

**INTRODUCED CORELLA
ISSUES PAPER**
April 2014



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Introduction

Background

Two species of introduced Corella, the Little Corella (*Cacatua sanguinea*) and the Eastern Long-Billed Corella (*Cacatua tenuirostris*), are currently known to reside in the Bunbury area, although the Little Corella is the more prevalent of the two. Neither species is native to the local area; they largely originate from other parts of Australia and either escaped or were released from aviaries, and subsequently bred in the wild (Department of Environment and Conservation (DEC), 2009a).

Introduced Corellas were first reported as causing a nuisance in Bunbury in August, 2010, when a flock of between 500 and 1000 birds were roosting in trees around Horseshoe Lake.

As they have no natural predators besides humans, and as access to food and water is unrestricted, numbers have been increasing over time and are expected to continue increasing. It is inevitable that the adverse impacts they cause will also increase as their population expands. As well as causing nuisance through excess noise and fouling, introduced Corellas also cause damage to playing surfaces such as grass fields, Astroturf and bitumen, and to other infrastructure such as aerials and wiring. They also cause significant damage to their roosting trees through continual pruning.

A recent survey by the Western Australian Local Government Association (WALGA) showed that introduced Corellas are considered to be a problem by ten local government authorities, six of which were in the Perth metropolitan area and four of which are in the South West.

Since 2010 when the issue came to light, City of Bunbury staff, together with stakeholders, have been undertaking various efforts to build their knowledge regarding the local population(s) of introduced Corellas and to explore control options.

The City of Bunbury continues to receive complaints from residents and businesses in the Bunbury area; this, combined with the potential escalating cost of repairs if management actions are not implemented has prompted the development of this Paper to investigate the issue and provide some guidance on potential management strategies.

A range of advisors, contractors and state government staff were consulted during the preparation of this Paper, the names and contact detail of these people are presented in **Appendix 1**. Note: Despite numerous attempts, the key Department of Parks and Wildlife (DPaW) contact for introduced Corellas, Mark Blythman, was not able to be contacted during the preparation of this Paper.

Purpose and scope of document

The purposes of this Paper are to:

- Compile existing information regarding introduced Corellas in the Greater Bunbury Region
- Document key issues and knowledge gaps
- Document history of local action and management to date
- Determine the existence of successful control methods exist by consultation/investigation of efforts in other jurisdictions
- Identify and justify proposed management strategies

Introduced Corella biology, natural distribution and behaviour

Biology

Little Corella – *Cacatua sanguinea*

The Little Corella is a small white cockatoo, approximately 35 – 40 cm in length (DEC, 2009a; Nevill, S. 2008). It has a small crest, white plumage that usually appears dirty, a blue grey ring of bare skin around the eye, and its wing and tail undersides are sulphur yellow (DEC, 2009a). The feathers located between the bill and the eye, as well as the bases of the feathers on the crown, cheek patches and throat, are rich salmon pink (DEC, 2009a). This colouration can be seen when the birds preen or the wind ruffles the feathers (DEC, 2009a). Vocalisations by the Little Corella consist of a variety of nasal and guttural sounds as well as high pitched screeches (Department of Environment and Heritage South Australia (DEH), 2007).

Four subspecies are recognised within Australia: *Cacatua sanguinea sanguinea*, *Cacatua sanguinea westralensis*, *Cacatua sanguinea gymnopis* and *Cacatua sanguinea normantoni*. A fifth subspecies, *Cacatua sanguinea transferta*, occurs in lowland New Guinea (DEH, 2007).

Subspecies Occurring within Western Australia

Cacatua sanguinea sanguinea - In general both adult males and females are white in colour with pink/orange lores and they have hidden bases of feathers of the head. They have dark grey/blue, bare eye rings which extend well below the eye and their eyes are dark brown. The juveniles are similar to the adults but they have a paler blue eye ring that is tinged grey/pink underneath the eye (World Parrot Trust, Accessed 11th July 2013).

Cacatua sanguinea westralensis - has brighter orange/red lores than the other subspecies, and the colour is more strongly washed through the feather bases of the head to the upper breast and mantle. The under-wings and under-tail are washed lightly with a deep yellow colour (World Parrot Trust, Accessed 11th July 2013).

Eastern Long-Billed Corella – *Cacatua tenuirostris*

The Eastern Long-Billed Corella is a white cockatoo, approximately 40 – 45 cm in length. It has a short rounded crest, a very long curved upper bill and extensive bright scarlet-orange colouring around the lores (between the eye and the upper base of the beak) and lower forehead above the base of the bill. This scarlet colouration passes over the eye and finishes at the rear of the eye. It has distinctive scarlet colouring to the base feathers at the top of its chest, giving it a 'cut-throat' appearance (DEC, 2009b; Nevill, S. 2008; Western Australian Museum, Accessed 11th July 2013).

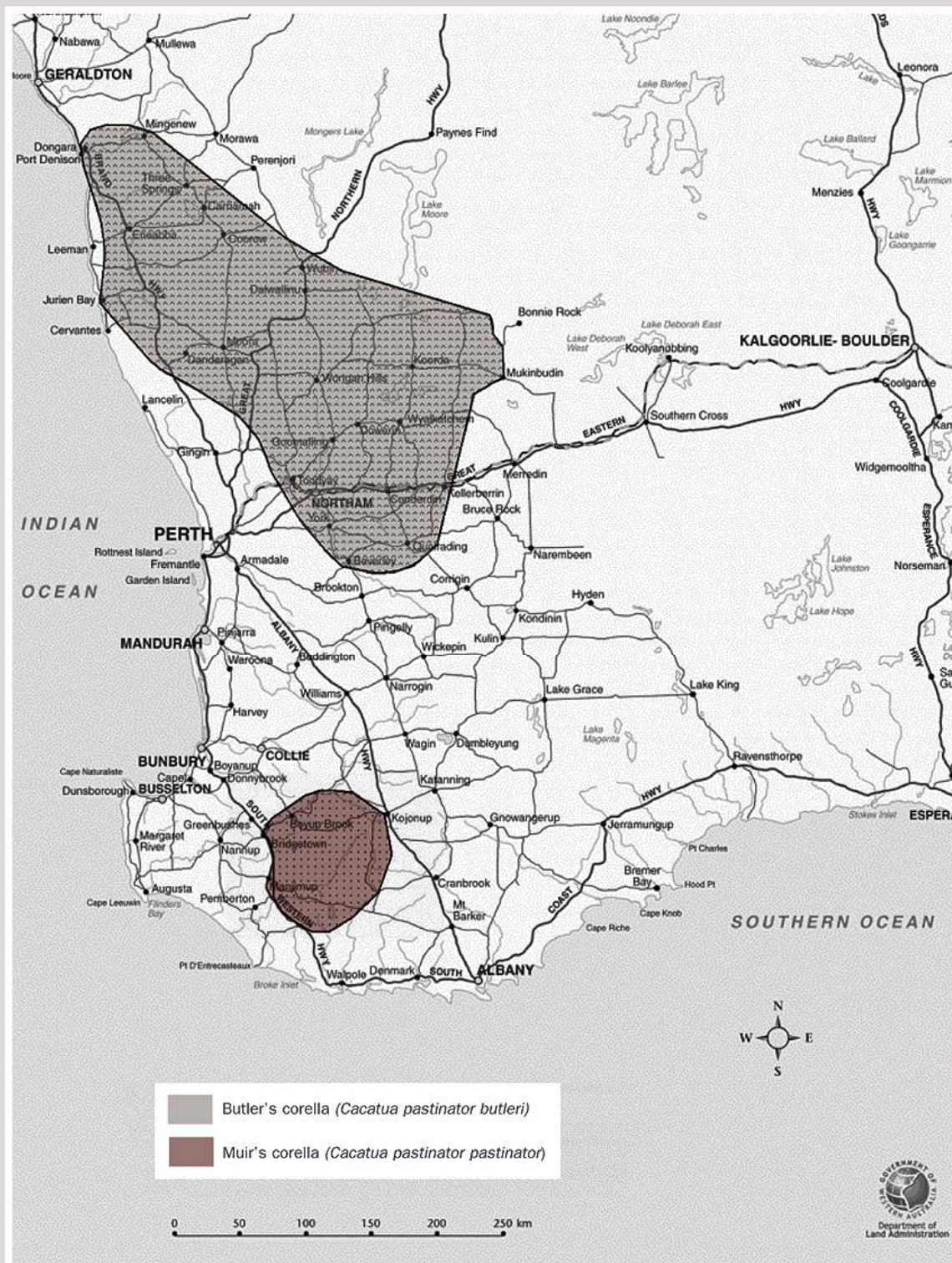
Difference to Endemic (Western) Corellas

