance of Terrestrial Invertebrates has never been undertaken by North Sydney Council. It is recommended that more detailed studies be undertaken in the future. Aquatic birds are recorded in the Fauna Survey and the Fauna of North Sydney Database, however it is recommended that a more comprehensive study of Aquatic Vertebrate fauna also be undertaken in the future.

Aquatic Macro-invertebrates are regularly sampled in water testing of creeklines in North Sydney as indicators of water quality. This testing is carried out by the Open Space and Environmental Services division.

For further information contact:

North Sydney Council Open Space and Environmental Services division.

For further information see:

Appendix D – Fauna of North Sydney Database 2003

3.3 Introduced and Feral Animals

Tracks, scats and other traces of the Red Fox (*Vulpes vulpes*) have been identified in Tunks Park and one fox was sighted in the Fauna Survey. The Red Fox would probably have a territory covering the area of both Tunks Park and adjoining Willoughby Council bushland areas.

Two exotic species of rodent dwell in Tunks Park: the Black Rat (*Rattus rattus*) and House Mouse (*Mus musculus*).

Six introduced bird species were recorded in the Fauna Survey: House Sparrow (*Passer domesticus*), Red-Whiskered Bulbul (*Pycnonotus jocosus*), Common Starling (*Sturnus vulgaris*), Common Mynah (*Acridotheres tristis*), Rock Dove (*Columba livia*) and Spotted Turtle Dove (*Streptopelia chinensis*).

European Honey Bees (*Apis mellifera*) are also known to have created hives in tree hollows in the reserve.

3.4 Pets

Dogs are frequently seen throughout the bushland of Tunks Park, and often not on leads. Dog scats were found throughout the Fauna Survey. Residential dwellings back onto Tunks Park (the lower section is bordered by an oval). It is highly probable that domestic cats prowl in the bushland of Tunks Park.

It is North Sydney Council policy that dogs must be on a lead whilst in bushland and that dog owners must pick up after their dogs. Under the *Companion Animals Act 1999*, cats are prohibited from harming native fauna. This is only possible if cats are kept out of the reserve. North Sydney Council encourages owners to keep cats inside all or most of the time.

For further information see:

Section 1.4.3 – Relevant Legislation: *Companion Animals Act, 1999*

Appendix J – Cat Attack and Fates of Native Animals of North Sydney Council From 1992 – 2001; Some Statistics for Ringtail Possums – 1 July 2001 to 30 June 2002, Sydney Metropolitan Wildlife Services

3.5 Vulnerable and Threatened Species

The only Vulnerable and Threatened species known to visit Tunks Park is the Grey-headed Flying-fox (*Pteropus policephalus*), listed as Vulnerable Schedule 2 under the *NSW Threatened Species Conservation Act 1995*. This species is frequently seen flying over and feeding in the reserve. Under this Act critical habitat is required to be protected. Tunks Park Bushland provides a food source for this species.

The Powerful Owl (*Ninox strenua*) has been recorded in the area on the Fauna of North Sydney Database. It is likely that this species may visit the area for food but it is unlikely that it nests or roosts in the area at present. The Powerful Owl is listed as a Vulnerable Species on Schedule 2 of the *NSW Threatened Species Conservation Act 1995*.

For further information see:

Section 1.4.3 – Relevant Legislation: *NSW Threatened Species Conservation Act 1995*

Section 1.5.13 – Specific Habitat Requirements

3.6 Locally Rare Species

The first sighting of Gould's Wattle Bat (*Chalinolobus gouldii*) in Tunks Park was recorded by the Fauna Survey 2002, flying over the western end of the reserve. This species of insectivorous micro-bat was first discovered in North Sydney in the Fauna Survey of Port Jackson Catchment in Gore Cove Bushland in 2001. This species was also recorded in Primrose Park and Brightmore Reserve in the Fauna Survey.

One of the two remaining species of large lizards, the Eastern Water Dragon (*Physignathus lesueuri*) lives around edges of the creekline in Tunks Park. The other large lizard being the Blue-tongue Lizard (*Tiliqua scinooides*) that was not recorded the Fauna Survey, however it has been recorded in the Fauna of North Sydney Database. This reserve is also home to the Southern Leaf-tail Gecko (*Phyllurus platurus*). The Green Tree Snake (*Dendrelaphis punctulata*), the

Golden-crowned Snake (*Cacophis squamulosus*) and the Red-bellied Black Snake (*Pseudechis porphyriacus*) have been seen on rare occasions.

Water birds such as the White-faced Heron (*Ardea novaehollandiae*), Little Pied Cormorant (*Phalacrocorax melanoleucos*) and Little Black Cormorant (*Phalacrocorax sulcirostris*) and Australian Pelican (*Pelecanus conspicillatus*) live around the waters edges of Tunks Park.

Small insectivorous birds such as the Eastern Yellow Robin (*Eopsaltria australis*), Superb Blue Fairy-wren (*Malurus cyaneus*), Silveryeye (*Zosterops lateralis*) and the White-browed Scrub-wren (*Sericornis frontalis*) also inhabit Tunks Park. These species are locally significant and indicators of the health and habitat provided by bushland.

Less common species include the White-headed pigeon (*Columba leucomela*), the Eastern Whip-bird (*Psophodes olivaceus*), Eastern Spinebill (*Acanthorhynchus tenuirostris*) and the Spotted Pardalote (*Pardalotus punctatus*). Periodically, Yellow-tailed Black Cockatoos (*Calyptorhynchus funereus*) are seen flying over and feeding in the reserve. In Summer 2002, a pair of Sacred Kingfishers (*Todiramphus sanctus*) were seen nesting in a termite nest in a Eucalypt tree in Tunks Park.

Crimson Rosellas (*Platycercus elegans*) are frequently sighted in the reserve. And although not indigenous to the region, Sulphur-crested Cockatoo's (*Cacatua galerita*) and Galah's (*Cacatua roseicapilla*) are also seen in Tunks Park.

The only nocturnal bird recorded in the Fauna Survey and regularly in the reserve is the Tawny Frogmouth (*Podargus strigoides*). The Southern Boobook Owl (*Ninox novaeseelandiae*) and Powerful Owl (*Ninox strenua*) have been recorded in the area on the Fauna of North Sydney Database. The Powerful Owl is listed as a Vulnerable Species on Schedule 2 of the *NSW Threatened Species Conservation Act 1995*. Owls are significant and also indicative of ecosystem health, as these creatures require large tracks of bushland, specific habitat and a food source of substantial prey (such as moths and Ringtail Possums).

Migratory species, the Common Koel (*Eudynamis scolopacea*) and the Channel-billed Cuckoo (*Scythrops novaehollandiae*) visit in Spring and Summer each year from the Asia Pacific Region for breeding. Pairs return to the same site each year to parasitise the nests of Pied Currawongs (*Strepera graculina*), Australian Ravens (*Corvus coronoides*), Australian Magpies (*Gymnorhina tibicen*), Magpie-larks (*Grallina cyanoleuca*) and Red Wattle Birds (*Anthochaera carunculata*).

For further information see:

Appendix C – Conservation Status of Wildlife in North Sydney
Section 1.5.13 – Specific Habitat Requirements

4.0 FAUNA REHABILITATION MANAGEMENT PLAN

4.1 Habitat Protection for Locally Significant Species

The aim of the Rehabilitation Plan for Tunks Park Bushland is to protect and enhance habitat for all known locally occurring native fauna. By doing so, these measures may help provide habitat for more occasional visiting and species uncommon to the area.

Species Habitat Protection and Restoration:

Mammals:

Common Brushtail Possum (*Trichosurus vulpecular*)

Brushtail Possums spotted mainly in the western end of the park.

Common Ringtail Possum (*Pseudecheirus peregrinus*)

Ringtail Possums present in both the eastern and western ends of the park.

Grey-headed Flying Fox (*Pteropus poliocephalus*)

Flying foxes observed flying over the reserve and feeding in tall Paperbark trees.

Gould's Wattle Bat (*Chalinolobus gouldii*)

Detected flying over Flat Rock Creek in the western end of the park.

Birds:

Australian Magpie	<i>Gymnorhina tibicen</i>
Australian Raven	<i>Corvus coronoides</i>
Australian Pelican	<i>Pelecanus conspicillatus</i>
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>
Common Koel	<i>Eudynamis scolopacea</i>
Crested Pigeon	<i>Geophaps lophotes</i>
Crimson Rosella	<i>Platycercus elegans</i>
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>
Eastern Yellow Robin	<i>Eopsaltria australis</i>
Eastern Whip-bird	<i>Psophodes olivaceus</i>
Grey Butcherbird	<i>Cracticus torquatus</i>
Laughing Kookaburra	<i>Dacelo novaeguineae</i>
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>
Little Pied Cormorant	<i>Phalacrocorax melanoleucos</i>
Magpie-lark	<i>Grallina cyanoleuca</i>
Masked Lapwing	<i>Vanellus miles</i>
Powerful Owl	<i>Ninox strenua</i>
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>
Red Wattlebird	<i>Anthochaera carunculata</i>
Sacred Ibis	<i>Threskiornis aethiopicus</i>
Sacred Kingfisher	<i>Todiramphus sanctus</i>
Silvereye	<i>Zosterops lateralis</i>
Southern Boobook Owl	<i>Ninox novaeseelandiae</i>