The Western Long-billed Corella (*Cacatua pastinator*) is comprised of two geographically isolated sub-species: Muir's Corella (*Cacatua pastinator pastinator*), which is restricted to the far south west of Western Australia near and around Lake Muir, and Butler's Corella (*Cacatua pastinator butleri*), which occupies the northern and western central wheatbelt (**Figure 1**). (DEC, 2007a; DEC, 2009c; DEC, 2009d).

The Eastern Long-Billed Corella has the longest upper bill of all the corellas and is the only species with scarlet upper chest feathers. Of the two introduced Corella species in the Bunbury region, the Eastern Long-Billed Corella is most similar to the local Western Corella (*Cacatua pastinator*) (Nevill, S. 2008). Both species have a long upper bill and scarlet colouring around the lores, however the Western Corella is larger than the Eastern Long-Billed Corella and its crest is taller and more erect. Differentiation between the two species is further apparent in that the scarlet colouring is not as intense or as extensive, and is restricted to between the eyes and the base of the bill in the Western Corella - it is absent from the upper chest and does not pass over or behind the eyes as it does in the Eastern Long-Billed Corella (**Figure 2**) (Nevill, S. 2008).

The Little Corella is slightly smaller than the Western Corella and has a much shorter bill. Unlike the scarlet colouration in the Western Corella, it has faint pink lores and markings at the base of its bill (**Figure 2**) (Nevill, S. 2008).

The Little Corella can often be confused with Muir's Corella, however Muir's Corella has a taller crest, a longer more curved bill and a larger eye-skin. Muir's Corella also has pink colouration on the feather bases of its throat but these are partly concealed and therefore not obvious (DEC, 2009b). The Little Corella can also be confused with Butler's Corella as these species are very similar in appearance (DEC, 2009a), however neither the Muir's nor Butler's Corella occur in the Greater Bunbury Region.



Distribution of Butler's and Muir's corellas

Figure 1. Distribution Map of Muir's Corella, *Cacatua pastinator pastinator* and Butler's Corella *Cacatua pastinator butleri* in Western Australia (DEC, 2009b).



Figure 2. Comparative photos showing crest length in the three species, (L-R) Eastern Long-Billed Corella, Little Corella and Western Corella. Eastern Long-Billed Corellas have quite short crests compared to the other two species. Crest length is more similar between the Little Corella and the Western Corella but is typically slightly longer in the Western Corella. Note also the difference in upper mandible lengths and the extent of red colouration.

Image and caption taken from <http://wabirdingblog.blogspot.com.au/2013/02/id-feature-corellas.html>, photos by Alan Collins, John Graf and Robyn Pickering

Little Corellas in Perth and Bunbury are the morphological type that is originally from New South Wales and are not the result of an expansion of the range of the native Little Corella, the nearest population of which is in Three Springs.

Distribution

Little Corella – *Cacatua sanguinea*

The Little Corella is widespread across Australia and was originally only found in the north Western Australia. It does not naturally occur in the South West Region of Western Australia (DEC, 2012a). It occupies most types of open country, inhabiting timbered water courses, the surrounds of dams and tanks, grasslands and farm lands in particular (DEC, 2009a). In many areas of Australia, Little Corellas are locally common around stations and homesteads. In north Western Australia, they are found mainly in flat lands near larger water courses, towns, homesteads, farmlands and coasts (DEC, 2009a). In the Gascoyne and Pilbara regions of Western Australia, the Little Corella originally occurred from the Pilbara south to the Murchison River, where they lived around the water courses and foraged on the riverine plains (DEC, 2009a).

Subspecies Occurring in Western Australia

Cacatua sanguinea sanguinea is native to the North West of Western Australia and the Northern Territory (**Figure 3**) (Avibase, Accessed 11th July 2013). *Cacatua sanguinea westralensis* is native to Western Australia and predominately occurs in the Murchison River Area and the northern most parts of the Greater South West Region (**Figure 3**) (Avibase, Accessed 11th July 2013). There is no known subspecies of the little Corella that naturally occurs in the Greater Bunbury Region.

The distribution of the northern subspecies of Little Corella, *Cacatua sanguinea sanguinea*, appears to have remained much the same since the time of settlement (DEC, 2009a). The southern subspecies, *Cacatua sanguinea westralensis*, however, has expanded its range as a result of agricultural development (DEC, 2009a). Permanent water sources established for stock in pastoral areas has enabled the Pilbara population of Little Corellas to expand away from natural water sources and therefore away from their natural habitat (DEC, 2009a). In the northern wheatbelt, suitable habitat and food availability, made abundant by grain production, has enabled the Little Corella to expand further south to the extent that they are now locally common in and near towns such as Dongara, Mingenew and Three Springs (DEC, 2009a).

Movement Patterns

Little Corella – *Cacatua sanguinea*

Little Corellas are a mostly sedentary species, however they have been known to display larger movements in response to extreme climatic conditions. Typically, they have no large scale seasonal movements but populations will exhibit regular local movements with seasonal patterns. Erratic movements can often occur when they follow available food and water resources. During the breeding season (May to October), breeding pairs form and travel to riverine habitats where they nest in large colonies. At this time, immature and non-breeding individuals are more mobile and can disperse up to 250 km (Australian Museum, Accessed 11th July 2013; Exotic Corella Working Group, 2011).

According to a report by the DEH, South Australia, (2007), tagging studies have shown that Little Corellas are not faithful to flock or roost sites from year to year. Individuals will return to the same region, however they are capable of moving between flocks and roost sites. The study found that the Little Corella flocks have changing membership, which draws from all flocks in the entire region (DEH, South Australia, 2007). This means that in South Australia, populations of Little Corella are not closed but instead are capable of mixing with other Little Corellas from other areas. The tagging studies also showed that Little Corellas are often found in association with Galahs and other species, particularly when feeding (DEH 2007).

Eastern Long-Billed Corella – *Cacatua tenuirostris*

Eastern Long-Billed Corellas do not usually travel long distances; most flock movements are in relation to food and water resource. During the summer months and early autumn, large flocks form, concentrated around food sources. During the breeding months (July to November), flocks decrease in size as individuals pair off into monogamous breeding pairs (Exotic Corella Working Group, 2011; Accessed 11th July 2013).