Spotted Pardalote	<i>Pardalotus punctatus</i>
Superb Blue Fairy-wren	<i>Malurus cyaneus</i>
Tawny Frogmouth	<i>Podargus strigoides</i>
Welcome Swallow	<i>Hirundo neoxena</i>
White-browed Scrub-wren	<i>Sericornis frontalis</i>
White-headed Pigeon	<i>Columba leucomela</i>
White-faced Heron	<i>Ardea novaehollandiae</i>
Willy Wagtail	<i>Rhipidura leucophrys</i>
Yellow-tailed Black Cockatoo	<i>Calyptorhynchus funereus</i>

Reptiles:

Eastern Water Skink (*Eulamprus quoyii*)
Found along Flat Rock Creek.

Grass Skink (*Lampropholis guichenoti*)
Present in western end of Tunks Park.

Delicate Skink (*Lampropholis delicata*)
Found in the eastern and western parts of Tunks Park.

Eastern Water Dragon (*Physignathus lesueuri*)
Found in Flat Rock Creek.

Southern Leaf-tail Gecko (*Phyllurus platurus*)
Found in sandstone areas near Quarry Creek.

Blue-tongue Lizard (*Tiliqua scinoides*)
Recorded in the Fauna of North Sydney Database.

The Green Tree Snake (*Dendrelaphis punctulata*), Golden-crowned Snake (*Cacophis squamulosus*) and Red-bellied Black Snake (*Pseudechis porphyriacus*)
Recorded occasionally on the Fauna of North Sydney Database

Frogs:

Common Eastern Froglet (*Crinia signifera*)
Present in wet areas near Flat Rock Creek.

Striped Marsh Frog (*Limnodynastes peronii*)
Present in a drain leading into Quarry Creek from Quarry Road.

4.2 Summary of Fauna Survey Findings

Native fauna throughout the North Sydney Local Government Area is not diverse or abundant. However, the fauna of Tunks Park is relatively diverse and abundant due to the relative large size of the reserve and diversity of habitat: Open Forest and remnant creekline vegetation.

No ground-dwelling native mammals were found. Two possum species were observed, with Ringtail Possums (*Pseudecheirus peregrinus*) being higher in abundance than Brushtail Possums (*Trichosurus vulpecular*). Two species of exotic rodent were present. A Red Fox (*Vulpes vulpes*) was also seen. Two species of Bats were detected: the Grey-headed Flying Fox (*Pteropus poliocephalus*) and Gould's Wattle Bat (*Chalinolobus gouldii*).

Thirty-one species of bird were recorded, with six of these being exotic. The Continuing Bird Survey observed twenty-six species of birds in Tunks Park Bushland. It is equalled only by Primrose Park in numbers of bird species for bushland areas in North Sydney.

Five species of reptile were identified and two frog species.

For further information see:

Appendix B – Fauna Survey Middle Harbour Bushland Reserves 2002

Appendix M – North Sydney Bushland Continuing Bird Survey Interim Report 2002

4.3 Site Issues and Objectives

SITE ISSUES

- Tunks Park once bounded a bay including mud flats and a creekline. The bay was filled in for playing fields. Flat Rock Gully, once a waterfall and creekline area (on Willoughby Council side of Tunks Park Bushland) was filled in and used as a rubbish dump. This area is now being restored by Willoughby City Council with the Flat Rock Gully Project. This change in landscape has impacted on the surrounding remnant vegetation.
- Tunks Park is bordered by playing fields to the north, and residential dwellings to the south. The border of houses will have impacts of domestic animals, artificial lighting shining into the reserve, and garden plant escapees.
- The large grassed areas of the playing fields, provides important habitat for native birds such as the Masked Lapwing, Welcome Swallow, Sacred Ibis, and Australian Magpie.
- Bordered by residential dwellings, Tunks Park has the potential for encouraging residents to plant native habitat gardens with the 'Native Havens – Flora for Fauna in your Garden' program, and to educate residents on domestic pets and native fauna.
- Bordering Willoughby City Council, this reserve has the potential to work in with North Sydney Council. Vegetation diversity is far higher in Willoughby than North Sydney, probably due to larger tracts of bushland and more recent urbanisation. Plant species from Willoughby could be sourced to increase overall biodiversity. Corridors between Willoughby and North Sydney may allow more native fauna to travel between the two areas and populate Tunks Park Bushland.

OBJECTIVES

Tunks Park Bushland

- To protect the diversity of vegetation communities and habitats,
- To promote biodiversity,
- To re-establish native vegetation and community structure of connective canopy, dense middle storey and understorey vegetation,
- To preserve and create shelter sites,
- To create Green Corridors and Wildlife Linkages,
- To create clean fresh water sources,
- To reduce the effect of 'edge effects',
- To eradicate all feral animals – namely, the Red Fox
- To reduce the effect of domestic and introduced animals on native fauna,
- To reduce the effect of aggressive and territorial native species (Noisy Miner, Pied Currawong) on native fauna,
- To encourage the practice of Bush Regeneration work that preserves and protects habitat,
- To reduce the artificial light shining directly into the reserve,
- To educate and facilitate residents wishing to create native fauna habitat gardens.

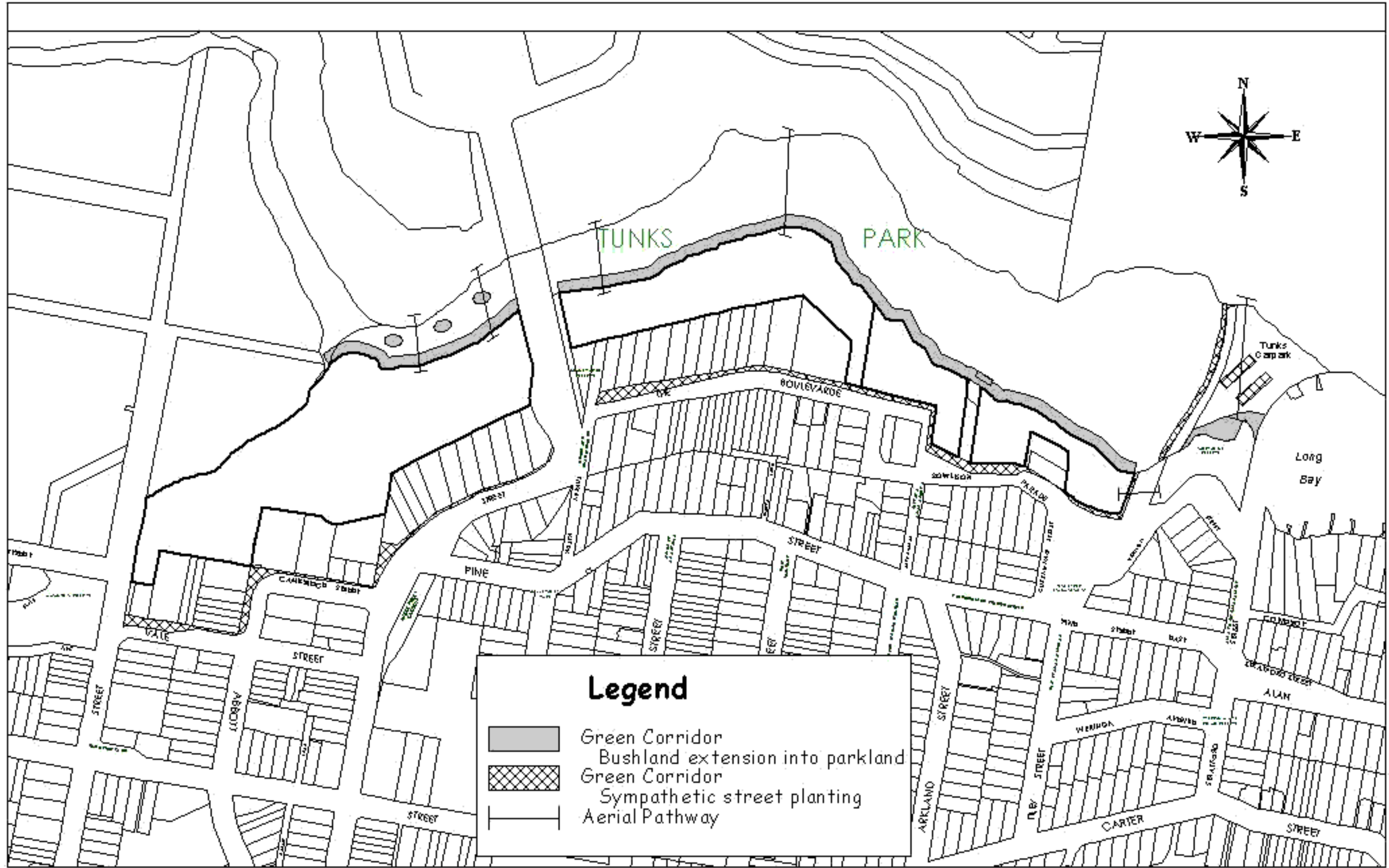
4.4 Nesting seasons of Scrub Birds

This table is to be used when considering the timing of pile burns and broad area burns, and primary bush regeneration. These activities should be carried out outside the breeding season of scrub birds. This is a list of scrub birds that are known to inhabit or thought to most likely inhabit (*) this bushland reserve.