Information relevant to both species of introduced Corella

Introduced Corellas shift location during the season; in summer they roost over or near water, in winter they roost over bitumen where they have access to radiant warmth. Both species have a preference for lit areas, assumedly due to the increased opportunity for predator detection such areas provide. Roosting also only occurs in trees that have branches with a particular vertical to horizontal angle, and appears to be more prevalent in species with open canopies.

In Perth, a portion of the introduced Corella population tends to relocate to the coast once breeding is over after having spent the breeding season in and around Guildford (inland). While the whole flock does not follow this pattern, sufficient numbers do, which reinforces the need for a coordinated and collaborative approach to control. This way, regardless of where the birds go, there is a strong likelihood that they will be trapped or shot.

Behaviour – breeding, feeding, roosting etc.

Little Corella – *Cacatua sanguinea*

Based on current information, there is no evidence to suggest that there are any differences in behaviour (breeding, feeding, roosting) between the subspecies of Little Corella that occur within the Greater Bunbury Region and those of other parts of Australia.

Little Corellas are sociable birds that are usually found in pairs or small flocks during the day, aggregating into large flocks when roosting. In the southern parts of their range, flocks can contain up to 1,500 individuals, while in the Kimberley flocks of 60,000 to 70,000 individuals have been recorded (DEC, 2009a).

Little Corellas tend to have traditional roosting sites, usually located in dense timber or close to water in the form of creeks and dams. In the mornings, they leave their roosting sites to feed and drink, preferring sites where they can obtain a clear all-round view (DEC, 2009a; Exotic Corella Working Group, 2011). During the middle of the day they shelter in tall trees, usually near their feeding and watering sites. Peak feeding times are early in the mornings and late in the afternoons. At these times, Little Corellas spend a great deal of time digging for buried seeds, freshly sown seeds and roots. In the evening they return to their roosting site and shelter there for the entire night (Exotic Corella Working Group, 2011).

The Little Corella primarily feeds on the ground on a diet mainly composed of grass seeds, with varying amounts of seed from other sources and bulbs depending on seasonal availability (DEC, 2009a). Their diet also includes nuts, fruits, berries, buds, shoots, flowers, roots, bulbs, corms and occasionally insect larvae, and they have also been observed feeding on onion weed (*Romulea rosea*) (Birdsinbackyards, Accessed 11th July 2013b).

Their natural diet includes seeds from Acacias and Eucalypts. In the wheatbelt they eat the seeds of Wheat (*Triticum aestivum*), oats (*Avena sativa*), double gee (*Emex australis*), pie melon (*Citrullus lanatus*), cape weed (*Arctotheca calendula*), barley (*Hordeum vulgare*), native plants and insect larvae. Further north, Little Corellas feed on the seeds of wheat, oats, burrs (*Sclerolaena* spp.), tickweed (*Cleome viscosa*) and melons. In the Kimberley, they feed on seeds of a variety of introduced and native plants such as; oats, sorghum (*Sorghum bicolor*), rice (*Oryza sativa*), spinifex (*Triodia* spp.), wheat and grasses (*Brachiaria* spp., *Aristida* spp.) (DEC, 2009a).

In aviaries, Little Corellas will eat sunflower seeds, safflower seeds, canary corn, hulled oats, millet, milo, wheat, apple, orange, almonds, peanuts, vegetables such as broccoli, corn, peas, silverbeet, plain Madeira cake, seeding grasses, insects such as grubs and mealworms and sometimes dried dog food (Exotic Corella Working Group, 2011).

In the northern parts of their range Little Corellas nest in hollows in boabs (*Adansonia gregorii*), river gums (*Eucalyptus camaldulensis*), large mangroves, cliff cavities and termite mounds. In the southern parts of their range Little Corellas nest in river gums, salmon gums (*Eucalyptus salmonophloia*), York gums (*Eucalyptus loxophleba*) and red morel (*Eucalyptus longicornis*) (DEC, 2009a).

Little Corellas form breeding pairs and are thought to mate for life. The breeding pairs nest in large colonies with several nests sometimes found in a single tree. In arid regions, where trees are often scarce, large numbers of individuals can congregate in one location (Australian Museum, Accessed

11 July 2013). Nesting appears to be more dispersed in the south west region (Exotic Corella Working Group 2011).

Breeding begins at the commencement of a long rain period (Australian Museum, Accessed 11 July 2013). One to four eggs are laid between the months of March and September (DEC, 2009a). Egg incubation takes approximately 24 days with fledging at approximately 6 to 8 weeks. Chicks become independent within a further 3 to 4 weeks (Birdcare, Accessed 11 July 2013a). The eggs are incubated by both the male and female parents; the males incubate the eggs during the day and the females incubate the eggs at night. Once born, the young are then fed by both female and male parents. Little Corellas reach sexual maturity at 3 to 5 years of age and in captivity they are known to have a lifespan of 20 years (Australian Museum, Accessed 11 July 2013).

Eastern Long-Billed Corella – *Cacatua tenuirostris*

In the wild, Eastern Long-Billed Corellas forage on the ground. Their natural foods include seeds, fruits, leaf buds, flower buds, nuts, fruiting bodies from trees and shrubs and insects. Opportunistic in terms of food resources, they are known to feed on paddock stubble, grass seeds (particularly those from grain crops), corms, bulbs (especially onion grass (*Romulea spp.*)), roots, sunflower seeds, insects and native plants such as Murnong (*Microseris lanceolata*) (DEC, 2009b).

In aviaries, they will eat canary corn, corn, hulled oats, millet, milo, sunflower seeds, safflower seeds, apples, oranges, almonds, peanuts, vegetables such as broccoli, corn, peas and silverbeet, plain Madeira cake, seeding grasses, insects such as grubs, mealworm larvae, pupa, beetles and sometimes dried dog food (Exotic Corella Working Group, 2011).

Eastern Long-Billed Corellas nest in the hollows of large old Eucalyptus trees and sometimes in the cavities of loose, gravelly cliffs. Breeding generally takes place from around July through to November (DEC, 2009b; Travelling Australia – Birds, Accessed 11th July 2013). The species forms monogamous pairs and both sexes share the tasks of building the nest, incubating the eggs and caring for the young (DEC, 2009b).

Between 2 to 4 white oval eggs are laid on a lining of decayed wood. Egg incubation takes approximately 24 days, fledging approximately 6 to 8 weeks and finally they become independent within a further 4 weeks. Eastern Long-Billed Corellas reach sexual maturity at 3 to 4 years of age and in captivity they are known to have a lifespan of 20 years (Birdcare. Accessed 11th July 2013b).

Conservation and Legal Status

Little Corella (*Cacatua sanguinea*) and Eastern Long-Billed Corella (*Cacatua tenuirostris*)

Both the Little Corella and Eastern Long-Billed are generally protected under Wildlife Conservation Act 1950 (WC Act), under which all species of native fauna are protected unless declared otherwise by the Minister for the Environment. Neither species is protected under the commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999. There is currently no statutory responsibility on any party to control Introduced Corellas.

Neither the Little Corella nor the Eastern Long-Billed Corella are declared pests of agriculture in the Greater Bunbury Region. The Little Corella is a declared pest of agriculture in the municipal districts of Carnarvon, Greenough, Irwin, Mingenew, Morawa, Mullewa, Perenjori and Three Springs. In these areas Corella populations are secure and damage to agriculture is likely to be a continual problem. Outside the open season area, a damage licence must be obtained from Department of Environment and Regulation (DER) (previously DEC) prior to shooting (DEC 2009a).