Table 1 – Bird Species, Nesting Height above Ground and Nesting Season

Common Name	Height (m)	J	F	M	A	M	J	J	A	S	O	N	D
Superb Blue Fairy-wren	Up to 1m												
* White-browed Scrub-wren	On or near ground												
Silvereye	1 – 5m												
* Eastern Spinebill	1 – 5m												
* Grey Fantail	1 – 6m												
Eastern Yellow Robin	Up to 7m												
* Brown Thornbill	Low shrubs												
* Buff-rumped Thornbill	Low shrubs												
Willy Wagtail	1 – 20m												
Red Wattlebird	3 – 10m (-20)												
* Golden Whistler	Up to 5m												
* Rufous Whistler	Up to 10m, mostly lower												
* Red-browed Finch	Up to 8m, often thorny												
* Eastern Whipbird	0.5-4m dense under-growth												

Key  Indicates breeding season



5.0 ACTION PLAN

Refer to **Map 2 – Rehabilitation Zones and Green Corridor Proposal**

Priority

The priority ratings given to each action in the matrix are subject to the availability of staff, funding and existing ideologies at the time of creation. For these reasons modification of priorities may occur as special circumstances arise.

ST	(Short Term)	Action completed within 2 years.
MT	(Medium Term)	Action completed within 2-4 years.
LT	(Long Term)	Action commenced after 4 years.
O	(Ongoing)	Action is carried out on a regular basis for the life of this action plan.
C	(Commenced)	Action has commenced.
CP	(Completed)	Action has been carried out.
AN	(As Needs Basis)	Action to be carried out on an as needs basis.

Table 2: Management Strategies for Tunks Park Bushland

For further information on all Action objectives see **Section 2.1** *Management Strategies for North Sydney Local Government Area*, and **Section 2.2** *Statement of Management Practices for Bush Regeneration Works*.

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
1, 2, 3	Declaration of Fauna Conservation Area	Lack of protection for native fauna under the Local Government Act.	Zone areas 1, 2 & 3 'Wildlife Protection Areas' under the <i>Companion Animals Act, 1998</i> .	- All Native Fauna	There are few walking tracks in Tunks Park Bushland and conservation value is high. See Section 1.4.3 <i>Relevant Legislation</i> .	ST
All	Replacement of lost shelter sites.	Loss of shelter sites.	Leave and replace rocks, logs, leaf litter and dead trees. Create temporary artificial shelter sites in areas that have been cleared. Place educational signage stating the importance of leaving these items in bushland areas.	- Reptiles - Frogs - Terrestrial Mammals	Dead trees should be left safe. They may need to be lopped back to stags. Collars of at least 30cm should be left where branches are to be removed, to allow for hollows to develop. Rocks and logs can be used in landscaping bush regeneration sites.	O

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
All	Weed removal techniques that preserve habitat.	Over-clearing and loss of shelter and habitat for native fauna in bush regeneration work.	<p>Apply mosaic clearing pattern technique to bush regeneration work.</p> <p>Clear only, an area no larger than 20m x 20m or 1/3 of the site.</p> <p>Leave areas of weeds (de-seeded) that provides middle storey vegetation and/or connective canopy.</p> <p>Ensure Contract Tenders include native fauna habitat protection and ensure site supervisor follows habitat protection methods.</p> <p>Primary Bush Regeneration and removal of scrub layer to be carried out outside scrub bird breeding season.</p>	<ul style="list-style-type: none"> - All Native Fauna - Small Bird Species - Possums 	<p>Lantana (<i>Lantana camara</i>) often provides the only habitat for small birds such as Superb Blue Fairy-wrens.</p> <p><i>Pittosporum undulatum</i> is frequently over cleared in bush regeneration works, often providing the only middle storey vegetation for possums and birds.</p> <p>See Table 1: Bird Species, Nesting Height above Ground and Nesting Season.</p>	O

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
All	Recreation of Natural Vegetation Structure.	Lack of connective canopy.	Create a Tree Plan for the reserve. Plant indigenous canopy species in areas lacking canopy. Install aerial pathways between areas lacking connective canopy. See: 'Installation of Aerial Pathways'.	- Possums	Dieback is occurring in the Burn Site in several Blackbutts (<i>Eucalyptus pilularis</i>). The cause is unclear, but large Termite nests inhabit each of these trees.	ST O
		Lack of dense middle storey vegetation.	Use of fire as a tool to regenerate middle storey vegetation. 'Direct Seed' middle storey species where the use of fire is inappropriate or has been unsuccessful. Plant middle storey seedlings where the use of fire is inappropriate or has been unsuccessful.	- Small Bird Species - Ringtail Possums	Loss of middle storey vegetation is one of the primary causes for loss of native fauna.	ST O
		Lack of understorey vegetation.	Remove weeds to encourage natural regeneration. Use of fire as a tool to encourage regeneration.	- Reptiles - Terrestrial Mammals - Invertebrates - Birds foraging for insects	Some species of ground covers generally always naturally regenerate.	ST O