Muir's Corella (*Cacatua pastinator pastinator*)

Muir's Corella is listed under Schedule 4 of the WC Act, however, the recovery team recommended delisting of the species on November 8, 2012. This recommendation is reflected on the federal government's Species Profile and Threats (SPRAT) Database (Accessed 11th July 2013,) and in a media release by the DEC (Accessed 11th July 2013) but is not yet reflected in Western Australian legislation.

Muir's Corella is listed as Vulnerable under the EPBC Act 1999. It is endemic to Western Australia. Muir's corella is a declared pest of agriculture under the provisions of the *Agriculture and Related Resources Protection Act 1976* in the shires of Boyup Brook, Cranbrook and Manjimup because it is a grain eating bird. It is on the List of Declared Animals, under category A7, which means a management program outlines the area and conditions under which controls may be applied. As it cannot be killed, non-lethal methods must be used to control the damage (DEC 2008).

Butler's Corella (*Cacatua pastinator butleri*)

Butler's Corella is not listed as Specially Protected Fauna under the WC Act or listed under the EPBC Act. It is a declared pest of agriculture (under the provisions of the *Agriculture and Related Resources Protection Act 1976*) in the northern Wheatbelt, where it has been recorded damaging grain crops and storage facilities, trees, ovals, lawns, power lines and television aerials (Johnstone, 2012). It is endemic to Western Australia.

Recorded Impacts

Nuisance and noise

Introduced species of Corella quickly become a nuisance to humans. They form large flocks that make considerable noise, particularly when attracted to feeding sites and when congregating at day and night roost sites. As the populations of introduced Corellas increase in size, noise and inconvenience problems will continue to grow (DEC, 2009b).

In parts of South Australia, previous monitoring showed that the noise levels generated by the Little Corella flocks exceeded the following recognised standards:

- World Health Organisation guidelines for sleep disturbances and annoyance
- Maximum allowable noise levels for industries in a predominately industrial area under the South Australia Governments Environmental Protection (Industrial Noise) Policy
- Maximum recommended design sound levels for primary and secondary school classrooms under AS/NZS2107 for areas adjacent to certain classrooms, DEH (2007).

Fouling

Introduced Corella droppings can foul trees, washing on clothes lines, foot paths, business stock, recreational areas and vehicles.

Health and Public Amenity

Corellas dig for corms, bulbs and roots, which can result in damage to grassed public playing surfaces, leaving sizable holes in the surface which can be hazardous to users. This potentially presents a public liability insurance risk to the managers of the playing surfaces (Local Government Authorities in many cases) (DEC, 2009b).

Introduced Corellas are known to chew on any item they encounter; the reasons for this are not

known but are likely to include curiosity, beak maintenance and foliage thinning, the latter aiding in predator avoidance (DEC, 2009b).

When roosting, introduced Corellas trim small branches, twigs and leaves from their roost trees. This damage has been recorded in recreation parks and heritage listed street trees. If continued over an extended period of time, this can impact on tree health, increasing the vulnerability to attack from invertebrates and fungal pathogens (DEC, 2009b). Continuous damage can lead to the death of major limbs or the tree itself. Damage to street and park trees can result in maintenance costs such as tree removal, street sweeping and park maintenance. Managing authorities also need to consider, evaluate and manage the risks of falling branches and trees, which can be costly (DEC, 2009b).

Introduced Corellas will also use artificial structures like telecommunications towers as temporary roost sites, causing damage to the cabling which can only be repaired by trained technicians. This causes additional costs to communications operators and therefore potentially also to customers of those services (DEC, 2009b).

Biodiversity and Environment

Introduced corellas cause damage to their roosting trees, posing a long-term risk to tree health (DEC, 2009b).

Introduced Corellas are also immediate and significant competitors with local native bird species that are hollow-nesters, such as parrots, native cockatoos, owls, raptors, some duck species and all three species of listed black cockatoo; Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Baudin's Cockatoo (*Calyptorhynchus baudinii*) and Forest Red-Tailed Cockatoo (*Calyptorhynchus banksii naso*). This impact is likely to increase as the number of mature trees available for nesting declines as a result of clearing for industrial development, agriculture and housing. Introduced corellas will also present a threat to populations of the endemic Western Corella, including the endangered Muirs Corella, if they continue to increase and expand their range (DEC, 2009b).

Hybridising in the wild, introduced corellas are also compromising genetic purity, and threatening the longterm viability of populations of native corellas and galahs. Known hybridisations include Little Corella x Eastern Long-Billed Corella, Eastern Long-Billed Corella x Galah and Little Corella x Sulphur Crest Cockatoo (DEC, 2009b).

Primary Production

Both the Eastern Long-Billed and Little Corellas feed primarily on the ground on seeds, corms, roots and bulbs (DEC, 2009b). They have been recorded eating summer/autumn stock feed (grain), digging up newly planted seeds such as wheat and oats, and pulling up seedlings of blue gums, lettuce, cabbage and other root vegetables. They have also been known to damage irrigation systems used in intensive horticulture by cutting piping or removing fittings, resulting in system leaks (DEC, 2009b). To date, there have been no reports of introduced Corella populations in the South West region causing significant economic damage to agriculture. This is potentially due to the distribution of birds in relation to market gardens and other such enterprises, however if populations continue to expand in size and range, it is likely they will move to areas where significant economic damage could result, especially in terms of horticulture and viticulture (DEC, 2009b).

Introduced Corellas in the Greater Bunbury Region

Introduced Corellas were first observed in the Bunbury area approximately 18 years ago, most likely introduced through escapes and releases from aviaries. Favourable conditions, such as the presence of abundant major food sources like pasture and irrigated turf areas, and access to water has supported the survival and breeding of escaped/released introduced corellas; this has resulted in the growth of local populations.

Unfortunately, verified information regarding the current local flock size, distribution and movement patterns is scarce. The information provided below is anecdotal, taken over the time period indicated.

Current Size of Flock

There is uncertainty regarding whether exchange occurs between the Bunbury and Australind flocks. The recent Perth-based DEC wing tagging project proved that the birds travel greater distances than expected. A recent introduced Corella wing-tagging project run by DEC (now DPaW) has proven that flocks travel further than was expected. During this project, birds being trapped in the suburb of Guildford were later also trapped in the southern suburb of Rockingham. Until this project, it was assumed that the Australind and Bunbury flocks were separate populations. Now it is almost certain that these flocks and the Busselton flock are the same population. However, in order to verify this assumption, a wing tagging project needs to be undertaken in Bunbury, Australind and Busselton to determine whether intermixing occurs, and if so, to what degree.

In 2010, the local introduced Corella population (flock) in the City of Bunbury was estimated to be between 500 and 1000 individuals by staff from DEC's South West Region office.

Knowledge Gap: Size of the introduced Corella population(s) in the Greater Bunbury Region

According to observation of the Bunbury and Australind populations, and anecdotal information from other nearby local governments (City of Mandurah, City of Swan), both species of introduced Corella flock together.

Knowledge Gap: The ratio of Little Corellas to Eastern Long-Billed Corellas in the Bunbury flock(s)

During late June/early July 2013, approximately 350-400 birds were observed roosting in the southern Centrepont carpark (adjacent to Stirling Street); it is not confirmed whether this constitutes the entire Bunbury population.

In early 2012, the Australind population consisted of approximately 400 individuals. Since this time, successful feed-trapping events coordinated by the Shire of Harvey have resulted in approximately 300 birds being exterminated. However, with recruitment of new birds to the flock (from unknown sources), during June 2013, this population remained at approximately 250 individuals.