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
			Plant or direct seed indigenous ground covers where natural regeneration has been unsuccessful.			
All	Reduce 'Edge Effect'	'Edge Effect' changing flora and fauna species diversity, allowing invasion of weed species and predation.	Plant 'Buffer Plants' along edges of reserves.	- Small Bird Species - Reptiles	For appropriate buffer species see Section 2.1.5 Buffer Planting .	MT C
			Advertise and encourage the 'Native Havens –Flora for Fauna in your Garden' program.	- Small birds - Reptiles - Birds - Possums	In 1996 the pilot project 'Backyard Bushcare' was trialed for residents backing onto Tunks Park. The project received some positive response.	O
All	Creation of 'Core' Conservation Area	Lack of core area with minimal disturbance and 'edge effect'. Disturbance from pedestrian traffic.	Reduce the number of walking tracks. Create formal walking tracks with boardwalks.	- All Native Fauna	There are few walking tracks through Tunks Park Bushland. Boardwalks over water puddles will create habitat for frogs.	AN
All	Creation of Green Corridors and Wildlife Linkages	Isolated pockets of bushland.	Create Green Corridors and linkages by extending indigenous planting on the playing fields and at Tunks car park.	- Large Bent-wing Bats - Birds - Some Terrestrial Fauna	See Map 2 for proposed Green Corridor plantings. Green Corridor planting needs to take into consideration views. To prevent blocking views, shrubs should only be used.	LT

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
			Advertise and encourage the 'Native Havens –Flora for Fauna in your Garden' program.	- Small birds - Reptiles - Birds - Possums	In 1996 the pilot project 'Backyard Bushcare' was trialed for residents backing onto Tunks Park. The project received some response.	O
All	Effective Fire Management	Lack of fire and subsequent and loss of vegetation diversity and middle storey vegetation.	Broad Area and/or Pile Burns approximately every 10 years. Broad area burn to be no greater than 1/4 of reserve area.	- All Native Fauna	Broad area and pile burns should be carried out outside breeding times of scrub birds. See Table 1: Bird Species, Nesting Height above Ground and Nesting Season.	O
2			Broad Area Burn carried out in 1996.		Regeneration of greater diversity and abundance was achieved than prior to pre-burn.	CP
3	Creation of Fresh Water Sources	Lack of clean freshwater sources.	Create Frog Ponds. Ensure clean stormwater is released into stormwater outlet through the use of Gross Pollutant Traps and public education. Recreate a natural creekline in Quarry Creek, and include ponds.	- Birds - Reptiles - Frogs	See Appendix H: Frog Facts No.2. The 'Yellow Fish Road' project in 2001 – 2002 aimed to educate people that 'the drain is just for rain'.	LT CP LT

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
1, 2, 3			Create Bird Baths.	- Birds	See Appendix I: How to Build a Bird Bath.	MT
All	Feral Animal Control	The Red Fox – Predator of native fauna.	Carry out Fox Baiting Program; and Den Fumigation.	- Possums - Birds - Reptiles	Fox baiting has not yet been carried out in Tunks Park. Willoughby Council has carried out fox baiting in the Willoughby side of Tunks Park.	ST O
		European Honey Bees - Occupy critical habitat of nesting hollows.	Remove Bee hives by blocking the hollow containing the bees, or to kill with flame or smoke.	- Possums - Parrots	Some hollows occupied by bees can be high and difficult to get too. Apiarists can be hired for assistance and/or Bee hive removal. Removal of hollow or killing with an insecticide is not favourable.	ST O
		European Honey Bees - Interfere with natural and successful pollination of native vegetation.		- Native Bees	Loss of small pollinating mammals and many bird species has also affected the loss of pollination of many species.	
		Indian Mynahs - Occupy tree hollows	Trap by use of Tree Netting or removal in nesting hollow.	- Possums - Parrots	Indian Mynahs may not be in high enough numbers in bushland areas in North Sydney for Tree Netting.	ST O