It has not been confirmed whether any interaction occurs between these two (Australind and Bunbury) populations. However, considering the relatively short distance between the two areas, this is considered likely. Corellas have also been observed in Binningup and are known to reside in

Mandurah; it is possible that exchange occurs between the Bunbury and Mandurah flocks via the smaller populations, such as the Binninup flock.

Knowledge Gap: Recruitment source of the Bunbury and Australind flock(s)

Based upon experiences in the Perth metropolitan area, DPaW has advised that the local population of introduced corellas is likely to continue to grow in size if management measures are not undertaken; if this occurs, it is expected that associated issues and impacts will intensify.

Movement Patterns

Daily movements

Based on observations during 2010-2011, during the day, the local population was thought to divide into 3 separate flocks which occupied the Eaton, Hay Park and Dalyellup areas. At night, the entire population roosted in one location. The roost location was originally Horseshoe Lake, which the flock has since abandoned.

Knowledge Gap: Roosting habits of the introduced Corella population(s) in the Greater Bunbury Region

Seasonal movements

Based on observations during 2012-2013, birds appeared to start pairing up in late May/early June, with the flock alternating between breaking up and re-forming as the breeding season and subsequent dispersal approaches. Between late spring/early summer and late May/early June, the flock congregated at feeding sites in one large group, making this the most effective time of year to undertake coordinated feed-trapping. However it should be noted that movement patterns are not definite, as such any control efforts will need to be flexible in terms of timing.

Knowledge Gap: Breeding times of the introduced Corella population(s) in the Greater Bunbury Region

Knowledge Gap: General movement patterns of the introduced Corella population(s) in the Greater Bunbury Region

Other behaviour

It was noted that in late May/early June 2013, introduced Corellas switched their preferred food source from dry food to fresh bulbs found in grassy areas and paddocks.

Recorded Impacts in the Greater Bunbury Region

The introduced Corella population has caused considerable nuisance in areas of Bunbury, including noise, fouling, defoliation of vegetation and damage to wiring on homes (Exotic Corella Working Group, 2010).

In 2010, the Bunbury Hockey Club experienced fouling of the pitch and facilities as well as damage to speaker cables and the pitch. The Bunbury Turf Club is experiencing ongoing problems, incurring damage to the trotting track and facility wiring and equipment (Exotic Corella Working

Group, 2010). At this site, impacts also include fouling of seats, defoliation of internal trees, unbearable noise and spooking of race horses, thereby causing safety concerns for horses and riders. It was estimated that approximately \$12,000 to \$15,000 damage had been caused by introduced corellas at the Bunbury Turf Club during 2010 (Exotic Corella Working Group, 2010)).

In August 2010, a petition signed by 286 residents in the Horseshoe Lake area was tabled at a City of Bunbury Council meeting seeking control of the birds in view of ongoing noise, damage and fouling nuisance concerns.

The City of Bunbury receives ongoing complaints from residents about Corella nuisance, particularly during the warmer months when the birds have re-congregated after breeding.

Locally, introduced Corellas are also raising environmental concerns over damage to potential nest trees, hybridisation with native Corellas, Black Cockatoos and Galahs, and over their competition with native species for habitat and resources.

History of Actions and Management to Date

A summary of key actions to date is presented in **Appendix 2**.

The City of Bunbury received a petition from 286 residents in the Horseshoe Lake area in August of 2010. In response to this, the City established an Exotic Corella Working Group in early 2011 to investigate the issue. Part way through the Working Group's investigations, the then DEC decided to extend Perth-based exotic Corella control programme to Bunbury for a one year trial. The trial was supported by the City of Bunbury, Shire of Harvey and Bunbury Turf Club. Through the programme, a feeding and trapping site was established at the Bunbury Turf Club, resulting in the euthanasia of approximately 60 birds. Based on this result, DEC applied for funding to continue programme but was unsuccessful; the programme was subsequently cancelled in mid to late 2012.

Since this time, the City of Bunbury has continued to research the matter. In January 2013, the Shire of Harvey was successful in applying for a damage licence from DEC and subsequently engaged a contractor to undertake control in the Australind area with approximately 150 birds euthanised between January and July of that year. Like the City of Bunbury, the City of Busselton has experienced ongoing issues with exotic Corellas and has introduced control measures with a degree of success (note: City of Busselton staff were not available during the preparation of this Paper to contribute information regarding their control efforts and results).

In order to establish the extent and severity of the problem in local government authorities around the state, the Western Australian Local Government Association (WALGA) undertook an online survey in April 2013. Responses were received from 23 authorities, with ten respondents citing experiencing problems resulting from introduced corellas. Of these ten authorities, five (three from the southwest and 2 from the metropolitan area) were experiencing problems with Corellas, while five (one from the southwest and four from the metropolitan area) had issues with both Corellas and Rainbow Lorikeets. The survey design did not allow responses for introduced Corellas and Rainbow Lorikeets to be differentiated so the following summary of results pertains to both species: Noise complaints and damage to property were cited as the issues of most concern, with a total estimate of \$155,000 being expended on repair work and a further \$22,000 on control work between the ten local governments experiencing problems. According to survey respondents, the most damage occurred during the period from October to April.

Lessons Learnt from other local efforts (particularly Shire of Harvey, City of Busselton and DEC)

Information in the following section has primarily been provided during discussions with external stakeholders during June 2013. The relevant source is cited for each point.

- Introduced Corellas are careful and intelligent birds. ‘Spotter’ birds fly ahead of the main flock and appear to assess the safety of feeding sites; they signal to the main flock whether it is safe to land and feed. If anything looks different or out of place, the birds will not land. This is particularly relevant to the identification and management of feed-trapping sites.
- Best results will come from a coordinated approach between local governments. In the southwest this includes Harvey, Bunbury, Busselton, Mandurah and Capel.
- Ongoing funding for control options likely to be required due to recruitment of new individuals to population (source of incomers yet unconfirmed); e.g. the Busselton flock increased from approximately 200 birds to an estimated 400 birds in one.
- Wing-tagging undertaken by DPaW has shown that birds travel further than was initially anticipated. In the study, birds initially tagged in Guildford were later tagged in Rockingham (approximately 47 km direct distance), while birds from the Busselton population are known to travel approximately 20 km between Busselton townsite and Amelia Park (near Vasse).
- Using multiple feed-trapping sites is labour and resource intensive and often causes additional problems without increasing the likelihood of successful control events. It is impossible to determine which feeding (trapping) station the birds will go to on the proposed trapping day, as such multiple trained personnel and additional equipment is required in order to ensure the ability to undertake trapping wherever the birds land.
- One single feed-trapping site is recommended, with one or two ‘backup’ sites identified for use in case the preferred site cannot be used. The site should be secluded (i.e. out of public view) and lockable in order to control of access. Feeding needs to be consistent, occurring at the same time each day with no days missed.
- DEC found it is easier and quieter to use whoosh (elastic or rubber fired nets) rather than cannon nets in an urban situation. Whoosh nets are significantly quieter, meaning they can be used at all times, and are less likely to scare the birds. It was found that after the initial firing (and trapping of some of the flock), the nets could be reset; if that trapper was patient, the remaining birds would re-land and start feeding again allowing a second trapping opportunity. Also whoosh nets were preferred by DEC as the technique is very easy to teach, and unlike the cannon net, no firearms license is necessary to implement its use.
- Roost shooting is not recommended until the population has been reduced through other methods to 40-50 individuals. Recent local roost-shooting attempts in populations larger than this size have not been successful as after the first shot(s), the birds will not re-land.
- If roost shooting is appropriate, shooters should aim to break up breeding pairs, as the male has to feed the female in order for her to support the chick. In order to do this effectively, camouflage clothing and patience is required. This approach is labour intensive, as such the yield for effort needs to be constantly assessed.
- Roost shooting of smaller populations is only recommended if there is good access to the site and a clear, easily accessible ‘drop zone’. Permits from DER and the WA Police will be

required.