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
		Feral Cats - Predator of native fauna.	Set Cat Traps. Cats to be taken to the local vet to be euthanased.	- Possums - Birds - Reptiles	To date no feral cats have been sighted in North Sydney.	AN
		Rabbits - Destroy native seedlings and regeneration.	Set Rabbit Traps.	- Native Plant Regeneration	Few rabbits have been sighted in North Sydney's Middle Harbour. These have been escaped or dumped pet rabbits. The <i>Calicivirus</i> is not known to have reached North Sydney.	AN
All	Domestic Animal Control	Disturbance from dogs and dog scent; dog faeces affecting bushland soil pH and nutrient status; and dog predation.	Install educational signage around reserves, stating that dogs need to be kept on leads in bushland areas and that owners need to pick up after their dog. Provide dog bins at either end of bushland reserve walking tracks. Educate residents with the 'Enviro-pet: North Sydney Guide to Pets and Native Fauna' publication.	- All Native Fauna	Dogs disturb, chase and some kill native fauna. This disturbance and scent cause some nesting birds and possums to abandon nests. One dog bin is situated in Tunks Park playing field. 'Enviro-pet: North Sydney Guide to Pets and Native Fauna' is an educational booklet addressing the issue of pets and native fauna to be distributed to all pet owners in North Sydney in mid 2003.	ST C ST C

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
			Increase Ranger patrol and enforcement laws.			ST O
		Domestic cat predation, scent, and faeces.	<p>Instate cat curfews and cat exclusion from bushland areas. See 'Declaration of Fauna Conservation Area'.</p> <p>Educate resident cat owners with 'Enviro-pet: North Sydney Guide to Pets and Native Fauna'.</p> <p>Trap cats found in bushland areas and return to the owner with a letter or take to Pound.</p>	- All Native Fauna	<p>Domestic cats are responsible for the deaths of many native fauna.</p> <p>'Enviro-pet: North Sydney Guide to Pets and Native Fauna' is an educational booklet addressing the issue of pets and native fauna to be distributed to all pet owners in North Sydney in mid 2003.</p> <p>The only way to effectively stop cat predation is to keep cats in doors, all the time or at least during dusk, evening and dawn.</p>	ST O C ST O
All	Minimise Artificial Lighting	Residential, street, footpath, and playing field lighting obstructing nocturnal faunal vision and reducing the overall effective habitat area of reserve.	<p>Install light shields on street, footpath and playing field lighting next to reserves.</p> <p>Educate residents backing onto the reserve to not direct lighting into the reserve.</p>	- Possums - Owls - Nocturnal Fauna	<p>Tawny Frogmouths benefit from lights, as lights attract moths and other insects.</p> <p>Light shields will not impact negatively on Tawny Frogmouths.</p>	MT

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
All	Installation of Nesting Boxes	Lack of nesting and breeding hollows.	Install nesting boxes bushland reserve for Possums and Parrots.	<ul style="list-style-type: none"> - Hollow Nesting Fauna - Parrots - Brushtail Possums - Ringtail Possums - Owlet Nightjars 	<p>Nesting boxes can be made for many hollow dwelling species.</p> <p>For further information on nest box designs refer to <i>The Nest box Book: Nestboxes for Birds and Mammals (1997)</i> Gould League of Victoria Inc.</p> <p>Nesting Boxes have been successful in attracting Ringtail Possums and some Brushtail Possums.</p> <p>In 2003 Council Employed 'Sleepy Hollows' to make and install Possum Boxes throughout reserves in North Sydney.</p> <p>Nesting Boxes have not yet proven successful in North Sydney in attracting Parrots. Boxes for other species have not yet been trialed.</p> <p>Nest Box invasion of European Bees needs to be monitored and boxes removed if invaded. Apiarists will remove and use hives.</p>	C ST O

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
					Bee swarming season, from November – January, instigates a higher chance of bees moving into boxes and installation should be avoided in this time. Indian Mynahs invading Nest Boxes has not been an issue in North Sydney.	
The Boul- evarde, Rowl- ison Pde	Installation of Traffic Calming Devices	Possum fatality on roads due to speeding vehicles.	Install traffic calming devices on roads adjacent to bushland areas.	- Possums - Blue-tongue Lizards	Contact North Sydney Council's Traffic Department.	LT
2 3	Installation of Aerial Pathways	Increased risk to possums due to lack of connective canopy and the need to come down to the ground.	Construct aerial pathways to allow possums to move safely over Miller Street. Construct aerial pathways between Tunks Park in North Sydney and bushland in Willoughby Council, over the playing field lacking connective canopy. Suggestion of up to 6 pathways.	- Possums	The RTA has trialed aerial pathways over large roads between bushland. Aerial pathways constructed over playing field to be installed by Council in conjunction with Willoughby Council. See Map 2 , for suggested Aerial Pathway construction.	MT

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
Various	Installation of Aerial Bundle Cabling	Frequent Possum and Bat electrocution in certain areas of aerial cables.	Install Aerial Bundle Cabling (ABC) on electric cables identified as having frequent bat and/ or possum electrocution. Identified areas need to be submitted to the OSES division.	-Possum -Grey-headed Flying-foxes	ABC is carried out by Energy Australia in conjunction with North Sydney Councils Open Space and Environmental Services Division (OSES).	LT O
3	Creepline and Closed Forest Restoration	Degraded waterways and creeklines. Loss of indigenous closed forest (rainforest) vegetation.	Regenerate indigenous creepline vegetation slowly without causing erosion. Carry out methods of natural regeneration, transplantation of clumped seedlings from other areas and, revegetation may need to be utilized. Plant native rainforest berry producing trees, such as <i>Acmena</i> sp. and <i>Syzygium</i> sp.	- Powerful Owl - Native Doves and Pigeons - Kingfishers - Dollarbirds - Spotted Pardelotes		MT C

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
All	Reduce Habitat Favoured by Aggressive Native Fauna	Large populations of the Noisy Miner and Pied Currawong.	<p>Re-establish dense middle storey vegetation in bushland areas through the use of fire, natural regeneration, planting or direct seeding.</p> <p>Plant shrubs and understorey vegetation only in island pockets and/ or in parkland.</p> <p>Discourage the planting of 'Robyn Gordon' and other large flowering hybrid Grevilleas in Parkland and private gardens, as they supply a large quantity of nectar to Noisy Miners.</p>	<ul style="list-style-type: none"> - Small Bird Species - Visiting and Migrant Birds - Possums out of their nest in daylight hours. 	<p>Dense middle storey vegetation provides shelter for small birds.</p> <p>Noisy Miners and Pied Currawongs are 'edge' species that utilize edges of bushland areas. Bushland in North Sydney is predominately small and narrow and dominated by large areas of 'edge'.</p> <p>Pied Currawongs and Noisy Miners favour stands of trees only as habitat.</p>	MT C
All	Pollution, Poison and Insecticide Control	Use of Insecticides, Pesticides and Organophosphates.	<p>Increase public education on the dangers of these chemicals to native fauna.</p> <p>Increase public education on organic gardening and natural alternatives to garden/ vegetable/ orchid pests.</p>	<ul style="list-style-type: none"> - Tawny Frogmouths - Insectivorous Birds - Blue-tongue Lizards - Insectivorous Reptiles - Frogs - Kookaburras, Magpies, Butcher Birds - Owls 	<p>Birds and reptiles that consume poisoned insects store the toxin in their fat reserves. In times of food shortage, fat reserves are used and the toxin is released.</p> <p>These poisons cause a painful death due to attacking the Central Nervous System.</p>	MT O

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
		Use of Rat Poison that indirectly kills Possums.	Increase public education on the dangers of rat poison to native fauna.	- Antechinus - Possums	Possums will eat and die from rat poison.	MT O
		Use of Rat poison to directly kill possums.	Increase public education on how to live with Possums. Sell Possum Boxes at cost price to the community. Distribute Councils publication 'Living with Possums' that addresses this issue.	- Brushtail and Ringtail Possums	Some residents, frustrated with having a possum in their roof, or eating their garden plants will purposely poison or trap possums and release them into bushland, causing probable death.	C O
3		Pollution and toxins entering waterways. Eg. Pesticides	Enforce tighter controls and fines on industry, companies and persons who pollute waterways , through the Environmental Protection Association.	- Fish & Crustaceans - Water Birds that eat fish and crustaceans - Ducks and Water Birds - Frogs	A toxin discharged into the catchment of Flat Rock Creek in March 2003 killed all fish and aquatic fauna. This toxic outbreak will then affect native fauna higher in the food chain and water birds and reptiles that live in the creek.	O
All	Seasonal food availability.	Loss of vegetation diversity. Loss of food availability all year round, particularly in winter.	Plant a diversity of vegetation that provides a mixture of flowers, seeds and berries throughout the year.	- Nectivore and Frugivore Birds - Possums	For further information see: Table 1.4: <i>Flowering and Fruiting Times of Native Trees and Shrubs.</i>	O MT

Zone	Objective	Threatening Process	Action	Fauna Protected	Comments	Priority
All	Re-introduction of Native Fauna	Loss of biodiversity.	Re-introduce Blue-tongue Lizards into suitable habitat.	-Blue-tongue Lizards	<p>These species can be bred and the program overseen by a trained Herpetologist and Apiarist.</p> <p>Permission is needed from the NSW National Parks and Wildlife Service.</p> <p>See Section 2.1.20: Re-introduction of Native Fauna.</p>	LT
2			Re-introduce Native Bees into suitable habitat.	- Native Bees - Native Flora		