- In preparation for establishing a feed-trapping site, local government staff (such as parks and gardens staff) should record observations of birds roosting and/or feeding. This information will help form a picture of the size of the flock and its patterns of behaviour.
- In consultation with DPaW, FPS have developed a remote-controlled automated feeder with motion-sensor cameras attached so that bird numbers can be estimated and bird movement and feeding patterns can be observed without the need for onsite personnel, which may spook the flock. This also removes the need for personnel to refill feed stations, enables the optimum time of day to trap any given population to be determined, and ensures that the feeding site appears the same to the Corellas on both non-trapping and trapping days.
- Discouraging birds from roosting within town centres was undertaken in the City of Onkaparinga on the Fleurieu Peninsula in South Australia. During this project it was found that "...shooting of 'spotter' birds followed by regular disturbance of flocks congregating in the town using starter pistols and bird frite largely prevented large numbers of birds from congregating in the town itself. It was evident that Little Corellas had come to associate the flashing light of the ranger's patrol vehicle with danger and moved on when this vehicle approached. Little Corellas did however roost in the Onkaparinga Gorge National Park over Summer." (QED Pty Ltd, 2003). Similar outcomes have been experienced at the City of Mandurah, where bird dispersal is a key component of the management programme. Birds are actively moved on from identified 'high value assets' and allowed to roost in areas where any nuisance will not affect nearby residents and any damage caused will not compromise human use. This approach is combined with shooting to continually reduce bird numbers.

Brief summaries of recent control efforts at other Local Government Authorities

City of Swan

The City of Swan are experiencing ongoing problems. They initially grossly underestimated the size of the flock and therefore the effort that would be required to undertake effective control, and also had significant opposition to control from residents in the Guildford area. As such, they subsequently handed control back over to DEC (now DPaW), along with funding towards the project.

City of Mandurah

The City of Mandurah have based their approach on that of several municipal councils in the eastern states, implementing a combination of dispersal techniques to protect high-value assets such as key playing fields and A-Class flora reserves, and culling. Culling is undertaken by shooting with a shotgun during roosting at night and with an air-rifle during the day when the birds are ground-feeding on grass fields. Over the last 9 months approximately 300 birds have been killed, reducing the current population to approximately 100 Little Corellas and 30 Eastern Long-Billed Corellas. City of Mandurah reports that the approach has been highly effective at reducing bird numbers while at the same time, minimising resident concerns or complaints over the culling technique – they city received more complaints regarding ethical treatment of animals when they were (unsuccessfully) attempting to trap the birds than they have since commencing the shooting programme.

Now that the population has been substantially reduced, the weekly programme involves two day patrols of 3 hours each (including shooting) and one night patrol of 4 hours.

City of Rockingham

The City of Rockingham has undertaken some Corella control work, but no coordinated programme has been developed as yet. City of Rockingham casual staff have also recently been assisting with assessing the extent of their problem and identifying potential trapping sites.

Shire of Harvey

In order to control a flock of approximately 400 birds in the Australind/Treendale area, under their current damage control licence the Shire of Harvey has undertaken 6 trapping events over the last approximately 7 months, with the last carried out on 11 July 2013. Produce Link in the Australind light industrial area was identified as an ideal trapping site. Between 70 and 140 birds were trapped at each event except for April and May events, which resulted in 12 and 0 birds respectively (purportedly due to there being spilled grain around the trapping site, meaning that birds had access to feed outside of the trapping area). One hundred thirty eight birds were trapped and exterminated in the first trapping event; other successful trapping events since then have resulted in around 70 birds being taken at a time. Similar experiences of the first trapping event resulting in the highest yield have also been observed in other trapping programmes. It is possible that the timing of the first Australind trapping event (January) also contributed to the high yield as this is when the birds form the largest flock.

Despite good results at trapping events and a total take of approximately 370 birds, the local population remains at around the same size (i.e. approximately 300 birds). A drop in the flock size from 400 to approximately 250 birds was initially observed. However numbers soon increased again. As a complete breeding cycle had not occurred to increase bird numbers again, it is assumed that the 'new' birds are the result of recruitment from other flocks. While the population remains approximately the same size, the number of complaints received by the Shire has dropped significantly; concurrently the number of residents calling to report observations and information about the local flock has increased.

There have been no observations to date of introduced Corellas displacing local native bird or fauna species in the Shire.

In June 2013, the Shire intended to apply for a new licence to enable control to continue, and were also scheduling a planning meeting to discuss results of the programme to date and consider options for improving results. The Shire has received numerous offers from local residents to assist with monitoring of the local population. However, as at July 2013 no action had been taken regarding this. The Shire are very interested in working in collaboration with the City of Bunbury and other interested nearby local governments, both in on-ground aspects of a programme and in lobbying for more effective legislative controls.

Objectives, Strategies and Actions

Objectives

Based on discussions with stakeholders, several key strategies and actions are considered necessary in order to maximise the effectiveness of any on-ground control efforts. These are discussed here in detail and presented in a summary table in **Appendix 3**. The DPaW is currently developing a standard operating procedure (SOP) for Corella control. It is anticipated that much of the following information will be included in the SOP.

On-Ground action objectives

1. Reduce impacts of introduced corellas on the local community and natural environment

Associated strategies

Collaboration

As there is a high likelihood that exchange of individuals occurs between the Bunbury, Australind, Busselton and Vasse flocks, any control efforts should be undertaken collaboratively between these local government authorities. Other affected stakeholders, such as the Bunbury Turf Club and Bunbury Trotting Club, and advisory stakeholders such as the Department of Agriculture and Food, Western Australia (DAFWA) and DPaW should also be engaged to increase the potential for synergies in control efforts and to enable two-way transfer of information, advice, results and monitoring data.

Funding

Ongoing funding for control options are likely to be required due to recruitment of new individual Corellas to the local population (source of incomers as yet unconfirmed but suspected to be the Australind and Busselton flocks).

Implement 'best practice' control methodologies

While funding is no longer available to DPaW to continue research into the behaviour of local populations and improve control methodologies, it appears that the current methodologies are sufficiently effective when implemented according to specific requirements; which are detailed as follows:

Trapping

- Control efforts primarily to be undertaken between November and April when it appears that the local population forms one or few large flocks, enabling a greater capture result for less input
- Control (feeding/trapping) site(s) to be secure (i.e. lockable), restricted to public access, have one entry/exit point for the trapper to gain access, provide a flat, open bird-landing surface, ideally provide grassy feed areas with trees and water nearby
- Several feeding/trapping sites to be identified with one and the remainder 'ready to go'; trapping can generally only be undertaken once or twice a month at any given trapping site before the birds stop coming to the site. At this time, the site needs to be 'rested' for approximately 3-4 weeks (i.e. consistent feeding maintained but no trapping undertaken) before the birds will start to revisit. Having several alternative sites to use in the event of birds avoiding the current/known trapping site will enable seamless transition from one site to the next, ensuring maximisation of the optimum trapping months.
- Not using multiple feeding/trapping sites concurrently within the one local government area: this is labour and resource intensive and often causes additional problems without increasing the likelihood of successful control events, because it is impossible to determine which feeding/trapping station the birds will go to on the proposed trapping day.
- In preparation for establishing a feeding/trapping site, local government staff could record observations of birds roosting and/or feeding to help build data around the size of the flock and its patterns of behaviour.
- Feeding to be undertaken consistently at the same time each day with no days missed in order to establish consistent bird feeding patterns. If days are missed, the birds will look

for alternative food sources. Once this happens it can take up to a month or longer to encourage them to return to the feeding site.

- Appearance of feeding/trapping site to be consistent in order to minimise 'spooking' of the birds. This can be undertaken through the use of dummy nets, remote control feeders, etc.
- Trapper to use alternate means of accessing the site (i.e. have access to multiple vehicles, park vehicles far from site and walk to trapping area, use sites with onsite facilities such as sheds which vehicles can be parked in during trapping), and use camouflage and disguise of their vehicle and person where required in order to minimise recognition by the birds. It has been shown repeatedly that the birds become familiar with vehicle(s) used by trappers, and once this happens, if 'spotter' birds see the vehicle at the feeding site, they will raise an alarm to discourage the flock from landing there.
- Trappers to be patient when trapping in order to achieve the greatest kill: if only a small proportion of the flock is trapped while a large proportion watches on, the untrapped birds have effectively been taught what to avoid and will be suspicious of the trapping site and potentially of the trapping equipment in the future. As such, it is better to wait until a large catch can be made; this will require patience on the trapping day.

Roost Shooting

- Roost shooting not recommended until the population has been reduced through other methods to 40-50 individuals. Recent local roost-shooting attempts in populations larger than this size have not been successful as after the first shot(s), the birds will not re-land.
- If roost shooting is appropriate (i.e. for smaller populations), it is only recommended if there is good access to the site, and a clear, easily accessible 'drop zone'. Permits from DPaW and the WA Police will be required.

Day shooting

Shooting undertaken with an air-rifle during the day when the birds are ground-feeding on grass fields. A firearms licence is required and police need to be notified before any shooting can take place. Shooting in these circumstances can be done in such a way that multiple birds are killed simultaneously with instant death.

Dispersal

Using spotlights at night and options such as 'Bird Frite' during the day, birds are discouraged from roosting in identified high value assets such as nature reserves and playing fields. They can also be moved on from shopping centres, town centres and areas where noise and other nuisance issues are a particular concern. This approach has been effective in several shires in South Australia (e.g. City of Onkaparinga) and at the City of Mandurah.

Monitor success of works

The following key performance indicators should be measured in order to determine the relative success of any control programme:

- Changes in introduced Corella numbers and behaviour (taken from motion sensor camera

data and anecdotal observation of birds at feeding and roosting sites).

- Number of birds trapped and killed in each trapping event
- Number of Little Corellas and Eastern Long-Billed Corellas trapped in each trapping event. This information could be used to strengthen the case for delisting the Eastern Long-Billed Corella from the *WC Act* and/or having Acclimatised Fauna Notices issued for both species
- Flock movement patterns, particularly regarding seasonal influences such as when the largest flocks form. This will help ensure that trapping events occur when the most birds are likely to be trapped. Currently this appears to be between the months of November and April however this needs to be confirmed. If a collaborative approach is undertaken, a coordinated regional database could be established, with each local government authority contributing information regarding their flock(s) size and movement, providing insight into the introduced Corella issue at the larger scale.

Strategic objectives

1. Support continual improvement of introduced Corella management

Associated strategies

Address knowledge gaps

The following knowledge gaps have been identified during the preparation of this paper:

- Breeding times of the introduced Corella population(s) in the Greater Bunbury Region
- General movement patterns of the introduced Corella population(s) in the Greater Bunbury Region
- Roosting habits of the introduced Corella population(s) in the Greater Bunbury Region
- Recruitment source of the Bunbury and Australind flock(s)
- The ratio of Little Corellas to Eastern Long-Billed Corellas in the Bunbury flock(s)
- Size of the introduced Corella population(s) in the Greater Bunbury Region

Restrict alternative food sources

- Alternative food sources to those provided at the feeding-trapping site, such as spilt grain (e.g. at stock feeders and at the Bunbury Port if/when grain export commences) and deliberate feeding by local residents to be restricted as much as possible to limit bird feeding options
- Discourage feeding of birds by residents through the development and implementation of an education campaign and/or creation of a local law to fine non-compliant individuals

Support appropriate recognition of corellas as pests

The formal recognition of bird species as a pest in urban and/or agricultural areas reduces compliances issues around implementing control activities and also has the potential to provide more opportunities for control to be undertaken. The following options are currently available under existing legislation:

Wildlife Conservation (Acclimatised Fauna) Notice 1992

Notices issued by the DER under the Wildlife Conservation Act by the Minister under section 14. According to the Government Gazette (1992), "...*"acclimatised fauna" means fauna living in a wild state as a result of being released or escaping from confinement or because it is the immediate or remoter offspring of fauna that has been released or has escaped from confinement.*" Both the Little Corella and the Eastern Long-Billed Corella meet this definition in the Greater Bunbury Region.

Under an Acclimatised Fauna Notice, open season (subject to relevant conditions) is declared within specified cadastral divisions (such as the south-west division). A precedent has been set in the Perth Metropolitan Area with such a notice issued for both the Rainbow Lorikeet and Sulphur-crested cockatoos (eastern sub-species) in September 1992.

Declaration under the Biosecurity and Agriculture Management (BAM) Act 2007

Section 11 of the BAM Act allows the Minister for Agriculture and Food to declare an organism permitted (as opposed to prohibited; as the introduced Corellas are already present in the state, they would be declared as 'permitted', not 'prohibited'. A permitted organism may also be a declared pest under section 22. Regulations 7 and 8 describe control categories that can be assigned to declared organisms. As stated in Section 22 of the BAM Act:

"The Minister may declare that any other organism of a kind specified or described in the declaration is a declared pest for an area if there are reasonable grounds for believing that the organism —

(a) has or may have an adverse effect on —

- (i) another organism in the area; or
- (ii) human beings in the area; or
- (iii) the environment, or part of the environment, in the area; or
- (iv) agricultural activities, fishing or pearling activities, or related commercial activities, carried on, or intended to be carried on, in the area;

or

(b) may have an adverse effect on any of those things if it were present in the area, or if it were present in the area in greater numbers or to a greater extent".

Therefore, due to their adverse effect on other organisms, human beings and the environment, introduced Corellas could be declared under Section 22. They would then most likely be assigned to category 'C3 Management' under Regulation 7. This Management category allows for the regulation of import, duty to report, keeping, supplying, breeding, movement and control of the organism. Some of these activities may be undertaken under permit. While the BAM Act is administered by the DAFWA, it is likely that the DPaW or the DER would be nominated as the 'coordinating agency' as in this region, Corellas primarily cause social and environmental impacts rather than agricultural impacts.

Benefits of having a species declared under the Act are:

- the ability to raise funds for control (undertaken through a recognised biosecurity group)
- the ability to regulate its keeping, supply, breeding and movement

As it is unlikely that DER or DPaW will have funds available to enable them to take the lead on introduced Corella control in the Bunbury region in the near future, it would be reliant on the City of Bunbury (and/or other local governments) in their application for declaration to detail their proposed control efforts, and specify where support from either the coordinating agency (most likely to be DPaW) or the contributing agency (DAFWA), would be required, such as under import, e.g. the City would require the assistance of DAFWA to help ensure that border controls are maintained, as this is not something that the City could reasonably do. City ranger staff could be deputised under the Act and subsequently be allowed to undertake compliance inspections (such as of aviaries) and issue notices.

It should be noted that while there would be some benefit in having introduced Corellas declared under the BAM Act, this will provide no assistance in the control of free-feeding of the birds by members of the public.

2. Address fundamental cause(s) of the issue, if possible, to prevent it from arising again in Bunbury or elsewhere

Associated strategies

Support improvement in domestic trade and keeping of corellas

- In cooperation with other nearby local government authorities, lobby WALGA to raise the issue with the state government on behalf of affected local government authorities, with an aim to achieving recognition of the extent of the problem and ultimately enable strengthen the ability of local governments to respond
- In addition to the legislative options outlined above, develop and deliver a communication program to educate local residents about the birds, their impacts and the City's proposed control efforts. Ideally this approach would be undertaken concurrently with adjoining and nearby local government authorities to ensure consistency in the message being conveyed.

Local Law

The City of Bunbury could develop a Local Law specifying control requirements for the keeping and breeding of introduced Corellas, and penalties for non compliance. Without a more coordinated legislative approach, such as could be achieved through measures outlined above, compliance with such a law would be difficult to maintain, however it would provide consistency with any control efforts and communication/education program that the City undertook in the future.

Monitoring and Evaluation of Objectives, Strategies and Actions

See the 'Objectives, Strategies and Actions' section for a list of suggested key performance indicators to be monitored to determine the effectiveness of the control effort. In addition to these, the following aspects of any control programme should be monitored in order to determine its cost-effectiveness:

- Hours spent on the programme including project management, administration, on-ground activities and monitoring
- Total dollars spent on implementing the programme
- Kill rates (to be tracked with hours and dollars spent)

Regular liaison with DPaW and other experts should also be undertaken to ensure that methodologies implemented by the City are consistently aligned with best practice control

techniques and updated to incorporate the results of new research.

Estimates of Costs of methodologies

Feeding/trapping

Cost estimates for the following management control items will need to be determined through the contractor quotation process.

- Hire of automatic feeder with motion sensor camera: \$X/week ex GST (needs to be left at the site for the entire trapping period, i.e. for the 6 month period from November to May)
- Trapping day: minimum 4 hours of operator time at \$X/hr, plus travel time. Up to three operators may be required depending on the trapping site
- Feed; approximately 4-5 bags of feed needed twice weekly per feeder (cost to be confirmed with suppliers)
- Disposal of carcasses (cost to be confirmed by CoB staff)
- Download and analysis of data from monitoring cameras – to be undertaken by CoB staff, otherwise charged at the operator rate of \$X/hour
- Rough estimate of \$XXX to undertake control of the Bunbury population and coordinate an education program of residents.

Dispersal and shooting

A relevant contractor may need to come and tour the CoB with CoB staff to help determine the extent of the issue and design an appropriate project. Through discussions with external stakeholders, patrolling is recommended to take place every second night for the first 2-3 weeks.

- Two x 3-hour day patrols and one x 4-hour night patrol per week at \$X/hour excluding GST, including consumables (projectiles, etc)
- Travel time at the standard hourly rate

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Appendix 1. Timeline of actions in response to Exotic Corella issue.

- **Circa 1995:** Introduced corellas were first observed in the Bunbury area
- **Circa 2008-09:** First record of introduced corellas breeding in local area (Dalyellup) was observed
- **3 August 2010:** Petition signed by 286 residents in the Horseshoe Lake area regarding introduced corellas was tabled at a City of Bunbury Council meeting, accepted and referred to the Bunbury Environment and Sustainability Advisory Committee (BESAC) for consideration and report.
- **12 August 2010:** BESAC initially briefed on the issue. Thorough consideration of the issue by the advisory committee was not possible during subsequent meeting rounds for a number of reasons.
- **22 November 2010:** BESAC proposes a recommendation to council on the matter via email following the receipt and consideration of a discussion paper from the advisory committee's executive officer. The recommendation is to form an Exotic Corella Working Group.
- **December 2010:** Bunbury Hockey Club complaint received regarding fouling of the pitch and speaker cable damage at carnival
- **14 December 2010:** Bunbury City Council resolves to form an external working group
- **Early 2011:** Working group formed. Members include representatives from the then Department of Environment and Conservation, Department of Agriculture and Food (WA), Bunbury Turf Club, Shire of Harvey, Shire of Dardanup and City of Bunbury
- **2011:** Subsequent working group meetings
- **2008 - 2011:** Illegal poisoning events
- **5 July 2011:** DEC applies for funding to extend its Perth-based introduced Corella control program to the Bunbury area
- **5 August 2011:** DEC receives funding to extend its introduced Corella control program
- **Nov/Dec 2011:** City provides DEC with \$1559.50 to trap corellas. 62 birds were trapped at a cost of \$27.74 per bird (excluding city staff coordination/liaison/meetings).
- **31 October 2011:** After a 12 month trial programme, City of Busselton Council resolves to continue with a Corella Control Programme primarily utilising feeding and trapping methodology
- **November 2011, December 2011 and January 2012:** Trapping event – encouraging corellas to feed at the Bunbury Turf Club
- **January 2012:** Trapping and killing event that was scheduled to occur at the Bunbury Turf Club was cancelled due to Corellas no longer coming to feed at the site.
- **2011 to 2012:** DEC Corella control program – 12 month event involving baiting and trapping activities using a remotely activated sling net at the Bunbury Turf Club. In total 63 corellas were culled in the program.
- **September 2011:** last working group meeting; ceasing of CoC involvement in introduced Corella control

- **Mid to late 2012:** DEC funding ends
- **April 2013:** WALGA releases online Corella and rainbow lorikeet survey to determine extent of issue for local governments

Appendix 2. Objectives, Strategies and Actions summary table

Objective	Strategy	Action
1. Reduce impacts of introduced corellas on local community and natural environment	1.1 Undertake works on a collaborative basis with key stakeholders (if possible)	1.1.1 Liaise with key stakeholders to determine whether a collaborative approach is feasible
	1.2 Coordinate control of local corella flock in accordance with DPaW recommended methodology	1.2.1 Obtain damage license from DER to undertake corella control
		1.2.2 Appoint contractor to undertake control activities
		1.2.3 Select trapping site/s in conjunction with contractor and partner organisations (if any)
		1.2.4 Support contractor in undertaking control activities
	1.3 Funding to enable effective control	1.3.1 Ensure ongoing funding is available
	1.4 Monitor success of works	1.4.1 Establish corella population and impact baseline
		1.4.2 Identify key performance indicators
		1.4.3 Conduct monitoring post-control activities
2. Support continual improvement of Corella management	2.1 Address knowledge gaps	2.1.1 Conduct wing tagging of corellas and follow up survey to determine whether the Bunbury and Australind populations intermix
		2.1.2 Conduct surveys to determine breeding times, roosting habits, movement patterns
		2.1.3 Conduct wing tagging and surveys to determine recruitment source(s)
	2.2 Reduce feed sites	2.2.1 Introduce local law to control feeding of corellas
		2.2.2 Introduce education campaign

		concerning corella feeding problems
	2.3 Support appropriate recognition of corellas as pests	2.3.1 Lobby WALGA to advocate for: -listing of corellas as declared pests under BAM Act -listing of corellas as acclimatised fauna under Animal Welfare Act -de-listing of eastern long-bills under Wildlife Conservation Act
3. Address fundamental cause(s) of the issue, if possible, to prevent it from arising again in Bunbury or elsewhere	3.1 Support improvement in domestic trade and keeping of corellas	3.1.1 Lobby WALGA to raise issue with state govt on behalf of affected LGAs
		3.1.2 Introduce local law to control keeping and breeding of corellas